July 2014

Active U.S. Patents

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MORGAN CONSTRUCTION COMPANY

ACTIVE U.S. PATENTS

AS OF 01 MAY 1990
01 MAY 1990

THIS BOOK CONSISTS OF THREE MAJOR SECTIONS:

1. A REFERENCE LIST WHICH BREAKS DOWN THE ACTIVE U.S. PATENTS BY COMMON SUBJECT MATTER, LISTED ALPHABETICALLY BY THAT SUBJECT NAME

2. A LISTING OF PATENTS BY INVENTOR LISTING ALL OF THE ACTIVE U.S. PATENTS CREDITED TO EACH INVENTOR, LISTED ALPHABETICALLY BY INVENTOR'S NAME

3. A COPY OF THE FIRST PAGE OF EACH ACTIVE U.S. PATENT, IN DOCKET NUMBER ORDER

26 Jan 1962
Rev.
18 Sep 1962
01 May 1963
01 Mar 1965
01 Jul 1968
01 Feb 1978
01 Feb 1982
01 Feb 1985
01 May 1990
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Inventors:

- Hill, W.J.
- Wynn, W.R.
- Klusmier, K.L.
- Starvaski, R.R.
- Woodrow, H.E.
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End of report. 122 Details encountered.
INVENTOR  DOCKET TITLE

ALEXANDER, F.A.  00586 MEANS AND METHOD OF HEATING AND HANDLING LONG COILED BILLET ROD FOR ROLLING 588X GAS TREATING APPARATUS

ANDERSON, R.A.  00597 SWITCH FOR CROPPING AND SAMPLING FRONT AND BACK ENDS OF BAR

BJORK, J.A.  00736 MEANS FOR LUBRICATING ROLL NECK/SLEEVE INTERFACE OF OIL FILM BEARING

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BRICKET, R.A.  00828 COOLANT SEAL FOR ROLLING OIL FILM BEARING

BRODEUR, R.R.  00641 VERTICAL ROLL CHANGING APPARATUS

BROUWER, W.  00678 ALIGNMENT APPARATUS FOR ROLLING MILL ROLLER GUIDE

DIVIRGILIO, R.F.  00828 COOLANT SEAL FOR ROLLING OIL FILM BEARING 00859 D.F. SEAL 00862 DOUBLE JOINTED COOLANT SEAL

DUFRIES, R.W.  00839 CONTACTLESS MASS FLOW CONTROLLER

FONTAINE, H.  00597 SWITCH FOR CROPPING AND SAMPLING FRONT AND BACK ENDS OF BAR

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Gould, D.E.  00648 MULTI-GROOVE NO-TWIST MILL ROLL MOUNTING
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GROTEPASS, J.  00656  PROCESS FOR FORMING FERROUS BILLETS INTO FINISHED PRODUCT

HAUCK, A.      00608  DEVICE FOR DIVIDING THE WIRE ROD INSIDE A COIL REFORMING CHAMBER

HILL, W.J.     00559  MATERIAL HANDLING APPARATUS
                  00563  MAGNETIC INVERTER
                  00564  TRANSFER APPARATUS
                  00566  MATERIAL HANDLING APPARATUS
                  00614  MAGNET HOLDER FOR MATERIAL HANDLING APPARATUS
                  00625  INFINITE END ALIGNING
                  00631  METHOD OF ACCUMULATING BARS PRIOR TO FORMING INTO BUNDLES
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KINNICUTT, R.    664A COIL INVERTER

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SHORE, T.M.  00822 SYSTEM FOR PRODUCING HIGH TOLERANCE RODS WHILE SIMPLIFYING LAYING HEAD CONT

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ABSTRACT OF THE DISCLOSURE

A rolling mill having a pass line defined by work rolls mounted in cantilever fashion on the ends of parallel pairs of roll shafts, with successive pairs of the roll shafts being disposed angularly to each other, and with each pair of roll shafts having roll parting adjustment means associated therewith for symmetrically adjusting the work rolls in relation to the pass line.
In a rolling mill, a rotatable laying pipe having at least one curved tubular pipe section with entry and exit ends. Replaceable tubular liner members are arranged in end-to-end relationship in each pipe section. Retainers are provided at the entry and exit ends of the pipe sections for retaining the liners in place during operation of the laying head.
An apparatus for propelling a product length moving axially along a given path. The apparatus includes endless flat-surfacEd flexible chains positioned on either side of the path. Each chain is supported on a set of spaced sprockets with the rotational axes of the sprockets supporting one chain being offset along said path relative to the rotational axes of the sprockets supporting the other chain. A piston and cylinder unit is employed to move one chain towards the other so as to grip the product length passing therebetween, and the chains are driven at a linear speed which is at least equal to that of the product length passing therebetween.

1 Claim, 8 Drawing Figures
A method and apparatus for coiling an axially moving product length. The apparatus including a laying head operating to form the product length into a series of rings which are deposited on an underlying platform within an annular space defined by an inner cylindrical core element and an outer container structure. The core element is comprised of an inexpensive flexible material and is supported during coil formation by an expandable shaper located by means of a centering pin on the platform. The outer container structure is movable between an operative position surrounding the core element, and an inoperative position permitting lateral removal of the platform and a completed coil formed thereon beneath the laying head.

The method encompasses the operation of the apparatus referred to above, and additionally includes a packaging operation, the initial step of which involves replacing the expandable shaper with a multi-sided brace, the corners of which bear against the inside of the core element. The outer surface of the coil is wrapped, again preferably with an inexpensive flexible material, and a plurality of retaining straps are applied to tie the entire package together. The location and number of retaining straps preferably coincides with the location and number of the corners of the multi-sided brace. The invention further encompasses the resulting packaged coil.

8 Claims, 7 Drawing Figures
MATERIAL HANDLING APPARATUS


Filed: Dec. 22, 1971

U.S. Cl. 214/1 PB, 53/26

FOREIGN PATENTS OR APPLICATIONS
1,074,496 1/1960 Germany 214/6 S
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ABSTRACT

An apparatus for handling elongated elements which includes a downwardly sloping ramp along which the elements move laterally into an assembly notch. Alignment devices are provided at either end of the assembly notch for aligning the ends of elements being collected therein. The alignment devices axially adjust the elements by contacting the ends thereof.

3 Claims, 4 Drawing Figures
ABSTRACT

An apparatus for transferring elongated elements from a first location to a laterally disposed second location. The apparatus includes a plurality of transfer members which are pivotally manipulated by operating means in a manner such that an elongated element at the first station is engaged at spaced points along its length by the transfer members and carried along the upper portion of a generally elliptical path to the second location.

4 Claims, 5 Drawing Figures
An apparatus for inverting and transferring a layer or tier of magnetic elongated elements from a receiving station onto an adjacent elevator. The apparatus includes a plurality of electromagnets, each of which is pivotally mounted for movement about a common axis between a first position underlying the receiving station and a second position overlying the elevator. A linkage arrangement is provided for vertically adjusting the pivotal axis of the magnets during transfer of the elements onto the elevator.

7 Claims, 4 Drawing Figures
TRANSFER APPARATUS


Filed: July 21, 1971

Filed No.: 164,601

U.S. Cl. 214/6, 214/6.5
Int. Cl. B65g 57/24

Field of Search 214/6.5, 6 DK, 6 H, 214/6 P, 6 G, 6 A; 271/84, 86, 88

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Primary Examiner—Robert J. Spar
Attorney—Chittick, Pfund, Birch, Samuels & Gauthier

ABSTRACT

An apparatus for transferring elongated elements from a receiving station onto an adjacent carrier. The elements are first arranged in a layer or tier on a plurality of laterally extending support members spaced along the length of the receiving station at a level slightly above that of the carrier. The loaded support members are next extended over the carrier, after which stop members are raised to operative positions protruding between the support members at the receiving station. Thereafter, the support members are retracted, causing the elements to be stripped therefrom onto the carrier.

7 Claims, 16 Drawing Figures
A material handling apparatus which includes a pusher mechanism operating in conjunction with fixed and movable stops to individually separate elongated elements from a batch and to laterally feed each separated element into a given path.

7 Claims, 10 Drawing Figures
A material handling apparatus which includes a pusher mechanism operating in conjunction with fixed and movable stops to individually separate elongated elements from a batch and to laterally feed each separated element into a given path.

7 Claims, 10 Drawing Figures
A material handling apparatus which includes a pusher mechanism operating in conjunction with fixed and movable stops to individually separate elongated elements from a batch and to laterally feed each separated element into a given path.

2 Claims, 10 Drawing Figures
A coupling for connecting fluid services to a housing. The device includes a movable coupling element which is clamped against a mating coupling element attached to the housing as an integral part thereof. Housing conduits communicate with passageways in the mating coupling element, the latter being in communication with the adjacent ends of intermediate passageways in the movable coupling element when the latter is clamped in the operative position. The other ends of the intermediate passageways are connected via flexible conduit means either to remote sources of fluid under pressure or to fluid drains. Seals at the interface between the two coupling elements ensure fluid-tight integrity between the communicating passageways.

7 Claims, 4 Drawing Figures
Means for mounting a work roll on a shaft. A cylindrical collet having at least one tapered surface, either exterior or interior, is pushed into an annular space between the roll shaft and work roll, one or both of these latter components having a reversely tapered surface which cooperates with the tapered surface or surfaces on the collet to provide a self-locking frictional connection. The collet is inserted and withdrawn from the annular space by mechanical or pneumatically operated mechanisms which coact with the collet and the shaft end or work roll.

14 Claims, 7 Drawing Figures
Means for mounting a work roll on a shaft. A cylindrical collet having at least one tapered surface, either exterior or interior, is pushed into an annular space between the roll shaft and work roll, one or both of these latter components having a reversely tapered surface which cooperates with the tapered surface or surfaces on the collet to provide a self-locking frictional connection. The collet is inserted and withdrawn from the annular space by mechanical or pneumatically operated mechanisms which coact with the collet and the shaft end or work roll.
A first pair of rolls preferably of unequal diameter and grooved in a manner to change the cross-sectional configuration of a bar of non-ferrous metal delivered from a continuous casting machine, from a generally trapezoidal section of substantial depth to a wider flattened less asymmetrical section, flat on both sides or flat on one side and concave on the other, and a second pair of rolls having concave grooves which will reduce the flattened bar delivered by the first pair of rolls to a generally symmetrical bar. The successive passes effectively carry out a method of operation which works the loose structure of the continuously cast bar into a more homogeneous fibrous structure.

 claim

 Drawing Figures
METHOD OF MAKING A CONCENTRIC WIRE ROPE ON A DOUBLE TWIST STRANDER


Filed: Mar. 27, 1972

Appl. No.: 238,391

U.S. Cl....................... 57/161, 57/58.52, 57/166
Int. Cl....................... D07b 3/00
Field of Search .... 57/3, 6, 58.49, 58.52, 58.54, 57/58.55, 58.57, 156, 160, 161, 166

References Cited
UNITED STATES PATENTS
3,044,246 7/1962 Schippers........................... 57/58.52

Abstract
The method of making a concentric wire rope on a double twist strander in which the rope is comprised of outer strands and a core strand and in which the lay of the wires of the outer strands is opposite the lay of the wires of the core strand and in the finished rope the length of the lay of the wires of the core strand has been shortened and the length of the lay of the wires of the outer strands has been increased.

5 Claims, 6 Drawing Figures
A process and apparatus for rolling and cooling medium to high carbon steel rod is provided wherein the rod is rolled at high speed and laid in rings directly onto a conveyor at high temperature. Thereafter high velocity hot water is sprayed onto the rings to cool them to a temperature near to but above A3. Transformation is then started while applying air to the rod, and while substantial parts of the rod are transforming, further accelerated cooling is again applied to the rod.

15 Claims, 1 Drawing Figure
Means and method for reheating a very long coiled billet to rolling temperature in a furnace with a moving hearth. The furnace has at its terminal end a heated vestibule in which the coil remains at proper rolling temperature while it is being slowly unwound and delivered to the first stand of a rolling mill.
ABSTRACT
Mechanism for determining and varying the tension present in a rod being rolled as it passes between adjacent stands in a rod mill. The read-out gives an indication enabling the operator to make manual speed adjustment of the rolls to change the rod tension to the desired norm, or through a feed-back device the roll speeds may be changed automatically to achieve the same result. The mechanism operates on the principle of temporarily applying a transverse force moved through a fixed distance against the moving rod. The resistance to this force measured by a load cell and associated meters will give an indication of the then existing rod tension as it moves between adjacent roll stands and an indication of the adjustment to be made in roll speeds to change the rod tension to the desired norm.

7 Claims, 3 Drawing Figures
For use with a regenerative furnace, an apparatus for heating an incoming flow of combustion air while simultaneously cooling the waste gases being discharged from the furnace prior to directing the same to a gas cleaning device. The apparatus includes a regenerative heat exchanger (hereafter referred to as "regenerator") connected in series with a recuperative heat exchanger (hereafter called a "recuperator") between the furnace and the gas cleaning device. Incoming combustion air is directed initially through the recuperator and then through one of the chambers of the regenerator before being admitted to the furnace. Waste gases are passed through the other chamber of the regenerator and then through the recuperator before being directed to the gas cleaning device. The apparatus further includes a valve mechanism for simultaneously reversing the flow of waste gases and combustion air through the chambers of the regenerator.
An apparatus for subdividing an axially moving product length is disclosed. The apparatus includes a pair of shear blades mounted on opposite sides of the path travelled by the product length. The shear blades are rotatable about non-parallel axes, and are arranged to effect a cutting action on the product length. The cutting action occurs along a reference line which intersects the path of product travel and which also bisects the angle included between the rotational axes of the cutting blades. The shear blades are driven continuously by a variable speed drive which is adjustable to equate the peripheral speed of the blade portions cutting the product with the linear speed of the product. The lengths of the resulting subdivided product sections can thus be varied by shifting the point at which the path of product travel intersects the aforesaid reference line and by making a suitable adjustment to the rotational speed of the shear blades.

8 Claims, 4 Drawing Figures
Mechanism consisting of a large driven pulley and a plurality of small rollers aligned along about 90° of the periphery of the driven pulley for changing the direction of rolled rod coming from a rod mill from horizontal to vertical for delivery to a laying reel or other rod collecting mechanism.

The small rollers in one form are carried by pivoted arms mounted on a support and are individually spring-pressed toward the driven pulley permitting acceptance therebetween of the oncoming rod and the application of correct pressure against the rod as it changes direction from horizontal to vertical. In another form, the small rollers are carried by the links of a chain extending along the driven pulley perimeter. The chain is spring-loaded to permit entry of the rod and between the pulley and rollers.

14 Claims, 10 Drawing Figures
ABSTRACT

A double twist wire stranding machine having a removable creel assembly permitting the creel and the exhausted spools of wire to be removed as a unit and to be replaced by another creel having full wire spools already mounted thereon with all individual wires properly in place around their respective guide pulleys and with the wire ends collected and ready for threading into operative position in the strander.

8 Claims, 3 Drawing Figures
SWITCHING MECHANISM FOR CROPPING AND SAMPLING FRONT AND BACK ENDS OF BAR PRODUCT DELIVERED FROM MILL

Inventors: Donald Sieurin, Northboro; Robert Anderson, Worcester, both of Mass.


Filed: July 2, 1973

Filed: July 2, 1973

Appl. No.: 375,759

U.S. Cl. 83/106, 83/288, 83/303, 83/306

Int. Cl. B23d 25/08, B23d 31/00

Field of Search 83/106, 105, 288, 303, 83/306, 307

ABSTRACT
On a rod mill, means for cropping the front and rear ends of the rod and delivering the cropped pieces directly from the shears to a crop box, and including means for dividing the rod, if desired, to produce suitable size coils.

14 Claims, 14 Drawing Figures
A twisting apparatus for use in multi-strand merchant bar and/or wire rod mills. The apparatus includes one twist roll mounted on a fixed housing and another twist roll mounted on a hood which is supported by and pivotally adjustable relative to the fixed housing, the said pivotal adjustment providing a means of varying the twist being imparted to the rolled strand passing between the two twist rolls.
United States Patent

Appl. No.: 750,760
Filed: Dec. 15, 1976

Related U.S. Application Data
Continuation of Ser. No. 497,030, Aug. 13, 1974, abandoned, which is a continuation of Ser. No. 353,496, Apr. 23, 1973, abandoned.

References Cited
U.S. PATENT DOCUMENTS
2,542,237 2/1951 Dewey 134/122
FOREIGN PATENT DOCUMENTS
496,231 11/1938 United Kingdom 239/553.5

Primary Examiner—Robert L. Bleutge
Attorney, Agent, or Firm—Thompson, Birch, Gauthier & Samuels

ABSTRACT
An apparatus for applying a liquid, for example cooling water, to the surface of an axially moving elongated element, for example a hot rolled rod in a rolling mill. The apparatus includes a housing having an interior chamber through which extends a guide assembly. The guide assembly in turn defines a longitudinally extending passageway which is suitably adapted and dimensioned to accommodate movement therethrough of the elongated element. Liquid is admitted into the chamber through an inlet in the housing and is thereafter fed into the passageway through an orifice in the guide assembly. Vanes in the chamber prevent the liquid entering the orifice from swirling about the longitudinal axis of the passageway.

1 Claim, 5 Drawing Figures
MATERIAL HANDLING APPARATUS

Inventor: Donald Sieurin, Northboro, Mass.

Filed: Oct. 18, 1972
Appl. No.: 300,733

U.S. Cl. 198/31 AB, 198/20 R, 198/218, 214/1 P, 214/1 BB
Int. Cl. B65g 47/26

References Cited
UNITED STATES PATENTS
2,364,386 12/1944 Peterson 198/20 X

OTHER PUBLICATIONS
SN 368,952, A.P.C. publication of Cramer.

Abstract
An apparatus for handling elongated elements, for example bar products being delivered laterally from the delivery side of a cooling bed in a rolling mill. The apparatus includes a longitudinally extending assembly device for receiving and temporarily accumulating the elements at a first location. At least two longitudinally extending element conveyors are positioned at other locations spaced laterally from and parallel to the assembly device. A transfer mechanism is employed to carry groups of elements laterally from the assembly device onto one or the other of the conveyors.

16 Claims, 7 Drawing Figures
In a machine having a bearing-supported rotary element, a bearing seal for preventing each of two different fluids used in the operation of the machine from contaminating one another.

10 Claims, 3 Drawing Figures
An apparatus for dividing a continuous series of rings dropping vertically in a helical formation from a delivery mechanism to an underlying collecting device in which the rings accumulate in coil form. The apparatus includes a plurality of pivotal elements which are movable from inoperative positions outside of the path of ring descent to operative positions extending into said path. When thus operatively positioned, the pivotal elements interrupt the further descent of rings into the underlying collecting device. A portion of the strand connecting the rings continuing to accumulate above the pivotal elements to those accumulated in coil form therebelow is located centrally by the operatively positioned elements in the path of ring descent. A cutting mechanism carried by and movable with the pivotal elements then operates to sever the centrally located portion of the connecting strand, thereby permitting the underlying coil to be removed from the collecting device.
APPARATUS AND METHOD FOR ALIGNING ROLLER ENTRY GUIDES IN A ROLLING MILL


Filed: Oct. 13, 1972

Appl. No.: 297,251

Primary Examiner—Milton S. Mehr
Attorney—C. Yardley Chittick et al.

ABSTRACT

An optical device of the type which may be focused along an observed centerline is employed to accurately align roller entry guides in a rolling mill. The optical device is temporarily mounted at a location separate from and preceding that of the roller entry guide to be aligned, with its observed centerline coinciding with the center of the roll pass into which product is to be directed by the guide. By thereafter shifting the focus of the optical device to the guide rollers, the gap defined by the guide rollers can be centered with respect to the observed centerline of the optical device by laterally shifting the entire roller entry guide.

7 Claims, 7 Drawing Figures
AXIAL ROLL ADJUSTMENT MEANS

Inventors: Charles S. Mercer, Worcester; Lewis C. Jennings, Boylston, both of Mass.


Filed: Mar. 8, 1973

Appl. No.: 339,120

U.S. Cl. ................................................ 308/233
Int. Cl. ................................................................ F16c 19/00
Field of Search ...... 308/232, 233, 234, 207 A, 308/189 A, 9

References Cited
UNITED STATES PATENTS
303,813 8/1884 Cousins ................................... 308/9
2,523,310 9/1950 Kirkpatrick .................................. 308/9
3,700,293 10/1972 Dray .................................. 308/9

FOREIGN PATENTS OR APPLICATIONS
265,300 7/1912 Germany .................................. 308/9

ABSTRACT

An apparatus for axially adjusting a work roll in a rolling mill. The apparatus includes an annular piston-cylinder assembly surrounding one end of the work roll. The cylinder is fixed relative to the roll chock and the piston, which is hydraulically actuated for reciprocal adjustment in opposite directions parallel to the rotational axis of the work roll, is connected through a thrust bearing assembly to the roll sleeve, the latter being fixed relative to the work roll and being both rotationally journaled in and movable axially relative to the roll chock.

6 Claims, 1 Drawing Figure
MATERIAL HANDLING APPARATUS


Filed: Jan. 15, 1973

Appl. No.: 323,642

Primary Examiner—Frank E. Werner
Attorney, Agent, or Firm—Thompson, Birch, Gauthier & Samuels

ABSTRACT

For receiving elongated elements, in particular "angles" and the like, an apparatus which includes an inclined surface along which the elements are permitted to slide laterally into a receiving notch. Counterweighted pivotal finger members protrude through slots at the receiving notch. The finger members absorb the sideward force of the elongated elements while at the same time exerting a retaining action thereon which serves to prevent elements entering the receiving notch from turning or flipping. The finger members are designed to recede into their respective slots as each element is removed from the receiving notch, and to thereafter return to their operative positions in preparation for receipt of the next element.

3 Claims, 2 Drawing Figures
CLAMP MEANS FOR MATERIAL HANDLING APPARATUS


Filed: Jan. 26, 1973

Appl. No.: 326,699

U.S. Cl. 214/1 R

Int. Cl. B65g 61/00

Field of Search 214/1 P, 1 PZ, 1 R, 6.5, 214/6 N, 8.5 C, 8.5 P, 8.5 R

References Cited

UNITED STATES PATENTS
3,729,190 4/1973 Harris et al. 271/68 X

FOREIGN PATENTS OR APPLICATIONS
969,527 9/1964 Great Britain 214/6 H

Primary Examiner—Frank E. Werner
Attorney, Agent, or Firm—Chittick, Thompson & Pfund

ABSTRACT

For use with an apparatus for handling elongated elements wherein the elements are initially arranged in a horizontal tier on spaced support members overlying a receiving device such as for example a vertically adjustable elevator, and wherein the support members are subsequently retracted from beneath the elements to deposit the latter on the receiving device, the improvement which comprises a clamp mechanism located at one end of the receiving device, said clamp mechanism being movable from an open inoperative position remote from the ends of the elements being handled to a closed operative position gripping the ends of the elements to thereby prevent the elements from turning or flipping about their longitudinal axes as they drop from the support members onto the receiving device.

5 Claims, 6 Drawing Figures
MAGNET HOLDER FOR MATERIAL HANDLING APPARATUS


Filed: Feb. 5, 1973

Appl. No.: 329,633

U.S. Cl. 214/1 BT, 214/6 FS, 294/65.5

Int. Cl. B66c 1/06

Field of Search 214/1 BS, 1 BT, 1 BH, 1 BV, 214/6 FS, 6.5; 294/65.5

References Cited

FOREIGN PATENTS OR APPLICATIONS

1,186,408 1/1965 Germany

Primary Examiner—Robert G. Sheridan
Assistant Examiner—George F. Abraham
Attorney, Agent, or Firm—Thompson, Birch, Gauthier & Samuels

ABSTRACT

For use with an apparatus for handling elongated magnetic elements wherein the elements are initially arranged in a horizontal tier on spaced support members underlying a receiving device, such as for example vertically adjustable elevator platforms, and wherein the support members are retracted from beneath the elements to deposit the latter on the receiving device, the improvement which comprises a magnet holder located on one side of the receiving device, the holder being movable between a raised inoperative position and a lowered operative position at which energization of the magnet which forms a part of the holder produces a magnetic force which causes the elongated elements to be held upwardly against the holder, thereby preventing the elements from turning or flipping about their longitudinal axes as the support members are retracted. Following retraction of the support members, the magnet is de-energized to drop the elements onto the underlying receiving device, and the holder is then returned to its raised inoperative position. The holder is also rotatable to a laterally remote position to one side of the receiving device.

9 Claims, 6 Drawing Figures
ABSTRACT

In a rolling mill, a pouring reel is disclosed having rotating elements defining an annular space into which a product length issuing from the mill is directed by a curved guide pipe to accumulate therein in cylindrical coil form. The exit end of the guide pipe is axially adjustable between an extended position protruding downwardly into the annular space, and a retracted position thereabove. When at the retracted position, the guide pipe is movable to a laterally remote position to permit vertical removal of a completed coil from the annular space.

6 Claims, 5 Drawing Figures
A coil forming and transfer apparatus is disclosed. The apparatus includes a pouring reel having a coil forming chamber defined by a peripherally notched or relieved coil support plate, an inner core fixed relative to and extending vertically from the support plate, and an outer chamber wall. These components are rotatable in unison during a coil forming operation, with the mill product being directed into the chamber where it accumulates in coil form. The support plate and core are vertically movable in relation to the outer chamber wall to remove a completed coil from the coil forming chamber to an elevated position thereabove. A transfer mechanism is provided adjacent to this elevated position. The transfer mechanism has a plurality of circularly arranged legs with inwardly protruding feet. The legs are movable from inoperative positions spaced radially from a coil at the elevated position, to operative positions radially engaging the coil, with the aforesaid feet located beneath the coil in the peripheral notches of the support plate. Once the legs are operatively positioned, the coil support plate is lowered, causing the core to be withdrawn from the coil, and further causing the coil to be deposited on the feet of the operatively positioned legs. The transfer mechanism is movable to another location at which the coil is removed therefrom onto associated handling equipment.
ABSTRACT

In a rolling mill, an interlocking labyrinth-type seal for a roll neck which is rotatably supported in a chock assembly. The seal includes an inner first sealing element which rotates with the roll neck, an outer second sealing element which is fixed in relation to the chock assembly, and a third sealing element which is carried on and movable axially along one or the other of the aforesaid first or second sealing elements. The sealing elements have axially and/or radially spaced flanges and surfaces which cooperate to define an interlocking sealing labyrinth for preventing the escape of lubricating oil from the bearing, while at the same time preventing the bearing and lubricating oil from becoming contaminated with rolling lubricant cooling water, mill scale, dirt, etc.

7 Claims, 2 Drawing Figures
An apparatus for aligning the ends of elongated elements moving laterally along a given path. The apparatus includes a first alignment head on one side of the path, and an elongated draw bar extending transversely in relation to the path. A second alignment head is arranged in opposed relationship to the first alignment head and is adjustably positioned along the length of the draw bar to accommodate batches of elongated elements which have previously been cut to different lengths. A drive is connected to and operates to impart opposite reciprocal motion to both the first alignment head and the draw bar, thereby causing the first and second alignment heads to reciprocally move towards and away from each other to contact and align the ends of the laterally moving elongated elements.
BUNDLE FORMING APPARATUS


Filed: Nov. 29, 1974

Appl. No.: 528,135

Related U.S. Application Data


U.S. Cl. 100/212; 100/7;

Int. Cl. B30B 5/04

Field of Search 214/6 DK, 6 H, 6 D, 214/6 N, 6.5; 100/7, 212; 53/148, 162, 236

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3,427,959 2/1969 Keil 100/212
3,531,001 9/1970 Lunden 214/6 DK
3,599,807 8/1971 Hedrick et al. 214/5 DK

Primary Examiner—L. J. Paperner
Attorney, Agent, or Firm—Thompson, Birch, Gauthier & Samuels

ABSTRACT

An apparatus for receiving a plurality of elongated elements and forming the same into a densely packed assembly. The apparatus may be mounted on a carriage which extends longitudinally in a direction parallel to the lengths of the elements being handled, and which is movable laterally along tracks or rails. The apparatus includes a plurality of pairs of cooperating arms spaced along the length thereof. Each pair of arms has a chain associated therewith, the latter being supported on appropriately positioned sheaves carried by the arms. One of the arms of each pair is preferably movable relative to the other arm between an open position to laterally receive the elongated elements therebetween for deposit on the aforesaid chains, and a closed position. The chains are initially adjusted to form bridging catenaries onto which the elements are transferred. Thereafter, the chains are gradually slackened by reciprocally operable mechanisms to form slings into which the elements introduced between the arms are received. Upon closure of the movable arms, the chains are tightened, thereby densely packing the assembled elements. The carriage is then moved laterally to another location where the densely packed elements are strapped or tied into bundle form, and then to still another location where the bundle is transferred to another handling apparatus.

6 Claims, 11 Drawing Figures
An apparatus for and a method of handling a product length which has been formed into a continuous series of rings, and which because of previous manufacturing operations, the rings making up the relatively short front and tail end sections of the product length are unacceptable, while the rings making up the major intermediate section of the product length are acceptable. The unacceptable rings are separated from the acceptable rings at a location overlying a coil forming chamber. A plurality of collecting devices are indexed through the coil forming chamber to collect the acceptable and unacceptable rings into separate coils.

14 Claims, 8 Drawing Figures
Apparatus is provided for uniformly cooling hot rolled steel rod over a continuous range of cooling rates from less than 0.5 °C/sec. to about 20 °C/sec. together with a mechanism for removing scale accumulated therein in a confined and safe manner. The context is that of cooling hot rolled steel rod directly after the steel leaves the rod mill wherein the rod may either be cooled rapidly by forced air convection or cooled very slowly under conditions in which a heated fluid or radiant heating must actually be employed in order to retard the cooling rate. The apparatus includes a group of cooling chambers, each of which has a blower which can be used to force cool air from the atmosphere onto the rod. Some of the cooling chambers are also equipped with means for supplying heat to the rod as may be necessary to retard the cooling rate. When this is done in air, scale formation on the steel is more extensive due to the prolongation of time at high temperature, and as the scale builds up, it also tends to break away from the rod and fall to the bottom of the cooling chamber. The air streams, which are otherwise used to control the cooling of the steel by forced air convection, can then be redirected and used to entrain and dispose of the scale from the cooling chambers. This is done by an arrangement of ducts and dampers whereby the blowing is adapted to draw air either from the atmosphere for cooling or from the cooling chamber where the scale accumulates, for scale disposal. Thus, when the apparatus has been used in the retarded cooling mode, and it becomes desirable to change to the rapid cooling mode, the dampers are set so that the blowers withdraw scale from the cooling chambers and transmit it to the scale disposal facility. Then the dampers are reset so that the blowers can transmit air into the cooling chambers to cool by forced air convection. When the means for supplying heat to some other cooling chambers are used, in order to retard the cooling rate, the remaining cooling chambers may be used to cool either by natural or forced convection. Those chambers being used for cooling by natural convection may be alternately adapted for the removal of scale accumulation by the use of a blower. The cooling chambers are equipped with an arrangement of nozzles adapted to apply a greater proportion of the cooling medium to the sides of the rings than to the centers. This helps to overcome the mass-effect of the overlapped rings at the side of the conveyor so as to cool more uniformly in the rapid cooling mode. The same nozzles may also be employed in the slow cooling mode when a heated gas is applied to the rod.
ABSTRACT

A horizontal or vertical roll stand for a rod or bar rolling mill comprising a pair of work rolls having a plurality of grooves spaced axially along the surfaces thereof, each work roll being journaled between bearings contained in bearing chocks, with the bearings being adapted to accommodate axial adjustment of the work rolls in relation to the bearing chocks. The bearing chocks are supported in a housing with the work rolls in parallel relationship and with the grooves defining a plurality of roll passes. An axial roll adjustment means is associated with each work roll. Both of the axial adjustment means are driven by a common axial adjustment drive. A clutch is connected between one axial adjustment means and the axial adjustment drive. When engaged, the clutch permits the axial adjustment drive to operate through both axial adjustment means, thus axially adjusting both work rolls simultaneously. When the clutch is disengaged, the axial adjustment drive operates through only one axial adjustment means, with the result that one work roll is adjusted axially in relation to the other work roll. The work rolls are additionally acted upon by roll parting adjustment means driven by a common parting adjustment drive.

On vertical roll stands, the axial adjustment drive and the parting adjustment drive are supported on a platform overlying the roll housing. Both drives are connected to their respective adjustment means via couplings which are separated and assembled in response to vertical movement of the platform between a lowered operative position supported on the roll housing and an inoperative position spaced vertically thereabove.

9 Claims, 14 Drawing Figures
An apparatus for laterally receiving elongated elements at an upper first location, for assembling the elements thus received, and for transferring the assembled elements downwardly to a lower second location. The apparatus includes a pair of spaced opposed guide surfaces defining an assembly and transfer zone which extends downwardly from the upper to the lower of the aforesaid locations. Carrier members protrude into and are movable along the length of the zone. Elongated elements are fed laterally, and preferably although not necessarily singly, into the zone through an inlet at the upper location. The elements are initially retained adjacent to the inlet and against the carrier members and are thus assembled at the upper end of the zone. The carrier members are moved downwardly along the length of the zone, initially for the purpose of accommodating the entry of elements into the zone during the assembly thereof, and thereafter to carry the assembled elements to the lower second location. The invention further includes apparatus for receiving the assembled elements at the second location, for carrying the same laterally to a third location where the elements are strapped into a dense bundle, and then to a fourth location where the bundle is delivered to other handling apparatus.

16 Claims, 7 Drawing Figures
METAL TREATMENT APPARATUS FOR STEEL ROD HAVING AN OSCILLATING PLATFORM BELOW THE LAYING HEAD

Filed: Dec. 3, 1973
Appl. No.: 421,158

U.S. Cl. 140/2, 266/3 R, 198/112
Int. Cl. B21f 23/00
Field of Search 140/1, 2; 266/3 R; 198/111, 112

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UNITED STATES PATENTS
3,603,355 9/1971 Geipel et al. 140/2
FOREIGN PATENTS OR APPLICATIONS
1,214.635 4/1966 Germany 140/2

Primary Examiner—Lowell A. Larson

ABSTRACT
A conveyor system for transporting objects sequentially deposited thereon is described in which a portion of the conveyor has imparted thereto an oscillation which is in the plane of the conveyor and transverse to the conveyor motion. The oscillating conveyor is described in the context of a heat treatment apparatus for hot rolled steel rod. In such heat treatment apparatus, the rod is first shaped by a laying head into a series of rings, and the rings are then deposited upon the moving oscillating conveyor. The rings on the conveyor form a flat overlapping, non-concentric orientation. The oscillation of the conveyor reduces the edge packing effect. The rings are then transported by another conveyor through a series of cooling chambers where they are cooled, such as by forced air convection. The oscillating conveyor includes a flat, wire-woven, endless belt, a portion of the belt, and preferably the oscillating part, being disposed below the laying head. The belt is supported upon a series of shafts having sprockets mounted thereon which engage the belt; one or more of these shafts is driven by a motor assembly. A cam mechanism is associated with the driven shaft to cause that shaft to oscillate along its longitudinal axis, the oscillation being approximately one inch in both directions from center. The belt in turn oscillates, and as the rings are deposited upon the belt, the rings are displaced transversely to the direction of the conveyor motion. The transverse displacement of the rings reduces the edge packing and assists in cooling the rings uniformly.

8 Claims, 6 Drawing Figures
VERTICAL ROLL CHANGING APPARATUS


Filed: Jan. 10, 1975

Appl. No.: 540,157

U.S. Cl. 72/239; 294/81 R

Int. Cl. B21B 31/08

Field of Search 72/239, 238; 294/81 R, 294/81 SF

Abstract

An apparatus is disclosed for moving an assembly of two vertical rolls and their respective upper and lower bearing chocks into and out of a roll housing in a rolling mill. The apparatus includes a central carrying member acting through oppositely extending adjustable link members pivotally connected to the upper bearing chocks of the roll assembly.

5 Claims, 4 Drawing Figures
AXIAL PRELOADING DEVICE FOR AXIALLY ADJUSTABLE GROOVED WORK ROLLS

Filed: Nov. 7, 1974
Appl. No.: 521,751

U.S. Cl. ........................................ 72/247
Int. Cl. ........................................ B21B 31/18
Field of Search .............................. 72/247, 245, 238, 248

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2,651,956 9/1953 Peterson .................. 72/247
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3,842,640 10/1974 Schmitt et al. .................. 72/238

Primary Examiner—Milton S. Mehr
Attorney, Agent, or Firm—Thompson, Birch, Gauthier & Samuels

ABSTRACT
An axial preloading device is disclosed for use with axially adjustable grooved work rolls in a rolling mill. The work rolls are axially adjusted by a mechanism which includes relatively rotatable and reactive supporting components, and the preloading device exerts an axial force on the mechanism to eliminate mechanical backlash between the aforesaid components.

4 Claims, 5 Drawing Figures
A seal for use between a housing and a rotatable shaft is disclosed. The seal includes a circular first assembly mounted on the shaft for rotation therewith, the said first assembly having an outer peripheral groove formed between a pair of radially extending flingers. A second assembly sealingly engages the housing, with an annular portion thereof protruding radially inwardly into the peripheral groove of the first assembly, and with the surfaces of the protruding annular portion being spaced relative to the adjacent surfaces of the groove. Circular wear rings carried by the flingers frictionally engage the protruding annular portion of the second assembly.

10 Claims, 7 Drawing Figures
A seal for use between a housing and a rotatable shaft is disclosed. The seal includes a first sealing assembly mounted on the roll shaft for rotation therewith, the said first assembly having an outer peripheral groove formed between a pair of radially extending flingers. A second sealing assembly sealingly engages the housing, with an annular portion thereof protruding radially inwardly into the peripheral groove of the first sealing assembly. The said protruding portion is provided with flanges which frictionally engage the flingers on the first sealing assembly.

6 Claims, 4 Drawing Figures
MULTI-GROOVE ROLL MOUNTING


Filed:  Dec. 26, 1973

Appl. No.: 423,431

U.S. Cl. 29/121 R, 72/221, 72/238

Int. Cl. B21B 27/02

Field of Search 72/247, 222, 221, 238, 72/199, 234, 366; 29/121 R, 121 A, 125, 129.5

ABSTRACT

Apparatus for mounting a multi-groove work roll on a roll shaft in a rolling mill. The apparatus includes a shoulder on the roll shaft, a spacer assembly on the roll shaft in engagement at one end with the shoulder, the opposite end of the spacer assembly being in engagement with a work roll axially received on the roll shaft, and a retainer assembly for holding the work roll against the spacer assembly in an operative position with one of the roll grooves aligned with the mill pass line. The spacer assembly includes at least one removable element, the presence or absence of which will change the axial length of the spacer assembly by a distance equal to the spacing between the centers of adjacent grooves on the work roll.

6 Claims, 6 Drawing Figures
ABSTRACT

An apparatus for detecting abnormal gains or losses in the amount of liquid lubricant being circulated through a lubrication system of the type having a pressurized side for delivering the lubricant from a main receiving tank to the equipment being lubricated, and an unpressurized drain side for returning the lubricant from the equipment to the receiving tank. The apparatus is located on the drain side of the system, and includes an indicating tank having a cross-sectional area substantially smaller than that of the main receiving tank. The lubricant is returned from the equipment being lubricated to the indicating tank, which is in turn drained into the main receiving tank through a drain line which has a metering valve adjusted to maintain a given operating level in the indicating tank during normal operation of the system. A level indicator generates a warning signal when the liquid level in the indicating tank undergoes an abnormal change from said given operating level.

6 Claims, 2 Drawing Figures
An apparatus is disclosed for use in a rolling mill to support the bearing chocks of a work roll in a roll housing. The apparatus includes specially designed components interposed between the bearing chocks and the restraining devices employed to oppose the axial and transverse forces developed during a rolling operation. The aforesaid components offer minimum resistance to movement of the bearing chocks through minute distances in the direction of rolling. The apparatus of the present invention makes it possible to measure tension in the product being rolled by employing sensing devices acting on the bearing chocks.
APPARATUS FOR CONTROLLED COOLING HOT ROLLED STEEL ROD IN DIRECT SEQUENCE WITH ROD MILL

Filed: Jan. 10, 1975
Appl. No.: 539,984

Primary Examiner—Milton S. Mehr
Assistant Examiner—E. M. Combs

ABSTRACT
Apparatus for conveying an elongated hot-rolled steel rod in overlapping off-set ring form over a controlled cooling conveyor. The conveyor is provided with a plurality of nozzles through which cooling air is supplied to the edges of the rings and with a lesser number of nozzles through which cooling air is supplied to the centers of the rings. The center and edge nozzles are supplied through independent air plenums each of which is supplied with air from independently controlled air blowers. The blowers are independently adjustable to adjust the quantity of cooling air to the center and edges of the rings. The nozzles are configured to direct high velocity streams of air along non-intersecting paths through the rings. The apparatus provides means for carrying out a process in which, by properly controlling the independently adjustable blowers, the rings may be made to cool along a predetermined time cooling curve with all parts of the rings cooling at the same rate.

5 Claims, 14 Drawing Figures
A process for forming a ferrous billet into a finished product is disclosed comprising the following steps, in sequence: heating the billet to an appropriate elevated bulk temperature in preparation for rolling; hot rolling the heated billet to produce a semifinished product having an intermediate bulk temperature which is lower than said elevated bulk temperature; cooling the semifinished product to reduce the surface temperature thereof to a level below that of a desired finish rolling bulk temperature; allowing the temperatures of the surface and center portions of the semifinished product to equalize substantially to the level of the desired finish rolling bulk temperature; allowing the semifinished product to a finished product; and, cooling the finished product to an ambient bulk temperature.

9 Claims, 3 Drawing Figures
PROCESS FOR COOLING HOT ROLLED STEEL ROD

Inventor: Norman A. Wilson, Shrewsbury, Mass.


Filed: Oct. 21, 1974

Appl. No.: 516,767

U.S. Cl.: 148/12 B; 148/155; 148/156

Int. Cl.: C21D 9/52

Field of Search: 148/12 B, 155, 156

ABSTRACT

Apparatus for conveying an elongated hot-rolled steel rod in off-set ring form on a conveyor through a series of cooling chambers. Each chamber comprises a stationary lower section and a removable cover section, the interior walls of each being heat reflective. Each chamber is also provided with tubes supported adjacent the interior walls and controlled in temperature by gas passing through said tubes, said gas being cold or hot, the hot gas being supplied from a plurality of separately controlled burners. The tubes differentially control the rate of heat radiation from the rod rings to compensate for the different rates of radiational heat loss emanating from the top and sides of the rod rings so as to cause the rod to cool uniformly. The side walls of the chamber are provided with adjustable apertures for the escape of radiant energy from the sides of the rod rings. Means are provided for controllably lifting the roof from its completely closed position to one in which the top of the lower section is entirely exposed. Means are also provided for blowing cooling air through the rings. The apparatus provides means for carrying out a process for controlling the loss of heat from the rod by applying radiant heat selectively to the rod, by reflection from the interior walls or by the heated or cooled tubes, or both, substantially in inverse proportion to the accumulated mass of the rod from side to side of the conveyor.

10 Claims, 15 Drawing Figures
Apparatus for conveying an elongated hot-rolled steel rod in off-set form on a conveyor through a series of cooling chambers. Each chamber comprises a stationary lower section and a removable cover section, the interior walls of each being heat reflective. Each chamber is also provided with tubes supported adjacent the interior walls and controlled in temperature by gas passing through said tubes, said gas being cold or hot, the hot gas being supplied from a plurality of separately controlled burners. The tubes differentially control the rate of heat radiation from the rod rings to compensate for the different rates of radiational heat loss emanating from the top and sides of the rod rings so as to cause the rod to cool uniformly. The side walls of the chamber are provided with adjustable apertures for the escape of radiant energy from the sides of the rod rings. Means are provided for controllably lifting the roof from its completely closed position to one in which the top of the lower section is entirely exposed. Means are also provided for blowing cooling air through the rings. The apparatus provides means for carrying out a process for controlling the loss of heat from the rod by applying radiant heat selectively to the rod, by reflection from the interior walls or by the heated or cooled tubes, or both, substantially in inverse proportion to the accumulated mass of the rod from side to side of the conveyor.
COIL HANDLING APPARATUS AND SYSTEM


Related U.S. Application Data
Continuation of Ser. No. 570,236, April 21, 1975, abandoned.

Field of Search
193/35 R; 214/1 B, 1 Q; 214/6 D, 8, 18 R, DIG. 1, DIG. 4; 100/12; 198/339, 780, 472, 583, 790, 373, 789

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3,548,739 12/1970 Glasson 100/12 X

Abstract
An apparatus and system is disclosed for receiving upstanding cylindrical product coils from a coil forming station at the delivery end of a rolling mill, and for transporting the coils along a path along which additional processing operations are performed on the coils at different locations. The apparatus includes a plurality of separately driven and independently operable roller table modules which are aligned to form longitudinally extending roller conveyor avenues. Transfer carriages are provided to laterally shift certain or all of the roller table modules from one to another of the longitudinally extending roller conveyor avenues. The drives for the roller table modules and the transfer carriages are all located beneath the transport level defined by the table rollers, the latter being located approximately at the floor level of the coil handling area. Smaller coils may be carried directly on the rollers of the roller table modules, while larger coils are preferably carried on specially designed pallets.
COIL HANDLING PALLET

Filed: Apr. 24, 1975
Appl. No.: 571,372
U.S. Cl. 248/346; 108/55.3; 211/49 R; 242/85; 248/119 R
Int. Cl. 86D 19/44

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Primary Examiner—Roy D. Frazier
Assistant Examiner—William E. Lyddane
Attorney, Agent, or Firm—Thompson, Birch, Gauthier & Samuels

ABSTRACT
A pallet is disclosed for use in a rolling mill for supporting cylindrical product coils during the transfer thereof from one location to another. The pallet includes a generally U-shaped base section having laterally spaced leg members joined at their rearward ends by a bridging member. The upper surfaces of the leg members are inclined slightly from front to rear. Support members or posts extend vertically from the rearward portions of the leg members. A coil supported on the pallet will have its lowermost end resting on the base section with the inclined upper surfaces of the leg members causing the coil to assume a slightly inclined position resting against the support members.

8 Claims, 3 Drawing Figures
An apparatus is disclosed for use in a rolling mill to invert upstanding cylindrical product coils in order to facilitate trimming and inspection of both ends of the coils. The apparatus includes a cradle into which a coil is laterally received. The coil is inverted by rotating the cradle about an axis transverse to the coil axis. Suitable holding devices on the cradle operate to prevent coil distortion during its inversion.

5 Claims, 21 Drawing Figures
An apparatus is disclosed for use in a rolling mill in compacting an upstanding cylindrical product coil. The apparatus includes a compacting station having a base platen divided into laterally spaced sections and an overlying vertically movable upper platen. A transport mechanism is employed to carry a coil laterally from a receiving station into the compacting station at an operative position between the platens. The transport mechanism includes a mandrel extending axially through the coil and an elevator head which is held by the mandrel in a raised position supporting the coil bottom at a level above the base platen. Thereafter, a lowering of the upper platen is accompanied by a corresponding gradual axial retraction of the mandrel and a lowering of the elevator head to the level of the base platen. This results in an axial compaction of the coil between the platens while the mandrel continues to provide internal support for the coil. Suitable retaining bands or straps are applied to the compacted coil, after which the upper plate, mandrel and elevator head are returned to their raised positions, and the transport mechanism is employed to move the compacted banded coil laterally from the compacting station to a delivery station.

8 Claims, 18 Drawing Figures
TOOL ASSEMBLY FOR MOUNTING AND REMOVING OVERHUNG ROLLS

For use in combination with a work roll mounted on the end section of a shaft by means of a sleeve member axially inserted in a wedged operative position therebetween, a fluid actuated tool assembly removably engageable with the shaft and sleeve member for axially moving the sleeve member into and out of its operative position. The tool assembly preferably comprises a piston contained in a cylinder which during use is movable axially relative to the piston. At a first end of the tool assembly, the piston is removably attachable to the shaft and the cylinder is arranged to abut the sleeve. At an opposite second end of the tool assembly, the cylinder is removably attachable to the sleeve, and the piston is arranged to abut the shaft. The piston and cylinder have cooperating internal surfaces arranged to define a chamber adapted to receive fluid under pressure, the said fluid pressure being operative to move the cylinder relative to the piston. Depending on which end of the tool assembly is being used, the aforementioned cylinder movement will produce a corresponding movement of the sleeve member into or out of its operative position between the shaft and the work roll.
APPARATUS FOR ALIGNING THE ENDS OF PRODUCT LENGTHS


Filed: Aug. 11, 1975

ABSTRACT

An apparatus for aligning the ends of product lengths being delivered laterally into an alignment zone. The apparatus employs a plurality of pairs of alignment heads which are arranged to reciprocally contact and align the ends of product lengths as they arrive in the alignment zone. The alignment heads are mounted for movement on a stationary rail spanning the length of the alignment zone. The rail is supported on a frame which also carries a pair of reciprocally driven draw bars. Remotely operable devices are employed to releasably connect the alignment heads to the draw bars and to adjust the spacing between cooperating pairs of alignment heads.

10 Claims, 15 Drawing Figures
ABSTRACT

An apparatus for forming elongated elements such as round bars, pipes and the like into a hexagonal bundle. Tiers containing appropriate numbers of elongated elements are deposited one upon the other in an assembly zone. The assembly zone is defined by a plurality of support surfaces, one of which is stationary, and the remainder of which are adjustable in relation to the stationary support surface in order to gradually impart a hexagonal cross section to the elements accumulating in the assembly zone. The completed assemblage of elements is then externally tied into a bundle in order to substantially retain the aforesaid hexagonal cross section after the bundle is removed from the assembly zone.
ALIGNMENT APPARATUS FOR ROLLING MILL ROLLER GUIDES

Inventors: Willem Brouwer, Lexington; Richard J. Reardon, Boylston, both of Mass.


Appl. No.: 781,581
Filed: Mar. 28, 1977

Int. Cl.: G01B 11/27; G01B 11/26; B21C 51/00

Field of Search: 356/138, 150, 153-154, 356/172, 247, 253-255; 72/37; 33/286

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U.S. PATENT DOCUMENTS
3,457,018 1/1969 Kloss

Primary Examiner—John K. Corbin
Assistant Examiner—Wm. H. Punter

ABSTRACT

An apparatus for observing the relative alignment of two pairs of guide rollers on a rolling mill roller guide. The roller guide is positioned with its guide roller pairs spaced along an axis extending between two light sources. A dichroic mirror is arranged between each pair of guide rollers and its adjacent light source. One dichroic mirror reflects blue light while transmitting red light, and the other dichroic mirror reflects red light while transmitting blue light. The light reflected from both dichroic mirrors is recombined by a third dichroic mirror and is then projected onto a screen as red and blue images which may be compared visually with a reference outline on the screen, the said outline being representative of proper guide roller alignment. When the roller pairs are properly aligned, the red and blue images coincide on the screen to produce a white image aligned with the reference outline.

9 Claims, 6 Drawing Figures
A neck seal is disclosed for use on a roll neck in a rolling mill. The neck seal has a flexible circular body with a pair of axially spaced resilient flanges extending radially therefrom. At least one and preferably both of the resilient flanges has a first annular section extending radially outwardly from the seal body to an intermediate peripheral shoulder, and a second annular section extending inwardly from the peripheral shoulder back towards the seal body.

6 Claims, 4 Drawing Figures
A seal is disclosed for use on the neck of a rotatable roll in a rolling mill. The seal includes a flexible circular inner body segment adapted to be mounted in sealing engagement on the roll neck for rotation therewith, and a flexible circular outer body segment adapted to be mounted on the exterior surface of the inner body segment. The outer body segment has axially spaced resilient flanges extending radially outwardly therefrom. The inner and outer body segments, which may if desired be manufactured of different materials, are connected together in a manner which prevents rotation of one segment relative to the other segment, and which also preferably permits the outer body segment to be readily separated from the inner body segment. A reinforcing element may be associated with the outer body segment for the purpose of resisting centrifugal forces acting on the seal during rotation of the roll neck.
MULTI GROOVE ROLL MOUNTING MEANS

Inventor: Norman A. Wilson, Shrewsbury, Mass.
Filed: Dec. 10, 1975
Appl. No.: 639,969
U.S. Cl. 29/121.6; 29/125; 72/199
Field of Search 29/121 A, 125, 129.5; 72/199, 221, 238, 247; 184/6

ABSTRACT

Apparatus for mounting a multi groove work roll on a roll shaft in a rolling mill. The apparatus includes a shoulder on the roll shaft, a spacer assembly on the roll shaft in engagement at one end with the shoulder, the opposite end of the spacer assembly being in engagement with a work roll axially received on the roll shaft, and a retainer assembly for holding the work roll against the spacer assembly in an operative position with one of the roll grooves aligned with the mill pass line. The spacer assembly includes at least two axially engaged components, one of which is reversible endwise relative to the other in order to change the overall axial length of the spacer assembly to thereby shift the roll axially through an appropriate distance to make use of additional grooves on the work roll.

10 Claims, 5 Drawing Figures
[54] MULTI-LINE ROLLING SYSTEM

[75] Inventor: Martin Gilvar, Oakham, Mass.


[21] Appl. No.: 892,932
[22] Filed: Apr. 3, 1978

Related U.S. Application Data


[51] Int. Cl.2 B21B 1/00; B21B 35/00
[52] U.S. Cl. 72/228; 72/238; 72/249

[58] Field of Search 72/226, 228, 250, 231, 72/234, 235, 249, 238, 239

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FOREIGN PATENT DOCUMENTS


Primary Examiner—Milton S. Mehr
Attorney, Agent, or Firm—Thompson, Birch, Gauthier & Samuels

[57] ABSTRACT

A multi-line rolling system having a plurality of rolling positions aligned in the direction of rolling. Each rolling position includes a housing or housing structures supporting at least two sets of work rolls which may be selectively coupled to a common power source, thereby permitting the rolling line formed by one roll set to be rendered inoperative while the rolling line of the other roll set continues to roll product received from a feed line. The system further includes an appropriate switching mechanism for directing product from the feed line to either rolling line.

12 Claims, 8 Drawing Figures
A flexible seal and seal assembly is disclosed for use in rolling mills where roll necks are journaled for rotation in oil film bearings.

The flexible seal has a circular seal body adapted to be mounted in sealing engagement on a tapered section of the roll neck for rotation therewith, and a pair of circular flexible flanges integral with and extending radially outwardly from the seal body with at least one of the flexible flanges being provided at its outer edge with an angularly extending flexible annular lip.

The seal assembly includes the aforesaid flexible seal surrounded by a circular non-rotatable rigid seal end plate having a radially inwardly extending rigid flange separating oppositely extending rigid shoulders. The rigid flange is located between the flexible flanges of the seal, with its inner edge spaced radially from the seal body. The shoulders of the seal end plate have cylindrical shoulder surfaces which are parallel to the rotational axis of the roll neck and which are arranged to be sealingly engaged by the flexible annular lips of the seal.
A flexible seal element with a reinforced drain labyrinth is disclosed for use on the outer seal ring of a seal assembly located between a roll end face and a bearing chock in a rolling mill, particularly the bearing chocks of the upper backup roll and the work rolls in a four-high mill. The seal element has a circular body portion adapted to tightly surround the outer seal ring. A first circular lip extends outwardly away from the body portion at an angle relative to the axis thereof to frictionally contact the roll end face. The seal body has a drain opening which is arranged to be aligned radially with a drainage port in the outer seal ring. The drain opening is protected by a second lip which extends outwardly from the seal body in a direction opposite to that of the first mentioned lip. A relatively stiff baffle member is attached to the seal body at a location spaced radially inwardly from the second lip. The baffle member and the second lip cooperate in providing a reinforced drain labyrinth which effectively prevents cooling water, mill scale, etc. from being centrifugally directed upwardly into the bearing from the rotating surfaces of underlying rolls.
ABSTRACT

An apparatus is disclosed for trimming and or subdividing rod or other similar mill products at a coil forming station. The rod, which may have previously been formed into overlapping rings on a conveyor, is carried to the upper end of an upstanding cylindrical chamber overlying an axially aligned mandrel. The rings drop from the conveyor through the chamber onto the mandrel where they are collected in coil form. Separating fingers are movable into the chamber to temporarily interrupt the descent of rings therethrough, with the rings above the separating fingers being connected to the rings accumulated around the underlying mandrel by a single connecting strand. Pivotal arms, preferably sickle-shaped, are movable beneath the separating fingers across the path of ring descent. Each pivotal arm carries a shear blade which cooperates with a stationary shear blade located at the periphery of the path of ring descent. The connecting strand is carried by one of the aforesaid arms through a short distance to the periphery of the path of ring descent where the strand is cut by the cooperating shear blades.

6 Claims, 3 Drawing Figures
An apparatus for handling and storing elongated articles comprises a plurality of parallel article support members or skids arranged in a horizontal plane to define a storage area having a receiving side from which the skids extend laterally. A plurality of transfer cars are located between the skids beneath the aforesaid horizontal plane. The transfer cars are aligned in a direction perpendicular to the skids and are moved in unison towards or away from the receiving side of the storage area by a common drive. Each transfer car carries a set of article elevating members with each set being adjustable individually between a lowered inoperative position beneath the plane of the skids and a raised operative position protruding thereabove.

6 Claims, 8 Drawing Figures
An apparatus for laterally arranging bars, particularly ferrous bars, moving longitudinally along a roller conveyor in a rolling mill. The bars are initially confined laterally into a compact group centrally located between the conveyor sides. The compact group is then subdivided into a plurality of laterally spaced bar packs which are then run over one or more magnetic separating rollers to achieve a desired lateral separation between each bar.
An apparatus for laterally separating a group of elongated magnetic elements, for example steel bars which are moving longitudinally along a conveyor. A rotatable fanning roll extends transversally across the path of the bars. The fanning roll has a magnet associated therewith. The magnet attracts the bars towards the fanning roll while simultaneously creating repulsion forces tending to laterally separate the bars. A deflecting roll located in advance of the fanning roll is employed to deflect the bars out of their normal path of travel in relation to the surface of the fanning roll to thereby produce a momentary separation between the front ends of the bars and the fanning roll. During this momentary separation, the magnetically induced repulsion forces are not impeded by frictional resistance between the bars and the surface of the fanning roll, and this in turn improves the resulting lateral bar separation.

5 Claims, 7 Drawing Figures
A process for rolling steel rod is provided whereby rolling rod at delivery speeds in excess of 15,000 fpm and cooling same after laying it in spread-out ring form on a conveyor is made feasible with less risk of cobbles and improved rod quality especially in the medium to high carbon content range by entering the rod after rolling into the laying head and thereafter cooling same non-uniformly through a grain size growing phase and a transformation phase with the non-uniformity of cooling rate during the transformation phase being kept in substantially inverse proportion to the differences in effective grain size established in the first phase. In addition a very long cooling conveyor which is necessitated by such delivery speeds (not only for high carbon steels but also low carbon and low alloy steels) is provided without requiring additional horizontal space, by arranging the conveyor in a multiplicity of tiers, spaced vertically, running in opposite directions, and being provided with means for transferring the rings from one tier to the next. Cobbles on the conveyor at high delivery speeds are minimized by coiling with \( \frac{1}{2} \)" spacing, and by reforming means adapted for high speed delivery of rings from the conveyor onto an upwardly sloping mandrel surface, or into a curved chute which stacks the rings on their sides. An intermittent reheat method is employed for processing rod where slow cooling and/or heat treatment at a steady temperature is required.
A process for rolling steel rod is provided whereby rolling rod at delivery speeds in excess of 15,000 fps and cooling same after laying it in spread-out ring form on a conveyor is made feasible with less risk of cobbles and improved rod quality especially in the medium to high carbon content range by entering the rod after rolling into the laying head and thereafter cooling same non-uniformly through a grain size growing phase and a transformation phase with the non-uniformity of cooling rate during the transformation phase being kept in substantially inverse proportion to the differences in effective grain size established in the first phase. In addition a very long cooling conveyor which is necessitated by such delivery speeds (not only for high carbon steels but also low carbon and low alloy steels) is provided without requiring additional horizontal space, by arranging the conveyor in a multiplicity of tiers, spaced vertically, running in opposite directions, and being provided with means for transferring the rings from one tier to the next. Cobbles on the conveyor at high delivery speeds are minimized by coiling with \( \frac{1}{4} \)" spacing, and by reforming means adapted for high speed delivery of rings from the conveyor onto an upwardly sloping mandrel surface, or into a curved chute which stacks the rings on their sides. An intermittent reheat method is employed for processing rod where slow cooling and/or heat treatment at a steady temperature is required.

5 Claims, 12 Drawing Figures
Apparatus and methods for hot rolling and treating rod first by depositing the rod in spread-out ring form on a moving conveyor, then gathering it into a relatively loose somewhat offset bundle and thereafter subjecting it to batch treatments among which are conventional annealing, and/or coating and baking as well as new forms of annealing not heretofore practiced.

4 Claims, 11 Drawing Figures
LAYING HEAD WITH SEGMENTED LAYING PIPE

Inventors: Robert D. Wykes, Worcester; Harold E. Woodrow, Northboro, both of Mass.


App. No.: 33,451
Filed: Apr. 26, 1979

Int. Cl. 72/66; 140/2; 193/2 R; 242/82

Field of Search 72/66; 140/2; 242/82; 193/2 R, 38; 302/64; 138/155

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4,189,106 2/1980 Weis 242/82

ABSTRACT

A laying head is disclosed for forming the longitudinally moving hot rolled product of a rolling mill into a helix. The laying head includes a housing carrying a cone assembly for rotation about an axis. The cone assembly has a support member with a three dimensional configuration curving around said axis. A plurality of clamp members are fixed to the support member at spaced locations along the length thereof. A plurality of discrete tubular guides are removably retained by the clamp members at operative positions collectively defining a guide path which is parallel to the curvature of the support member. Means are provided for receiving the product along said axis and for delivering the product into the first of the guides. Means are also provided for rotating the cone assembly, whereupon passage of the product along the guide path will result in the product exiting from the laying head in the form of a helix.

10 Claims, 7 Drawing Figures
An apparatus for connecting a cover to a chock in a rolling mill comprising spaced supports on the chock, an arm extending laterally from the cover into the space between the supports, and a pin extending through communicating openings in the supports and the arm. Certain of the openings are dimensioned in relation to the pin to accommodate axial shifting of the cover between a closed position against the chock and an intermediate position from which the cover is free to pivot about the pin to an open position exposing the bearing end. A disengageable retainer is provided for holding the cover in the closed position.

6 Claims, 3 Drawing Figures
In a rolling mill having a plurality of roll stands aligned along the mill pass line, each roll stand having parallel roll shafts carrying cooperating pairs of work rolls, with the roll shafts of at least some of the roll stands being offset 90° with respect to the roll shafts of the other roll stands in order to eliminate the necessity for twisting the product as it progresses from stand to stand along the mill pass line, an apparatus for driving the roll shafts consisting of intermeshed gears carried by each pair of roll shafts for establishing a drive connection therebetween; a driven sprocket wheel connected to one roll shaft of each pair; a gear unit for each roll stand, each gear unit having an input shaft and an output shaft, the output shaft of each gear unit being parallel to the roll shafts of the roll stand associated therewith and having a driving sprocket wheel thereon; and endless chains for connecting the driving and driven sprocket wheels, the input shafts of the gear units being interconnected along a single drive line parallel to the mill pass line and being driven by a common power source.
An oil film bearing for a roll neck in a rolling mill, wherein a sleeve with a tapered bore in mounted on a tapered section of the roll neck for rotation therewith, the sleeve being journalled in a non-rotatable bushing contained in a bearing chock. During rolling, a film of high pressure oil is maintained hydrodynamically between the sleeve and bushing at the bearing load zone. In order to provide lubrication at the roll neck/sleeve interface, a portion of the hydrodynamic oil is bled from the sleeve/bushing interface via holes extending radially through the sleeve into a plurality of longitudinal primary grooves in the sleeve bore. This conventional arrangement is improved by the addition of a plurality of secondary grooves in the sleeve bore. Oil is forced from the primary grooves into the second grooves via connecting grooves in the sleeve bore. The connecting grooves create a pressure differential which opposes reverse flow of oil from the secondary grooves into the primary grooves.
A high reduction method and apparatus for continuously hot rolling a product through a plurality of roll passes, wherein the distribution of horizontal forces in at least one roll pass other than the first is such that spontaneous entry is prevented by a maximum momentary opposing force which is greater than the available delivery force of the preceding roll pass. An additional force is exerted on the product in advance of the preceding roll pass. This additional force, when combined with the available delivery force of the preceding roll pass, is of sufficient magnitude to overcome the maximum momentary opposing force of the said one roll pass and thus achieve forced entry therein.

FOREIGN PATENT DOCUMENTS
A heavy duty axial adjustment mechanism for a rolling mill roll neck which is rotatably supported in a radial bearing contained in a chock. A rolling element thrust bearing has its inner race fixed axially in relation to the roll neck. The outer thrust bearing race is axially confined between separable retainer components which are interconnected by fasteners. The retainer components each have external adjusting threads in engagement with internal adjusting threads on the chock. Rotation of the interconnected retainer components imparts axial adjustments to the roll neck relative to the chock without subjecting the fasteners to damaging thrust forces.

5 Claims, 2 Drawing Figures
COIL FORMING APPARATUS WITH AXIALLY ADJUSTABLE MANDRELS

Inventor: Melcher Puchovsky, Dudley, Mass.

Filed: Nov. 13, 1979

Abstract

A coil forming apparatus has a pair of mutually perpendicular elongated mandrels mounted on a hub. Rotation of the hub about an axis perpendicular to the mandrel axes results in the mandrels being moved between a collecting station at which they protrude vertically from the hub to receive product rings from an overlying delivery device, and a discharge station at one side of the hub at which they protrude horizontally to accommodate axial removal of the coils. The mandrels are axially adjustable relative to the hub, and each mandrel has oppositely disposed ends adapted to receive rings from the delivery device. A retracting device is employed to withdraw each mandrel across the rotational axis of the hub from the discharge station to an intermediate station on the opposite side of the hub.

11 Claims, 14 Drawing Figures
A bearing assembly for a roll neck in a rolling mill includes as an integral component a force exerting means consisting of a nut threaded on a ring. The ring is detachably mounted by means of a bayonet-type connection in a non-rotatable axially confined position on the roll neck. The nut is engageable with other bearing components and is rotatable relative to the ring to axially force the bearing assembly into and out of its operative position on the roll neck.
A apparatus for separating unacceptable elongated elements from a batch of such elements being dropped laterally and singly from a delivery mechanism into a receiver. The unacceptable elements are deflected away from their path of descent from the delivery mechanism to a laterally located discharge zone, from which the unacceptable elements are then removed longitudinally to a location remote from the receiver.

3 Claims, 8 Drawing Figures
ABSTRACT

A pouring reel has a rotatable tube with a bottom and an upstanding cylindrical side wall open at the top. Pin members are arranged in a circular row concentrically within the side wall. The pin members are pivotally adjustable between vertical positions cooperating with the tub side wall to define an annular coil forming chamber, and inoperative positions inclined inwardly from the side wall. Pivotal adjustment of the pin members from their inoperative to their operative positions is achieved by inserting a carrier into the tub. The carrier has a base which extends across and forms the bottom of the coil forming chamber, and a central core which carries contact members arranged to urge the pin members into their operative positions.

11 Claims, 4 Drawing Figures
ABSTRACT

A compact rolling mill has a housing structure divided into a plurality of rolling bays by rigidly interconnected posts extending transversally across the rolling line. Each rolling bay has a window facing a common side of the mill. The rolling bays are adapted to contain roll packages, with each such package including a pair of work rolls straddle mounted between bearings arranged in bearing chocks. The roll packages are movable, either singly or as a group, in a common lateral direction through the windows, between operative rolling positions supported by the housing posts within the rolling bays, and extracted inoperative positions on the aforesaid common side of the mill.

15 Claims, 13 Drawing Figures
In a rolling mill wherein hot rolled rod is directed along a downwardly curved path into a vertical laying head which forms the rod into a series of rings, a method of and apparatus for propelling the rod through the laying head. The rod is passed between a pair of adjustable driven pinch rolls located in advance of the downwardly curved path. An initial closing force is exerted on the pinch rolls to establish an initial parting prior to entry of a rod front end therebetween. The initial parting is sized to produce at least some rod deformation while providing a driving relationship between the pinch rolls and the rod. The initial closing force is greater than the momentary surge in separating force accompanying impact of a rod front end with the pinch rolls. The initial parting is maintained until the rod front end has negotiated the downwardly curved path and has passed through the laying head, at which time the initial closing force is released. The pinch rolls can then either be opened completely to allow the rod to continue running freely therebetween, or the initial closing force can be replaced by a lower secondary closing force which allows the rod to push the pinch rolls apart to a secondary parting. The second parting continues the driving relationship between the pinch rolls and the rod, without any accompanying rod deformation.

10 Claims, 7 Drawing Figures
A single strand rolling mill has successive pairs of work rolls arranged to roll rod and bar products in a twist-free manner. The work rolls are carried on roll shafts included as part of roll packages which are detachably mounted to gear housings, and the gear housings contain intermediate drive shafts and intermeshed gears connected via line shaft segments and intermeshed bevel gears to a primary mill drive. The gear housings are carried on a base which is made up of a flat vertically upstanding structural member standing on edge and joined to an underlying base plate. The structural member extends beneath and in parallel relationship to the rolling line. Rib members extend laterally away from and are spaced along opposite sides of the structural member. The rib members are joined on edge to both the structural member and the base plate and have upper support edges on which the gear housings are secured.
ABSTRACT
A material handling apparatus has a first operational mode for bundling elongated elements having round cross-sectional profiles, and a second operational mode for stacking elongated elements having shaped flat-sided cross-sectional profiles.

13 Claims, 21 Drawing Figures
A water guard for use in a rolling mill wherein the neck of a roll is rotatably supported in an oil film bearing contained in a bearing chock, with a seal assembly located between the roll end face and the bearing chock to retain oil in the bearing and to exclude contaminants such as cooling water, mill scale, etc. from the bearing. The seal assembly includes a circular seal end plate fixed relative to the bearing chock at a location surrounding a flexible seal mounted on the roll neck for rotation therewith. The water guard is circular and it has a radially extending mounting flange integrally joined at its inner edge to an angularly outwardly extending sealing flange. The mounting flange is adapted to be surrounded by and to be secured to the seal end plate, and to provide the sole means for supporting and maintaining the sealing flange in frictional contact with the roll end face. Both the water guard flanges are elastically flexible with the mounting flange having a rigidity which is greater than that of the sealing flange.

8 Claims, 8 Drawing Figures
Apparatus is provided whereby maximum options for the treatment of steel rod in direct sequence with rolling are available within a single piece of equipment, all on a single treatment line, and all at convenient, labor free, push-button control. Maximum application of heat to the rod is provided for heat treating, slow-cooling or intermittent reheat cooling or treating, and alternatively maximum application of cooling air is available by means of individually controllable air ducts and guides associated with each roller conveyor for applying air at different pressures both across and/or along the conveyor. Special means for applying forced air to the rod through outlets in contact with the rod assure maximum penetration of cooling air into the dense parts of the lay. Special forms of rollers are provided for applying cooling air to the rod and to the rollers as well as for supporting rod during heat treatment.
United States Patent [19]
Jalil et al.

[54] APPARATUS FOR COMBINED HOT ROLLING AND TREATING STEEL ROD

[75] Inventors: Asjed A. Jalil, Holden; Earl S. Winslow, Jr., Grafton; Charles H. Gage, Westboro, all of Mass.


[ ] Notice: The portion of the term of this patent subsequent to May 13, 2001 has been disclaimed.

[21] Appl. No.: 562,828


Related U.S. Application Data


[51] Int. Cl. .............................. C21D 9/52
[52] U.S. Cl. .............................. 266/106; 266/111; 72/286
[58] Field of Search ..................... 266/106, 78, 90, 111; 72/286; 432/59, 144, 138, 247; 148/143, 155, 156, 153; 34/236, 152, 240; 198/811, 955

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Primary Examiner—L. Dewayne Rutledge
Assistant Examiner—Christopher W. Brody
Attorney, Agent, or Firm—Maurice E. Gauthier

[57] ABSTRACT
Apparatus is provided whereby maximum options for the treatment of steel rod in direct sequence with rolling are available within a single piece of equipment, all on a single treatment line, and all at convenient, labor free, push-button control. Maximum application of heat to the rod is provided for heat treating, slow-cooling or intermittent reheat cooling or treating, and alternatively maximum application of cooling air is available by means of individually controllable air ducts and guides associated with each roller conveyor for applying air at different pressures both across and/or along the conveyor. Special means for applying forced air to the rod through outlets in contact with the rod assure maximum penetration of cooling air into the dense parts of the lay. Special forms of rollers are provided for applying cooling air to the rod and to the rollers as well as for supporting rod during heat treatment.

3 Claims, 10 Drawing Figures
A method and apparatus for quenching steel rod in a high speed rolling mill is provided wherein a liquid coolant is preliminarily applied to the rod prior to its exiting from the mill finishing train in order to increase the column strength of the exiting rod by lowering the surface temperature thereof to less than about 950° C. Thereafter, as the rod progresses through additional liquid cooling devices on the way to the mill laying head, tractive forces are applied to the rod. The aforesaid increase in rod column strength acts in concert with the application of tractive force to insure that the rod has sufficient rigidity and forward momentum to pass from the finishing train through the liquid cooling devices and to and through the laying head.
A method and apparatus for controlling the gauge of a product, such as for example a rod or bar, as the product is passing from an upstream roll stand to a finishing block. The product is rolled under tension between successive sizing stands arranged between the upstream roll stand and the finishing block. Variable loops are introduced in the product between the upstream stand and the first sizing stand as well as between the second sizing stand and the finishing block. Cross sectional dimensional measurements are taken of the product emerging from the second sizing stand, and signals representative of such measurements are employed by a controller to vary the product tension between the sizing stands in order to correct off-gauge conditions in the product emerging from the second sizing stand.
A method and apparatus for imparting a three-dimensionally curved configuration to a straight elongated element wherein one end of the element is removably supported with its axis coincident with a reference axis. The element is partially pre-bent away from the reference axis into conformity with a two-dimensional first guide path. Thereafter, the pre-bent element is bent into conformity with a three-dimensional helical second guide path.

14 Claims, 17 Drawing Figures
An apparatus for assembling tubes, bars, rods and other like elongated elements preparatory to bundling the same.

7 Claims, 5 Drawing Figures
United States Patent

Salter, Jr. et al.

COOLANT SEAL FOR ROLLING MILL OIL FILM BEARING

Inventors: Lowell S. Salter, Jr., Shrewsbury; Ralph F. Divirgilio, Holden; Russell A. Brickey, Princeton, all of Mass.


Filed: Apr. 4, 1983

A coolant seal for use in a rolling mill wherein the neck of a roll is rotatably supported in an oil film bearing contained within a bearing chock, with a seal assembly located between the roll end face and the bearing chock to retain oil in the bearing and to exclude contaminants such as cooling water, mill scale, etc. from the bearing. The seal assembly includes a circular seal end plate fixed relative to the bearing chock at a location surrounding a circular flanged seal mounted on the roll neck for rotation therewith. The coolant seal is circular, with a radially disposed mounting flange integrally joined at its inner edge to a sealing flange extending angularly and flexibly therefrom. The mounting flange is secured to a mounting surface on the seal end plate at a location placing the sealing flange in frictional contact with the roll end face. The mounting flange is provided with an integral bumper protruding axially therefrom in one direction towards the roll end face, and an integral positioning shoulder protruding axially therefrom in the opposite direction in a recess in the mounting surface of the seal end plate.

10 Claims, 7 Drawing Figures
UNITED STATES PATENT OFFICE

Reardon et al. [19]

[54] AUTOMATIC GAUGE CONTROL SYSTEM FOR MULTI-STAND TIED BLOCK ROD ROLLING MILL

[75] Inventors: Richard J. Reardon, Boylston; Endre S. Maroti, Shrewsbury; Colin Roy, Worcester; John S. Lindsay, Shrewsbury, all of Mass.


[21] Appl. No.: 550,800

[22] Filed: Nov. 14, 1983

[51] Int. Cl. ............................. B21B 37/12

[52] U.S. Cl. .................................. 72/9; 72/12; 72/16; 72/234

[58] Field of Search .................. 72/8, 11, 16, 235, 9, 72/12, 234

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Primary Examiner—E. Michael Combs
Attorney, Agent, or Firm—Maurice E. Gauthier

[57] ABSTRACT

The dimensions of a product passing through the finishing block of a roll rolling mill are measured. Where the dimensions of the product exiting the last finishing stand are out-of-tolerance, a calculation is made to determine the extent to which the roll parting of the work rolls of one of the two last finishing stands must be adjusted to bring the product into tolerance. Based on the calculated adjustment, progressively smaller adjustments are made to the roll partings of the work rolls of the upstream finishing stands to distribute the work which must be performed on the product to bring the product into tolerance.

9 Claims, 17 Drawing Figures
A method for rolling and heat treating small diameter stainless steel rod, comprising the following sequence of steps: cooling the rod prior to and during finish rolling to increase its stiffness; passing the rod through a sizing mill to achieve close tolerances; subjecting the rod to additional water cooling to thereby improve its resistance to surface scratching; forming the rod into rings which are received in an offset pattern on an open moving conveyor; subjecting the offset rings moving along the conveyor to a solid solutioning treatment by reheating and water quenching the same; and then air cooling and drying the rings before collecting them into coils.

7 Claims, 2 Drawing Figures
A mass flow control system for a wire drawing machine wherein wire is drawn through a die by a rotating block driven by a variable speed motor. The thus drawn wire is accumulated as a plurality of windings on the block before being removed therefrom via a guide. The guide is arranged on a carrier ring which rotates independently of the block about the axis of block rotation when a difference exists between the rates at which wire is wound onto and removed from the block. The control system includes a motion detector for generating electrical signals representative of the direction and speed of rotation of the carrier ring. Controls associated with the drive motor and responsive to the aforesaid signals adjust the rotational speed of the block in order to reach a steady state condition where wire is being wound onto and removed from the block at the same rate, and the carrier ring remains motionless.
A level winding apparatus for coiling elongated material, such as wire or tube, into a compact coil. A non-contacting device located near a spooling arrangement for coiling consists of at least two parallel spaced-apart arm arrangements each located on either side of the material as it is wound onto a spool. Each arm arrangement is adjustable to accommodate the transverse dimension of the material and carries a photoelectric control unit having fiber optic carrying cables connected to transmitter and receiver means for creating a high intensity light field extending at least a length to accommodate a range of paths of travel the material takes from the feeding means to the spool starting from an empty spool to build-up of the coil. An undesirable approach angle of the material onto the spool is detected and a correction is made so that the formed coil contains a number of superimposed layers each with a number of evenly and closely abutting adjacent windings.
An arrangement for and method of operation for threading strand-like material such as wire or tubing around a grooved type, rotatable block assembly wherein tension is needed to pull the material through a reduction die, includes a plate mounted on the same shaft as the block. This plate supports three devices used in a time sequence relationship in said threading operation for the drawing process: a gripper arm for grasping the pointed end and introducing it into the groove; a shear for severing the pointed end; and a deflector mechanism for guiding the material away from the block assembly. Clutch assemblies are selectively operated to place the plate into and out of engagement with the drawing block for the plate’s rotation therewith and it’s non-rotation.
A fluidized bed die container holding a lubricant compound receives material which is to be reduced in a die. Pressurized air entering the bed beneath the lubricant agitates the particles to fluidize them so that contact is continually assured between the lubricant and the material, and the pressurized air is used to help cool the die.
METHOD AND APPARATUS FOR UNCOILING AND STRAIGHTENING MATERIAL FOR PROCESSING THEREOF

Inventor: John H. Miles, Ravenna, Ohio

Filed: Mar. 24, 1980

ABSTRACT
A method and apparatus for uncoiling material such as wire, from a coil supported about a horizontal axis by a drum, including separating a loop from the coil, and bending the leading end of the material upon its exit from a pinch roll unit so that it takes a path generally parallel to that of a predetermined passline, and straightening the material once the leading end passes through the straightener roll area. An end bender roll and two of the straightener rolls are mounted on a pivotal frame connected to a piston cylinder assembly which causes the frame to be rotated through an arc in a direction to either bring the end bender roll into an operative position while the two straightener rolls are in an inoperative position, or to bring the end bender roll into an inoperative position while the two straightener rolls assume a nested relationship with a fourth roll in an operative position.

22 Claims, 10 Drawing Figures
APPARATUS AND METHOD FOR AIR COOLING HOT ROLLED STEEL ROD

Inventors: Asjed A. Jalil, Holden; Charles H. Gage, Westborough, both of Mass.


Appl. No.: 666,917

Filed: Oct. 31, 1984

Int. Cl. F26B 7/00; C21D 9/52; C21D 9/56; F27D 15/02

U.S. Cl. 34/20; 148/156; 266/106; 432/59; 432/80

Field of Search 432/59, 80; 34/20; 266/106; 148/12 B, 156

ABSTRACT

A conveyor has successive mutually spaced driven rollers in which hot rolled steel rod is transported in the form of overlapping offset rings. The rings are rapidly air cooled by first nozzles which direct first jets of cooling air upwardly to impinge against and to flow around the conveyor rollers, and by second nozzles which direct second jets of cooling air upwardly between the rollers. The first and second jets of cooling air produce respective first and second velocity profiles, each having an average velocity. The arrangement of the first and second nozzles in relation to each other and to the conveyor rollers is such that the velocity profiles of the first and second jets are superimposed one over the other to produce a broader combined velocity profile having an average velocity greater than that of either the first or second velocity profiles.

8 Claims, 9 Drawing Figures
APPARATUS FOR THE CONTROLLED COOLING OF WIRE ROD FROM ITS ROLLING TEMPERATURE


Appl. No.: 347,316
Filed: Feb. 9, 1982

Apparatus for cooling rolled wire rod consists of a first part which guides the wire rectilinearly and cools it with water, a turn-laying unit which forms the wire into turns and lays the turns in staggered disposition on a continuously running conveyor, and a second part comprising the conveyor which allows passage of an approximately vertically directed stream of air to the turns and conveys the wire turns to a coil forming station which collects them. In order to provide substantial adaptability to various cooling requirements by means of simple and inexpensive conversion, the two parts are composed of a plurality of modules of the same modular length or an integral multiple of the modular length. A base frame carries the modules and the turn-laying unit is fixed on the base frame in a longitudinally displaceable manner. Thus, the lengths of the first and second parts can be changed, and individual modules or groups can be replaced.

12 Claims, 12 Drawing Figures
A seal for use on the tapered section of a roll neck in a rolling mill. The seal has a flexible circular body with a circular lip and a circular flange at one end thereof. The lip extends axially from the body and the flange extends radially from the body and normal or perpendicular with respect to the body axis when the seal is in an unstressed condition. The seal is adapted to be axially received on and to be radially stressed by the tapered roll neck section with an accompanying radial expansion of the lip which produces a circumferential bending moment tending to angularly distort the flange from its perpendicular orientation to the seal axis. An internal circular shoulder on the seal body, coacts with the tapered roll neck section to counteract the bending moment and thereby prevent distortion of the flange.
DOUBLE JOINTED COOLANT SEAL

Inventors: Thomas E. Simmons, Westford; Charles L. Innis, Paxton; Ralph F. DiVirgilio, Jefferson, all of Mass.


Filed: Mar. 14, 1985

Patent Number: 4,585,236
Date of Patent: Apr. 29, 1986

ABSTRACT

A circular coolant seal has a base flange arranged in a base plane perpendicular to the seal axis. A flexible resilient sealing flange is integrally joined at one edge to the base flange and terminates at its opposite edge in a sealing lip located in a sealing plane parallel to and spaced axially from the base plane. The sealing lip has a first portion extending from the base flange angularly away from the base plane and inwardly towards the seal axis to an intermediate hinge portion, and a second portion extending from the hinge portion away from the seal axis and angularly towards the sealing plane. The configuration, flexibility and resilience of the sealing flange is such that axial displacement of the sealing lip in relation to the base flange is accompanied by both axial and radial displacement of the hinge portion.

8 Claims, 4 Drawing Figures
METHOD OF CONTROLLING PRODUCT TENSION IN A ROLLING MILL

In a rolling mill wherein product is rolled continuously in successive first and second blocks at the finishing end of the mill, a pinch roll unit is interposed between the two blocks. The motor speed of the pinch roll unit is employed in combination with other variables to preset the motor speed of the second block prior to entry of the product front end therein. The preset motor speed of the second block produces an acceptable level of interblock product tension once the product has entered the second block. Thereafter, product elongation in the first block is monitored and required adjustments to the motor speed of the second block are made in order to maintain interblock product tension within acceptable limits.

2 Claims, 2 Drawing Figures
SPLIT YOKE UNIVERSAL JOINT

Inventor: Robert K. Koelling, Sr., Dallas, Tex.


Filed: Jun. 13, 1985

Int. Cl. ................................................ F16D 3/40
U.S. Cl. .................................................. 464/135; 403/344

Field of Search ........................................ 403/57, 74, 157, 344;
........................................................................ 464/30, 32, 33, 135, 134

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Primary Examiner—Stuart S. Levy
Assistant Examiner—Daniel P. Stodola
Attorney, Agent, or Firm—Thompson, Birch

ABSTRACT
A universal joint has a cross formed by two mutually perpendicular pairs of coaxial trunnions, each pair of trunnions being rotatably received in bearings which in turn are coaxially retained in the bearing caps of one of two yokes. The yokes are subdivided into half sections which each include one of the bearing caps. The half sections of each yoke are separably interconnected with a juncture therebetween defined by confronting mating surfaces. Interengaging elements are provided at the juncture for preventing the thus interconnected half sections from shifting in relation to each other in directions which disturb the coaxial alignment of the bearings.

4 Claims, 9 Drawing Figures
ABSTRACT

In a bearing assembly for a roll neck in a rolling mill, an inner seal ring is mounted with an interference fit as by shrink fitting, on an end portion of an inner bearing component, e.g., the sleeve of an oil film bearing or the inner race of a roller bearing. The end portion of the inner bearing component is suitably dimensioned and configured to deflect radially inwardly under the influence of hoop stresses developed as a result of the aforesaid interference fit, thereby causing the inner seal ring to be inclined towards the roll end face. The end portion of the inner bearing component has an outer diameter which is larger than the outer diameter of the remainder of the inner bearing component.
In a bearing assembly for a roll neck in a rolling mill, an inner seal ring is mounted with an interference fit as by shrink fitting, on an end portion of an inner bearing component, e.g., the sleeve of an oil film bearing or the inner race of a roller bearing. The end portion of the inner bearing component is suitably dimensioned and configured to deflect radially inwardly under the influence of hoop stresses developed as a result of the aforesaid interference fit, thereby causing the inner seal ring to be inclined towards the roll end face. The end portion of the inner bearing component has an outer diameter which is larger than the outer diameter of the remainder of the inner bearing component.
An oil film bearing for rotatably supporting the journal surface of a rolling mill roll neck on a hydrodynamically maintained oil film. The bearing includes a bushing adapted to interrupt the load carrying continuity of the oil film and to subdivide the load zone into compound pressure zones.
A system for preheating air being fed to a continuous fired furnace by means of high temperature waste gases exhausted from the furnace. The system includes two pairs of interconnected regenerators. The regenerators of one pair are alternately connected by means of a reversing valve to an ambient air inlet and a waste gas exhaust stack, and the regenerators of the other pair are alternately connected by means of a second reversing valve to the furnace's waste gas outlet duct and combustion air inlet duct.

2 Claims, 1 Drawing Figure
A rolling mill roll assembly includes a roll shaft having a tapered portion located adjacent to an end portion. An annular tungsten carbide work roll is received on the tapered shaft portion. The work roll has circumferentially spaced keys integrally formed on its outer face. A tapered sleeve is axially wedged between the work roll and the tapered shaft portion. A drive ring is connected to the sleeve. The drive ring is splined to the shaft end portion and is provided with lug members which are axially received between and which are rotatably engaged with the keys on the outer roll face. Driving torque is thus transmitted from the shaft to the roll via the driving ring, with the roll being concentrically located with respect to the shaft axis by the tapered sleeve.

13 Claims, 5 Drawing Sheets
Disclosed is an annular roll for use in combination with a roll shaft having a tapered portion and an end portion, the roll surrounding the tapered shaft portion and having circumferentially spaced keys in an outer face thereof, an abutment engageable with an inner face of the roll to axially locate the roll on the roll shaft, a tapered sleeve axially received in a tightly wedged position between the roll and the tapered portion of the roll shaft, an axially shiftable drive ring connected to the sleeve and spline to the shaft for rotation therewith, the drive ring having lugs rotatably interengaged with the keys on the outer face of the roll, a first retainer engageable with the outer face of the roll to axially urge the roll against the abutment, and a second retainer engageable with and acting through the drive ring to prevent axial removal of the sleeve from between the roll and the tapered portion of the roll shaft, a tool for axially shifting the tapered sleeve into and out of its wedged position between the roll and the tapered portion of the roll shaft.

2 Claims, 5 Drawing Sheets
A rolling mill laying head has a first tubular shaft mounted on first bearings for rotation relative to a stationary housing structure. A second hollow shaft carrying a three dimensionally curved laying pipe is mounted on second bearings for rotation relative to the first hollow shaft. Both hollow shafts are rotatably driven in the same direction at different speeds.
ABSTRACT

A portable carrier module for transporting work rolls and entry and exit guides to and from a cantilevered roll stand in a rolling mill. The carrier module remains removably mounted on the roll stand during the rolling operation, and includes integral roll cooling means automatically coupled to water supply conduits extending through the roll stand housing.

10 Claims, 4 Drawing Figures
Decelerator apparatus acting to reduce the distance over which lengths of hot rolled product slide before coming to a halt on leaving a rolling mill stand.

So as to avoid the use of pinch rolls or the like, the apparatus employs deforming rollers acting on a leading length of said rolled product in a direction perpendicular to its length and a shear for severing the leading length of product from a following length being acted on by said rolling mill stand whilst said rollers are still in motion.

11 Claims, 5 Drawing Sheets
A tool for use in combination with an annular roll fixed on the end of a shaft by means of a sleeve axially inserted in wedged engagement therebetween. The tool includes a hydraulically actuated piston-cylinder assembly having an axially extending mounting stem which is adapted to be received in detachably interlocked engagement within an axial blind bore in the end of the shaft. The cylinder is rotatable on the stem to adjust the tool between sleeve removal and sleeve inserting positions. When in the sleeve removal position, the piston bears against the shaft end and the cylinder engages and removes the sleeve. When in the sleeve insertion position, the cylinder is checked against a stop on the mounting stem and the piston urges the sleeve into wedged engagement between the roll and the shaft.

5 Claims, 3 Drawing Sheets
A rolling mill run-in table has at least two parallel paths extending alongside the receiving end of a cooling bed. First and second slide members extend respectively along each path on the side thereof closest to the cooling bed. First and second unitary lift assemblies extend respectively along the opposite side of each path. Each lift assembly has a side channel opening laterally towards the cooling bed. An underlying operating mechanism alternately adjusts the left assemblies between lowermost positions at which their side channels are closed by the adjacent slide members and aligned with the respective paths to confine product lengths moving axially therealong, and elevated positions at which the side channels are above the receiving paths and clear of the adjacent slide members to accommodate lateral discharge of the product lengths onto the receiving end of the cooling bed.