United States Patent

Properzi

[15] **3,646,790**

[45] **Mar. 7, 1972**

[54] **APPARATUS FOR A MULTIHEAD ROLLING UNIT ARRANGED TO ENABLE THE RAPID REMOVAL AND REPLACEMENT OF SAID UNIT**

[72] Inventor: **Ilario Properzi**, c/o Continuus S.p.A. Via Cosimo del Fante 10, Milan, Italy

[22] Filed: **Nov. 7, 1969**

[21] Appl. No.: **870,556**

[30] **Foreign Application Priority Data**

Nov. 21, 1968 Italy.....24035 A/68

[52] **U.S. Cl.**.....**72/43**, 72/201, 72/236

[51] **Int. Cl.**.....**B21b 45/02**, B21b 27/06

[58] **Field of Search**.....72/43, 44, 45, 200, 201, 202, 72/236, 237, 238, 239

[56] **References Cited**

UNITED STATES PATENTS

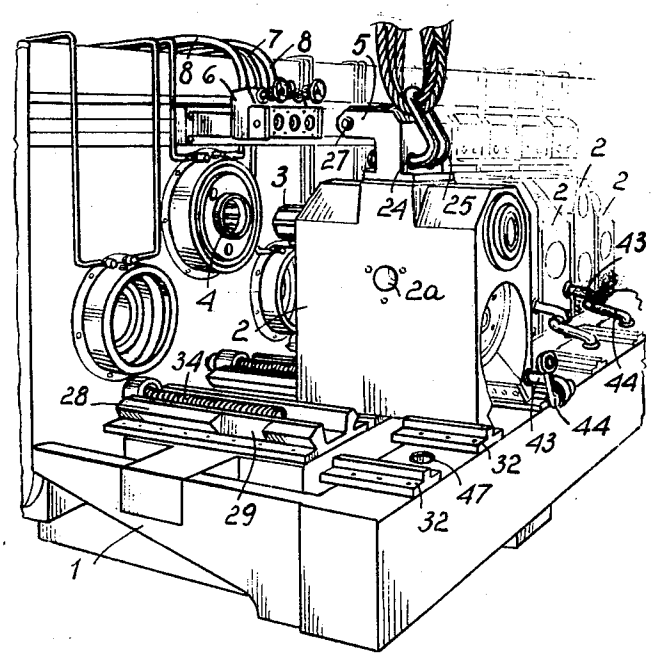
2,996,025	8/1961	Georgeff	72/446
3,221,529	12/1965	Chang	72/237
3,312,096	4/1967	Stubbs et al.	72/238
3,316,746	5/1967	Kocks et al.	72/238
3,328,973	7/1967	Schieb	72/239
3,355,923	12/1967	Gillet	72/239
3,406,552	10/1968	Krauss et al.	72/236
3,525,244	8/1970	Bohnenkamp	72/238

Primary Examiner—Richard J. Herbst
Assistant Examiner—E. M. Combs
Attorney—Guido Modiano and Albert Josif

[57] **ABSTRACT**

An apparatus for multihead rolling units in which each unit is removably mounted on a fixed bed and provided with a lubricating and cooling fluid distributor. Said distributor comprises two portions fast with the fixed bed and the unit, respectively. Said portions include direct operation valve means arranged to automatically open and close the fluid flow passage in the engagement and disengagement phases, respectively, during the sliding movement of said unit along respective guides.

3 Claims, 12 Drawing Figures



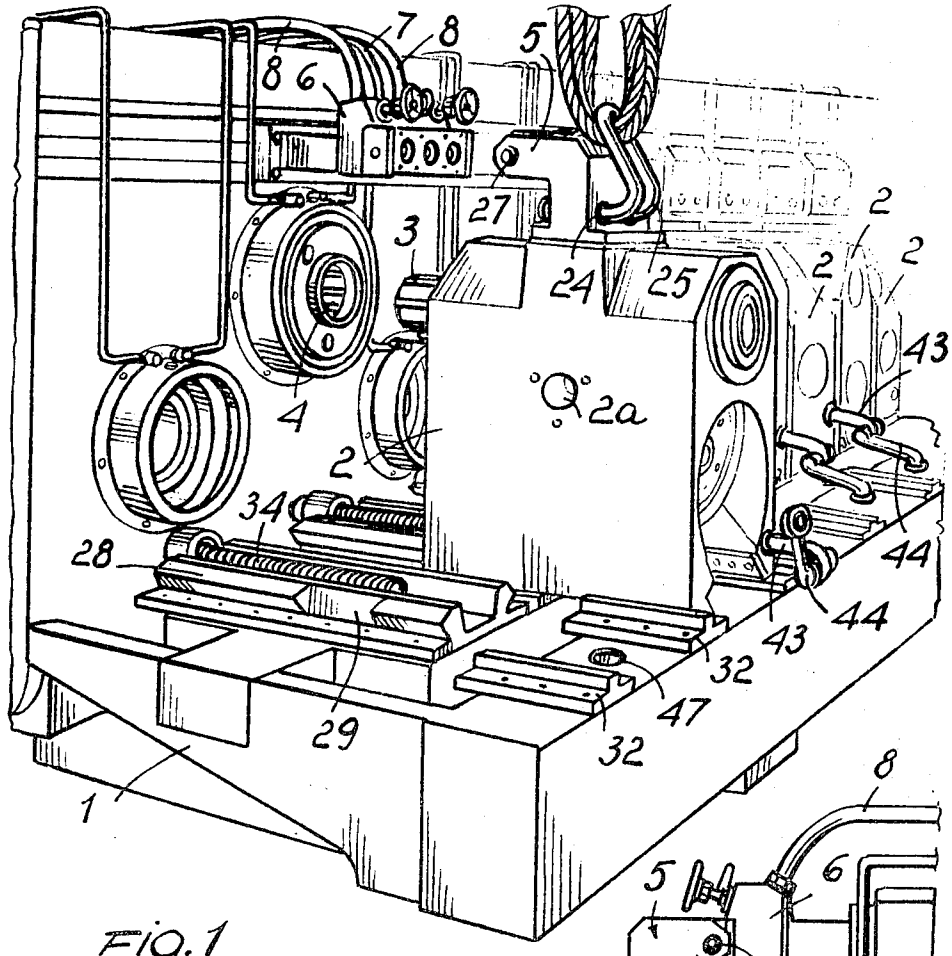


FIG. 1

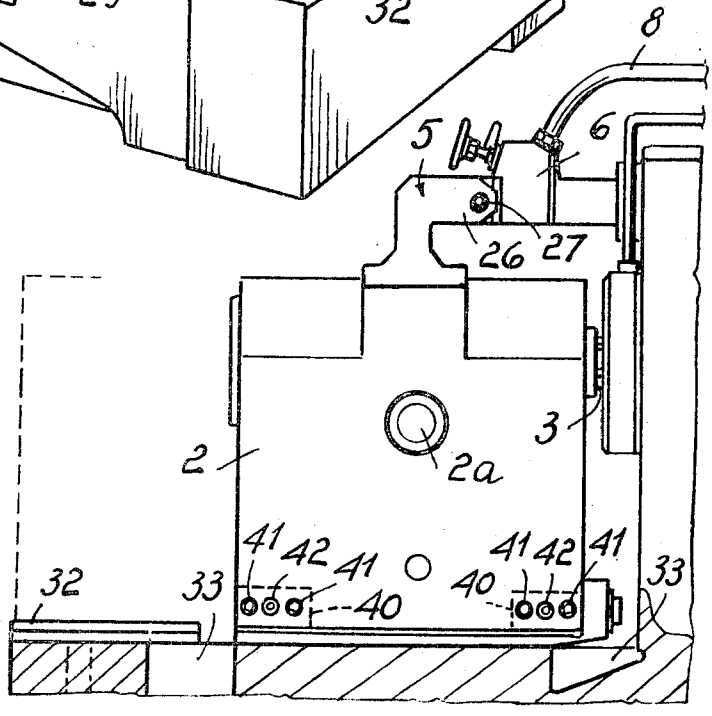


FIG. 2

INVENTOR
ILARIO PROPERZI

BY

AGENT

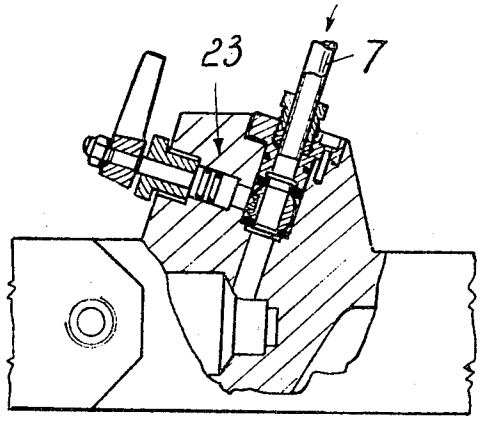


Fig. 5

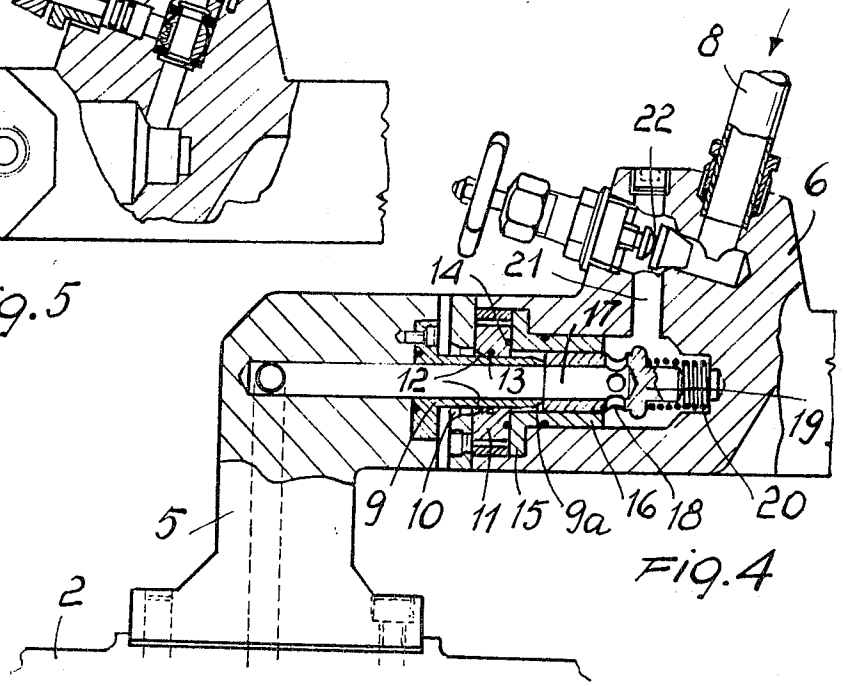


Fig. 4

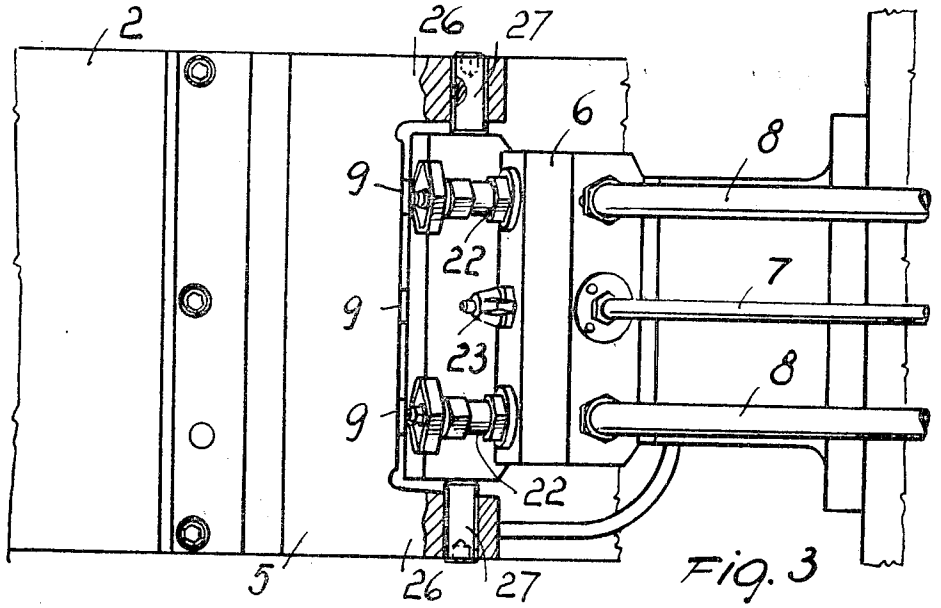


Fig. 3

INVENTOR
ILARIO PROPERZI

BY

Albert Josif
AGENT

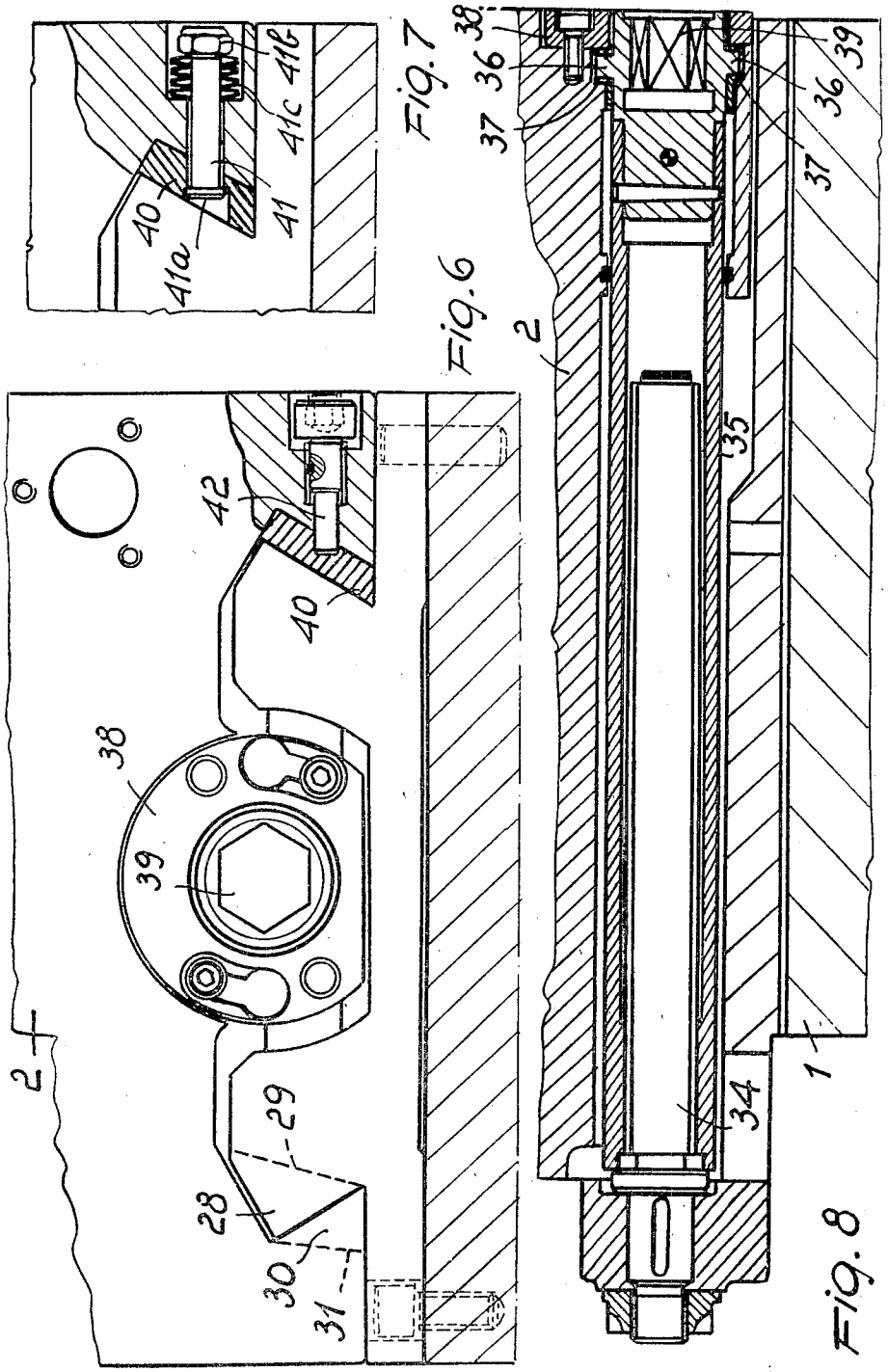


Fig. 7

Fig. 6

Fig. 8

INVENTOR.
ILARIO PROPERZI

BY

Albert Josif
AGENT

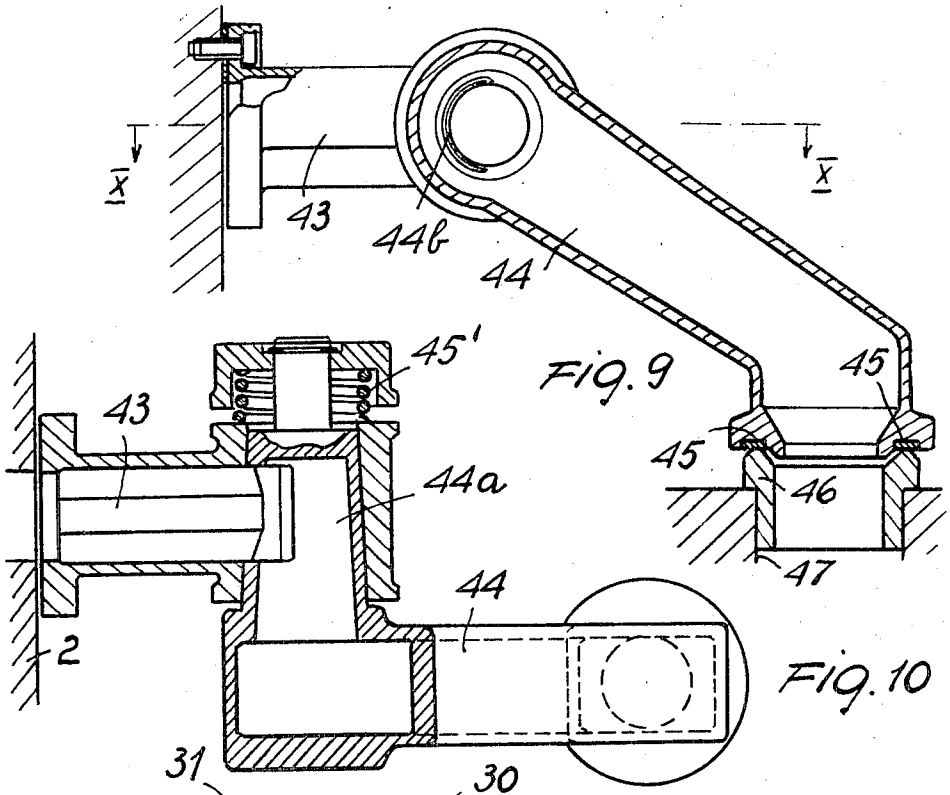


FIG. 9

FIG. 10

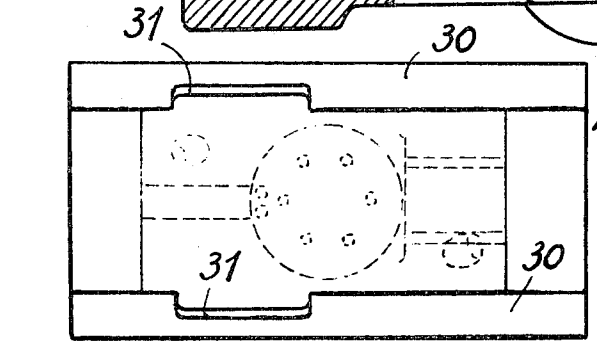
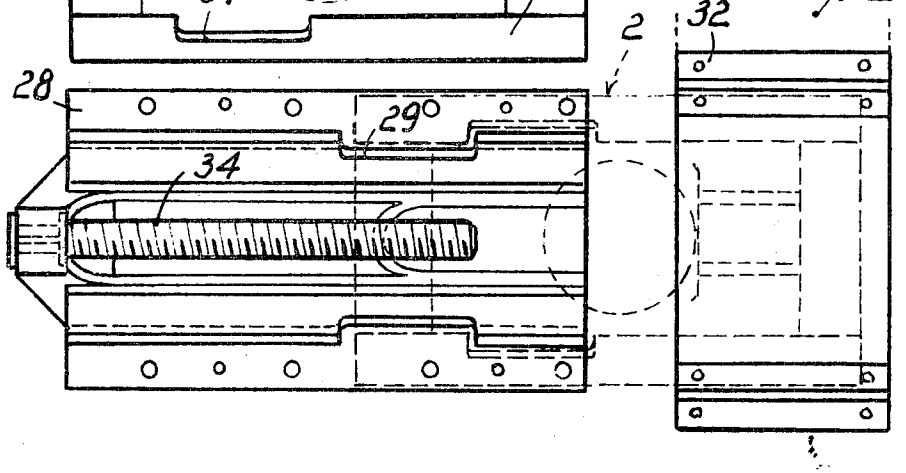


FIG. 11

FIG. 12



INVENTOR
ILARIO PROPERZI

BY

AGENT

APPARATUS FOR A MULTIHEAD ROLLING UNIT ARRANGED TO ENABLE THE RAPID REMOVAL AND REPLACEMENT OF SAID UNIT

BACKGROUND OF THE INVENTION

The present invention relates to an apparatus for use with a multihead rolling unit, for example of the kind for the production of wire rods, which apparatus is designed to enable the rapid removal and replacement of said unit.

As is known, a multihead roller for the production of wire rods comprises a plurality of monoblocks or units, each of which contains rolling cylinders and the relative driving transmissions. Such units are arranged in side-by-side relationship on the fixed table of the roller in manner such that it is possible to replace the units separately when revision or overhaul is necessary.

At present it is not possible to replace a unit in rapid and simple manner since it is firstly necessary to disconnect the flexible connections relative to the oil ducts for the lubrication of the gears associated with the rolling cylinders, the ducts arranged to pass cooling emulsion to the rolling guides and cylinders, and the oil discharge ducts. When this has been done the unit can be displaced laterally by disengaging it from the relative guides and then raising it by means of a winch.

The unit which has to replace the unit sent for overhaul, is mounted by effecting the operations described above in the reverse order.

The rolling mill consequently remains idle for a relatively long period of time and this has a considerable adverse effect on productivity.

The main object of the present invention is that of considerably reducing time losses involved in the replacement of the units of a multihead rolling mill, by providing an apparatus which enables the rapid and ready replacement of a rolling unit.

Another object of the invention is that of providing an apparatus of the described type which, after the replacement of a rolling unit, does not necessitate new adjustments in the supplies of lubricating and cooling fluids.

SUMMARY OF THE INVENTION

According to the invention there is provided an apparatus for multihead rolling units, in which each unit is releasably mounted on the fixed framework and is arranged for sliding on substantially horizontal guides, the improvement wherein the lubricating and cooling fluid distributor comprises a first portion fast with the top of said unit, a second portion fast with the fixed framework of said rolling mill and cooperating with said first portion, a plurality of unions associated with said first and second part of the distributor for the passage of said fluids towards the various members of said unit, nozzle end portions of said unions associated to said first portion of the distributor and arranged to be seal inserted in corresponding holes formed in said second portion of the distributor, and valve means associated to the unions of said second portion of the distributor and arranged to be actuated directly by said nozzle portions in the opening direction during the engagement phase and indirectly in the disengagement phase, during the sliding of said unit on said guides.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will appear more clearly from the following detailed description of a preferred embodiment of an apparatus according to the invention for a multihead rolling unit, illustrated by way of example in the accompanying drawing in which:

FIG. 1 is a perspective view of a multihead rolling mill with one unit in raised position;

FIG. 2 is a side view of a multihead rolling mill unit in the working position;

FIG. 3 is a partial plan view of a rolling mill unit in the working position;

FIG. 4 is a cross-sectional view, to an enlarged scale, of the distributor for the cooling and lubricating fluids;

FIG. 5 is a cross-sectional view of a valve member which can replace that shown in FIG. 4;

FIG. 6 is a partially sectioned front view of the lower portion of a rolling mill unit;

FIG. 7 shows a detail of the guide arrangement for a rolling mill unit;

FIG. 8 shows, in vertical means section, a detail of the displacement device for a rolling mill unit;

FIG. 9 shows, partially in elevation and partially in section, a lubrication fluid discharge device for a rolling mill unit;

FIG. 10 is a sectional view taken along the line X—X of FIG. 9;

FIG. 11 is a view from below of the guides of a rolling mill unit, and

FIG. 12 is a plan view of guides fast with the fixed framework of the rolling mill for the sliding of a rolling mill unit.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to the drawings, the apparatus according to the embodiment for the replacement of a multihead rolling mill unit comprises various devices arranged to enable the rapid removal and replacement of said unit. The illustrated example relates to a rolling mill comprising a fixed framework 1 and a plurality of monoblocks or units 2 mounted for sliding on horizontal guides so that they cannot be displaced laterally. Such rolling mill is, for example, of the kind for the manufacture of wire rods.

Each unit 2 contains rolling cylinders and the relative control transmissions which are driven by a grooved shaft 3 which projects from the back of the rolling mill. When the rolling mill is in operation the grooved shaft 3 engages in a countermember 4 mounted on the fixed framework 1 (FIG. 1) and rotated by suitable driving means.

As is known, each unit 2 must be connected to ducts along which there are passed lubrication fluid for the gears associated to rolling cylinders, and cooling emulsions for the guides and rolling cylinders (the ingot being rolled is caused to pass continuously from one unit to another through the holes 2*a* provided in such units 2; the guides which must be suitably cooled being arranged adjacent said holes 2*a*).

According to the embodiment, the means for supplying the cooling and lubricating fluids comprise a first portion or top body 5 mounted on the top of each unit 2, and a second portion or distributor 6 fast with the vertical portion of the fixed framework 1, said portions defining rapid connection means for the passage of the fluids to the units 2.

The unit 2 shown is of the kind which requires a central duct 7 for the lubricating fluid and two lateral ducts 8 for the cooling emulsion, but, obviously, the arrangement and number of ducts may be varied according to the kind of monoblock.

Said first portion 5 comprises three nozzle projections 9 (FIG. 4) arranged with their axes horizontal and having a conical terminal portion 9*a*.

Said nozzle portions 9 constitute the ends of ducts for the distribution of lubrication and cooling fluids inside the unit 2.

As is clearly shown in FIG. 4, each nozzle portion 9 is inserted in a relative horizontal-axis duct hole formed in the portion 6 of the distributor fast with the framework 1.

More precisely, there is provided an entrance portion 10 having a conical lip and followed by a ring 11 which is mounted for lateral displacement with a certain degree of play and having a conical lip 12. The ring 11 is also provided with an internal gasket 13 and a front gasket 14, arranged to respectively engage the outer surface of the nozzle portion 9 and a shoulder 15 fast with the portion 6 of the distributor. Said shoulder 15 forms part of a first hollow sleeve 16 in which there is slidably mounted a second cylindrical hollow sleeve member 17 provided with lateral bores 18 forming passage means for the fluid and terminating in a cap portion 19 which engages a spring 20. Said spring 20 is arranged to urge the hollow sleeve member 17 outwards. In the working position, the unions of the portion 5 are in communication with the ducts 7

and 8 through the bores 18 of the relative members 17 of the portion 6 of the distributor and the expanded chamber formed at the end of the sleeve member 16 below the ducts 21 controlled by valve members 22 (FIG. 4) or 23 (FIG. 5). The valve member 22 is of the adjustable kind so that the delivery of cooling emulsion may be varied according to desire; the valve member 23 controlling the delivery of lubricating fluid is not adjustable but may simply be closed or fully opened.

In the working arrangement (FIG. 4) each nozzle portion 9 pushes the relative member 17 so that the bores 18 of the latter permit the passage of fluid; while in the unit replacement position (FIG. 1) each nozzle portion 9 is spaced from the portion 6 of the distributor so that the relative member 17 moves outwards, under the action of the spring 20, until the bores 18 are closed by the sleeve 16. That is to say, during the forward displacement of the unit 2 there occurs the automatic closure of the fluid passage.

During the displacement of the unit 2 towards the working position, each nozzle portion 9 firstly passes through the entrance 10 and is then inserted in the hole of the ring 11, due to the lip 12 provided in the ring 11, while said ring can displace laterally since, as previously stated, it is arranged with a certain degree of play. In this way the self-centering of the seal ring 11 and the insertion of each nozzle portion 9 in the hole provided in the ring 11 are ensured, even when there is not a perfect axial alignment with the relative hole formed in the portion 6 of the distributor. As the displacement of the unit 2 towards the working position continues, each nozzle portion 9 engages endwise with the relative member 17, after which the fluidtight seal is ensured by the gasket 13. The member 17 is thus displaced until it reaches the position shown in FIG. 4 in which the flow of fluid through the holes 18 can take place.

The valve members 22 (which may be adjusted by acting on relative control knobs) establish the delivery of fluid and, due to the automatic opening and closure of the fluid passages, it is not necessary to displace such control knobs when the unit 2 is replaced. In similar manner it is not necessary to displace the control lever of the valve member 23 during such replacement operations.

In order to ease the upward displacement of the unit 2, during the raising step, the portion 5 fast with said unit is provided wit bores 24 through which the hooks 25 (FIG. 1) of a raising crane may be inserted.

The portion 5 also has lateral projections 26 (FIG. 3) arranged so as to form a fork which surrounds the portion 6 of the distributor in the working position. Each lateral projection 26 is provided with a screw 27 which can be adjusted so as to approach the portion 6 of the distributor and sturdily lock the upper portion of the unit 2 to the fixed framework 1 and thus eliminate any possible oscillations of the unit 2 during operation.

For the sliding of the unit 2 dovetail guides are provided. More precisely, each unit 2 slides on two parallel prismatic guides 28 secured horizontally on the fixed framework 1 and provided with notches 29. The lower portion of the unit 2 correspondingly has counterguides 30 (FIG. 11) with notches 31 (in FIG. 11 the unit 2 is seen from below).

The notches or narrowed portions 29 and 31 are provided in positions such as to enable, in the advance raising position of the unit 2 (shown in dotted lines in FIG. 12), the disengagement of the guides 28 from the counterguides 30. In such arrangement, moreover, the front portion of the unit 2 abuts on T-section guide portions 32 secured horizontally on the fixed framework 1 in suitable alignment with the guides 28 (FIGS. 1 and 12). Between the guide portions 32 and the guides 28 there passes a portion of a collection channel 33 for the cooling emulsions.

The displacement of the unit 2 is effected by means of the device shown in FIG. 8. Such device comprises a screw 34 fixed horizontally between the guides 28 and arranged to extend forward cantileverwise for a certain distance. Said screw 34 engages a female screw 35 which is mounted, with its axis horizontal, for rotation adjacent the base of the unit 2. The frontal portion of the female screw 35 has an annular ridge 36 which, on one side, engages a shoulder 37 forming part of the body of the unit 2 and, on the other side, engages a rapidly demountable flange 38. The front end of the female screw 35 has a polygonal cavity 39 inside which the correspondingly shaped point of a driving unit (such as an electric or pneumatic drilling machine) arranged to facilitate the displacement of the unit 2 may be inserted.

The arrangement shown in FIG. 8 corresponds to the working position with the female screw 35 screwed fully on the fixed screw 34. In order to bring the unit 2 into the advanced position, the point of said driving unit is inserted in the polygonal cavity 39 of the female screw 35 and the driving unit is actuated so as to rotate the female screw and unscrew it from the fixed screw 34. The unit 2 then slides on the guides 28, the female screw 35 being retained by the flange 38. The advancement of the unit 2 on the guides 28 is continued until the front portion of the unit 2 is in alignment with that of the base of the fixed framework 1, so that said unit 2 is in the raising position and its forward portion rests on the guide portions 32. In order to permit the raising of the unit 2 it is, however, necessary to further unscrew the female screw until it is disengaged from the fixed screw 34. To do this it is necessary to briefly rotate the rapidly demountable flange 38 so as to free it, after which it is possible to rotate the female screw 35 and fully disengage it from the fixed screw 34 without the occurrence of any advancement of the unit 2.

The unit 2 may then readily be raised and replaced with another unit.

For the adjustment of the play in the sliding movement of the unit 2, at least a portion of the latter is provided, adjacent the counterguides 30, with a pair of gibs 40 (FIGS. 2, 6 and 7), each of which is retained by two lateral bolts 41 and a central pusher member 42. Each bolt 41 (FIG. 7) has, on one side, a widened portion 41*a* which engages a corresponding shoulder formed in a bore passing through the relative gib 40, while, on the other side, the head 41*b* engages a set of cup springs 41*c* acting on a corresponding shoulder so as to pull the bolt 41 outwards. In this way the gib 40 is resiliently retained on the body of the unit 2. The pusher member 42 arranged centrally with respect to each gib can be screwed, to a greater or smaller degree, by acting externally, so as to suitably position the gib 40 for the adjustment of the play (FIG. 6).

For the discharge of the lubricating liquid each unit 2 is provided with a pipe union (FIGS. 9 and 10) comprising a first tubular fixed section 43 and a second tubular section 44 mounted for rotation on said fixed tubular section 43. More precisely, the section 44 has an elbow-joint shape with a truncated cone-shaped lateral projecting portion 44*a* rotatably inserted in a corresponding hollow seat, at right angles thereto. The insertion of the portion 44*a* in the relative seat is ensured by the action of a spring 45' (FIG. 10). In the portion 44*a* there is provided a lateral aperture 44*b* which, in the working arrangement (FIG. 9), communicates with the cavity of the fixed section 43.

By rotating the section 44 upwards the aperture 44*b* is closed by the wall of the seat of the portion 44*a*, so that the closure of the fixed tubular section 43 is obtained. The end of the rotatable section 44 is provided with a seal gasket 45 which engages, in the working arrangement (FIG. 9), the upper edge of a collar 46 fixed to a hole 47 which communicates with the collector for the lubricating fluid.

When it is desired to pass from the working arrangement to the replacement situation, the discharge device of the unit 2 is disposed with the section 44 raised, as indicated in FIG. 1; in this way the closure of the section 43 is ensured and it is possible to slide the unit 2 forwards.

From the preceding description the working of the apparatus according to the embodiment will be clear.

The advancement of the unit 2 may be carried out rapidly after having rotated the section 44 of the lubrication discharge unit upwards, without it being necessary to disconnect or displace the lubrication or cooling liquid feed unions. The

mounting of a new unit in place of the unit 2 removed is equally easy since the connection with the lubrication and cooling fluid feed unions 7 and 8 is automatic; when the unit has reached the operative position, the section 44 of the lubricating fluid discharge union is lowered, so that the tubular section 43 is simultaneously placed in communication with the lubrication fluid collector.

It will be apparent to those skilled in the art that many modifications and variations are possible within the scope of the appended claims.

1. An apparatus for multihead rolling units, comprising a fixed framework, a plurality of substantially horizontal guides, each unit being releasably mounted on a pair of said guides, a lubricating and cooling fluid distributor, arranged on said framework, adjacent to each unit, and means for discharging said lubricating and cooling fluid, each adjacent to said units, each distributor having at least one duct hole for the lubricating fluid and one duct hole for the cooling fluid, connected to lubricating and cooling fluid supplies, a top body on each unit for cooperation with said distributor, means, on each unit, for the rapid connection of said top body with said distributor, and of said unit with said discharging means, respectively, to cause communication for the lubricating and cooling fluid through said unit, and means for displacing said unit on said guides, wherein, according to the improvement, said means for the rapid connection of said top body with said distributor comprises a nozzle projection for the lubricating and for the cooling liquid, respectively, communicating with the internal lubricating and cooling means of each unit, respectively, a first hollow sleeve member arranged rigidly inside each of said duct holes of said distributor and defining at its end internal to said distributor a chamber communicating with said fluid supplies, a second hollow sleeve member, slidably mounted inside said first hollow sleeve member, and having lateral passage means near its end internal to said distributor, said second sleeve member being movable by said nozzle projection when said unit is approached to said distributor from an external position in which said lateral passage means are closed by said first hollow sleeve member into an internal position in which said lateral passage means are in communication with said chamber, resilient means being provided internally to said duct holes to cause said second sleeve member to be urged into said external position to close communication from said distributor to said units, and wherein said means for rapid connection of said units with said discharging means comprise an articulated pipe union having direct operation value means for closing the passage of fluid after disconnecting said pipe union at one of its ends.

2. An apparatus according to claim 1, wherein said articulated pipe union comprises a first section rigid with said unit and provided at its free end with a hollow seat defining an axis thereinside and extending substantially at a right angle with said first section, a second section having a lateral projection cooperating with said hollow seat and defining passage means from said second section to said first section, said passage means comprising a lateral aperture in said lateral projection being in alignment with said first section when said second section is connected to said discharging means and being closed by said hollow seat when said second section is released from said discharging means and rotated around said axis of said hollow seat.

3. An apparatus according to claim 1, wherein each unit is mounted slidably on said horizontal guides from an internal working position to an external replacement position and wherein said guides are provided with narrowed portions for the disengagement in said external replacement position, guide portions also being arranged on the front of the framework base for supporting the front portion of the unit in said external replacement position.

* * * * *