

EUROPEAN PATENT APPLICATION

Application number: 85306238.8

Int. Cl.⁴: **B 21 B 39/16**
B 21 B 39/14

Date of filing: 03.09.85

Priority: 20.05.85 JP 106174/85

Date of publication of application:
 26.11.86 Bulletin 86/48

Designated Contracting States:
 DE FR GB IT SE

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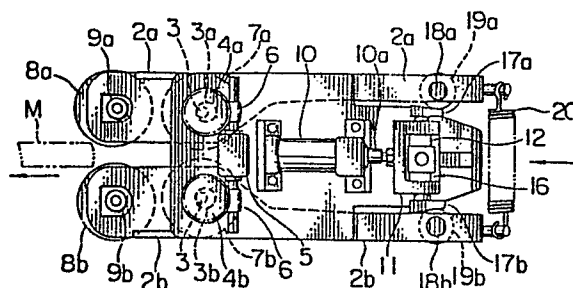
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Rolling mill guiding unit.

There is disclosed a rolling mill guiding unit which comprises a support stand (1), a pair of roller holders (2a, 2b), a pair of guide rollers (8a, 8b) rotatably mounted one on each holder (2a, 2b) at one end thereof and defining therebetween a roller gap through which rolling material (M) is passed, a respective pivot (3) mounting each holder (2a, 2b) on the support stand, a spring arrangement (20) engaging with the holders (2a, 2b) so as to bias them to turn about the pivots (3) in a direction such as to increase the roller gap between the guide rollers (8a, 8b), and a driving device (10) engaging with the holders (2a, 2b) and operable to cause the holders to turn about their pivots (3) in a direction such as to reduce the roller gap and thereby force the guide rollers (8a, 8b) into engagement with the rolling material (M). The driving device comprises a ram (10) which has a line of action extending parallel to the direction of passage of the rolling material (M) through the rolling mill, and a transversely extending support element (16) can be reciprocated longitudinally of the rolling mill for the purposes of varying the adjustment of the roller gap. A pair of sliders (17a, 17b) are mounted one on each end of the transversely extending support element (16) and engage with pressure rollers (19a, 19b) provided on the holders (2a, 2b) on the other side of the pivots (3) from the guide rollers (8a, 8b). The sliders (17a, 17b) have continuous engagement with the pressure rollers (19a, 19b) via smooth wedging surfaces, thereby enabling accurate adjustment of the roller gap under the action of the

ram (10). In addition, fine adjustment of the roller gap can be obtained by forming the support element (16) from two separable shaft portions (16a, 16b) having oppositely directed external threads, and by providing an internally threaded pipe (21) which is mounted on the shaft portions. The pipe (21) can be manually rotated by a ratchet mechanism (23, 24), or a spanner (S) engaging a nut-like portion (211), in order to effect fine adjustment of the roller gap. This fine adjustment can be carried out when rolling material (M) is passing through the rolling mill, or in the absence of the rolling material.

FIG. 2



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ROLLING MILL GUIDING UNIT

This invention relates to a rolling mill guiding unit comprising a support stand, a pair of roller holders, a pair of guide rollers rotatably mounted one on each holder at one end thereof and defining therebetween a roller gap through which rolling material is passed, a respective pivot mounting each holder on the support stand, a spring arrangement engaging with the holders so as to bias them to turn about the pivots in a direction such as to increase the roller gap between the guide rollers, and a driving device engaging with the holders and operable to cause the holders to turn about their pivots in a direction such as to reduce the roller gap and thereby force the guide rollers into engagement with the rolling material.

The guiding unit of the invention is operable with rolling material, such as, for example, wires and rods. As is well known, in order to obtain high dimensional accuracy of rolling material, such as wires or rods, by means of rolling operations in a rolling mill, accurate (inductive) guidance of the material plays an important part. The stronger the pressing action of the guide rollers on the rolling material, the more efficient will be the guiding function. However, for a strong pressure action of a guide roller, the gap between the rollers may become slightly smaller than the dimension of the rolling material, causing the latter to force its way through the roller gap thereby involving the risk of shock loadings being applied to the guide rollers. In view of this potential unfavourable situation, it has been proposed that the guide rollers should be held wide apart each time the rolling material is introduced and, at the moment when it enters the roller gap, the rollers are caused to reduce the gap in order to achieve positive (inductive) guidance of the rolling material.

Reference will now be made to Figure 6 of the

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accompanying drawings, which shows one conventional construction of inductive guiding unit of a rolling mill. A box B carries a pair of roller holders 33 which each carry a respective guide roller 31 at one end, the holder 5 33 being pivotally mounted in the box B via a shaft A. The opposite ends of the roller holders 33 are interconnected by a spiral tension spring S, and this exerts a spring force tending to draw the rear ends of the holders 33 towards each other, thereby increasing the 10 roller gap defined between the guide rollers 31. However, in order to close the roller gap between the guide rollers 31, a hydraulic cylinder 32 is provided which is arranged to act between the roller holders 33, on the side of the shaft A remote from the guide rollers 15 31, and operation of the cylinder 32 causes the guide rollers 31 to be moved into engagement with the rolling material M as it passes through the guiding unit. In the event of change in dimension of rolling material to be passed through the guiding unit, adjusting bolts 34 are 20 provided which are located between the hydraulic cylinder 32 and the roller holders 33, to permit any necessary adjustments in the roller gap in accordance with the dimensions of the rolling material.

Reference will also be made to Figure 7 of the 25 accompanying drawings, which also shows a conventional arrangement of inductive guiding units of a rolling mill. In this arrangement, a hydraulic cylinder 42 acts between a pair of roller holders 43, and a ram 42a of the cylinder is coupled with a sliding cam 45 having a 30 stepped external profile which makes contact, on each side thereof, with a respective follower spindle 46. Adjusting screws 44 are fitted on each of the roller holders 43, to permit axial adjustment of the spindles 46. In the arrangement of Figure 7, upon reciprocating 35 movement of the sliding cam 45 under the action of cylinder 42, each roller holder 43 is caused to carry out

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a swinging movement about its shaft A, thereby causing stepwise adjustment of the guide rollers 41 provided at the opposite ends of the holders 43. Fine or micro-adjustment of the spacing between the guide rollers 41 can be carried out by operation of the adjusting screws 44, to cause corresponding displacement of the positions of the spindles 46 which contact the sliding cam 45. As in the arrangement of Figure 6, the arrangement of Figure 7 provides a box B, shafts A forming pivots for the roller holders, and a tension spring S which tends to urge the guide rollers 41 apart from each other.

The guiding unit arrangements shown in Figures 6 and 7 have a number of problems in their operation.

Thus, in the arrangement of Figure 6, the hydraulic cylinder 32 operates to adjust directly the spacing between the guide rollers 31, but this spacing cannot be adjusted in the absence of any load i.e. when the rolling material M is not passing through the guiding unit. The construction is such that the guide rollers 31 make contact with the rolling material to create positively a load without fail, and though the hydraulic pressure in the cylinder 32 is capable of adjusting the load to some extent, adjustment to a delicate pressing force is a matter of considerable difficulty. Furthermore, the provision of the bolts 34 on the holders 33 for extending the range of displacements between the roller surfaces does not provide an easy task to carry out the necessary increments of adjustment. In particular, it is not easy to ensure by visual observations that the same amount of increase or decrease has been carried out on both of the bolts. A failure to cause equal adjustment of the bolts will result in misalignment of the centrepoint of the gap between the rollers relative to the line of passage of the rolling material, thereby causing possible admission of material

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with shock loadings and unbalanced nipping pressure, and other so-called mis-rolling phenomena. Furthermore, it is necessary for the rolling mill to be stopped during the course of these adjusting operations, causing
5 detrimental effects on the rate of operation of the rolling mill.

Furthermore, in the guiding unit of Figure 7, there are other problems. Although the gap between the guide rollers 41 can be fixed to a certain value, the use
10 of the step-shaped cam 45 makes stepless adjustments of the roller gap impossible. Furthermore, fine or micro-adjustment has to be carried out by the adjusting screws 44, with similar difficulties to those described above for the adjusting bolts 34 in the arrangement of
15 Figure 6. In particular, fine adjustments remain a serious problem, requiring suspension of operation of the rolling mill while the adjustments take place.

According to the invention there is provided a rolling mill guiding unit comprising a support stand, a
20 pair of roller holders, a pair of guide rollers rotatably mounted one on each holder at one end thereof and defining therebetween a roller gap through which rolling material is passed, a respective pivot mounting each holder on the support stand, a spring arrangement
25 engaging with the holders so as to bias them to turn about the pivots in a direction such as to increase the roller gap between the guide rollers, and a driving device engaging with the holders and operable to cause the holders to turn about their pivots in a direction
30 such as to reduce the roller gap and thereby force the guide rollers into engagement with the rolling material:

characterised in that the engagement between the driving device and the holders is provided by a pair of pressure rollers mounted on the opposite end of the
35 holders and a pair of sliders movable by the driving device in a direction parallel to the direction of

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passage of rolling material through the rolling mill and engaging continuously one each with a respective pressure roller via a smooth wedging surface.

In a guiding unit according to the invention, it
5 is possible to achieve stepless adjustment of the roller gap in an accurate and speedy manner.

Furthermore, in a preferred embodiment of rolling mill guiding unit according to the invention, the sliders are carried one at each end of a transversely extending
10 support element which is arranged to be capable of linear reciprocating movement parallel to the direction of passage of the rolling material under the action of a ram, and the support element comprises a pair of externally threaded and relatively movable shaft portions
15 with oppositely directed threads, and an internally threaded pipe is mounted on the shaft portions. Means is provided for rotating the pipe in order to extend or retract the shaft portions, and thereby permit fine adjustment of the roller gap via the engagement between
20 the sliders and the pressure rollers. Therefore, in this preferred embodiment, stepless fine or micro-adjustment can readily be carried out of the roller gap in a simple and accurate manner. Furthermore, this fine adjustment can be carried out even when the rolling mill is in
25 operation.

The invention will now be described in more detail, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a front view of a preferred embodiment
30 of rolling mill guiding unit according to the invention;

Figure 2 is a plan view of the guiding unit shown in Figure 1;

Figure 3 is a partially enlarged sectional view of parts of an adjustment mechanism of a guiding unit;

35 Figure 4 is a partially enlarged sectional view of an alternative arrangement of adjusting mechanism;

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Figure 5 is a sectional view taking on the line 5-5 in Figure 4; and

Figures 6 and 7, as indicated above, show plan views of two practical examples of conventional constructions of rolling mill guiding units.

As will become evident from the subsequent detailed description of the preferred embodiment, there is disclosed herein a rolling mill guiding unit which comprises a support stand (1), a pair of roller holders (2a, 2b), a pair of guide rollers (8a, 8b) rotatably mounted one on each holder at one end thereof and defining therebetween a roller gap through which rolling material (M) is passed, a respective pivot (3) mounting each holder (2a, 2b) on the support stand, a spring arrangement (20) engaging with the holders (2a, 2b) so as to bias them to turn about the pivots (3) in a direction such as to increase the roller gap between the guide rollers (8a, 8b), and a driving device (10) engaging with the holders (2a, 2b) and operable to cause the holders to turn about the pivots (3) in a direction such as to reduce the roller gap and thereby force the guide rollers into engagement with the rolling material.

In order to provide stepless adjustment of the roller gap, the engagement between the driving device (10) and the holders (2a, 2b) is provided by a pair of pressure rollers (19a, 19b) mounted in the opposite end of the holders and a pair of sliders (17a, 17b) which are movable by the driving device in a direction parallel to the direction of passage of rolling material through the rolling mill and engaging continuously one each with a respective pressure roller via a smooth uninterrupted wedging surface.

The preferred embodiment will now be described in detail.

As represented in Figs. 1 and 2, a pair of roller holders 2a, 2b are supported on a guide box 1 via

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eccentric pieces 3a, 3b of an eccentric shaft 3 which serves as a pivot for swinging motion of each holder. On the upper end of the eccentric pieces 3a, 3b are mounted worm wheels 4a, 4b and with this worm wheel a worm gear 6 supported free to rotate on a pedestal 5 is engaged. On the roller holders 2a, 2b, in the position where rolling material M should be introduced, a pair of sub-rollers 7a, 7b are mounted free to rotate on the eccentric shafts 3 and the distance between the sub-rollers is available for adjustment by means of revolutions of the worm gears 6.

In the end of the roller holders 2a, 2b, a pair of guide rollers 8a, 8b are supported by journals 9a, 9b. The roller gap between the guide rollers 8a, 8b is available for adjustment by an adjusting means in accordance with the change of dimensions of the rolling material M. As the adjusting means, a hydraulic cylinder is adopted as a driving device 10 for a power plant and this cylinder is fastened to the guide box 1 through a frame. A ram 10a of the hydraulic cylinder 10 can make a reciprocating motion to and fro by means of operation of hydraulic valve (not shown). Further, at the end of the ram 10a is mounted a U-shaped bracket 11. As shown in Fig. 3, on the bottom surface of the bracket 11, a sliding bearing 12 provided with an internally expanding groove 12a is fixed with bolts 13. Inside the groove 12a, a rail 15 is fitted which is fixed onto the guide box 1 with a bolt 14. The bracket 11 is, in accompaniment with the forward and backward displacements of the ram 10, available for translation along the rail 15. A transversely extending support element, in the form of a supporting shaft 16, passes through both walls of the bracket 11 and on both ends of the supporting shaft taper sliders or wedges 17a, 17b are fixed. The outside surfaces of the taper sliders 17a, 17b are inclined to the inside facing on the feeding side of

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the rolling material M (Refer to the righthand side of Fig. 2), the width of the slider being made narrowing down in the feed direction. Thus, the engaging surfaces of the sides are smooth, uninterrupted wedging surfaces.

5 Each one of the taper sliders 17a, 17b is kept in contact with a respective one of a pair of pressure rollers 19a, 19b, supported by shafts 18a, 18b in the rear end of the roller holders 2a, 2b. The rear ends of the roller holders 2a, 2b are interconnected by a spiral spring 20

10 which exerts a spring force on the roller holders in such a way that the rear ends tend to approach one another, and by this spring force, the taper sliders 17a, 17b are kept in constant contact with the pressure rollers 19a, 19b.

15 Further, the distance between these guide rollers 8a, 8b is available for fine or micro-adjustment by the following means. Namely, this adjusting means is provided with a turnbuckle consisting of the supporting shaft 16 and an internally threaded pipe 21 mounted

20 thereon. The supporting shaft 16 is, as shown in Fig. 3, comprised of a right-handed screw 16a and a left-handed screw 16b and the inside ends of each shaft are facing each other with a distance between them and on the other hand, the outside ends are fixed securely on the side

25 wall of the bracket 11 with key-bolts 22a, 22b. The threaded shafts 16a, 16b are locked from turning by key-bolts 22a, 22b. The bottom ends of the key-bolts 22a, 22b are available to slide in grooves 161a, 161b which are shaped in the outer periphery of the respective

30 threaded shafts 16a, 16b. The space between the inside ends of the threaded shafts 16a, 16b is connected with the thread fastening with the pipe 21. Both end surfaces of the pipe are in contact with the inside surfaces of the side wall of the bracket 11 and on the outside

35 periphery of the central part of the pipe is provided with a ratchet 23. A round-section handle 24 is formed

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protruding from this ratchet for manual operation of this ratchet.

In the following, description will be made of the adjusting method of a gap between the guide rollers 8a, 8b. Firstly, description will be given on how to narrow down the gap between the guide rollers 8a, 8b further from the situation shown in Fig. 2. At the beginning, when the ram 10a of hydraulic cylinder 10 is permitted to advance, the bracket 11 advances also and, at the same time, the taper sliders 17a, 17b located on both sides of the bracket advance as a single unit and these sliders, while allowing the pressure-rollers 19a, 19b to rotate, impart swinging motions to the roller-holders 2a, 2b with the shafts 3 as fulcrums. This arrangement forces the front end parts of the roller holders to approach each other to a narrower separating distance between them, whereas the rear end parts are forced to be separated one from the other against the spring force of the spiral spring 20. Therefore, the guide rollers 8a, 8b come closer to narrow down the gap between them. As, on this occasion, motions of the bracket 11 and the taper sliders 17a, 17b are limited by those of rail 15 and sliding bearing 12, the same amount of regulation is given to each guide roller. This adjusting operation allows the gap between the rollers to fit the diameter of the rolling material M.

In case a micro-adjustment of the gap between the rollers is required, the following procedures may be followed. For example, in order to reduce the gap slightly, the ratchet 23 is turned via the round-sectioned handle 24, so that the threaded pipe 21 is turned to make outward displacements of the threaded shafts 16a, 16b respectively, whereby the taper sliders 17a, 17b force the pressure rollers 19a, 19b to the outside giving thus a slight swinging motion to the roller holders 2a, 2b with the shafts 3, 3 as the fulcrums.

The above procedures effects a slight narrowing down adjustment of the gap between the rollers.

As a means of rotating the threaded pipe 21, the ratchet 23 is employed in the above example. However, a
5 thickwalled polygonal portion 211 in the middle of the threaded pipe, as shown in Fig. 4 and Fig. 5, may also be used. The width across flats of this polygonal thickened portion fits the width of the jaw of a spanner S for turning the threaded pipe. In this particular example,
10 when compared with the aforementioned example, the construction may be simplified because of elimination of the ratchet mechanism.

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Claims:

1. A rolling mill guiding unit comprising a support stand (1), a pair of roller holders (2a, 2b), a pair of guide rollers (8a, 8b) rotatably mounted one on each
5 holder (2a, 2b) at one end thereof and defining therebetween a roller gap through which rolling material (M) is passed, a respective pivot (3) mounting each holder (2a, 2b) on the support stand, a spring arrangement (20) engaging with the holders (2a, 2b) so as
10 to bias them to turn about the pivots (3) in a direction such as to increase the roller gap between the guide rollers (8a, 8b), and a driving device (10) engaging with the holders (2a, 2b) and operable to cause the holders to turn about their pivots (3) in a direction such as to
15 reduce the roller gap and thereby force the guide rollers (8a, 8b) into engagement with the rolling material (M):

characterised in that the engagement between the driving device (10) and the holders (2a, 2b) is provided by a pair of pressure rollers (19a, 19b) mounted on the
20 opposite end of the holders and a pair of sliders (17a, 17b) movable by the driving device (10) in a direction parallel to the direction of passage of rolling material (M) through the rolling mill and engaging continuously one each with a respective pressure roller via a smooth
25 wedging surface.

2. A guiding unit according to claim 1, characterised in that the sliders (17a, 17b) are carried one at each end of a transversely extending support element (16) which is arranged to be capable of linear reciprocating
30 movements parallel to the direction of passage of the rolling material under the action of a ram (10).

3. A guiding unit according to claim 2, characterised in that the support element (16) comprises a pair of externally threaded and relatively movable shaft portions
35 (16a, 16b) with oppositely directed threads, and in that an internally threaded pipe (21) is mounted on said shaft

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portions (16a, 16b), and means is provided for rotating said pipe (21) in order to extend or retract the shaft portions and thereby permit fine adjustment of the roller gap via the engagement between the sliders (17a, 17b) and
5 the pressure rollers (19a, 19b).

4. A guiding unit according to claim 3, characterised in that said means for rotating the pipe (21) comprises a ratchet mechanism (23, 24).

5. A rolling mill according to claim 3, characterised
10 in that said means for rotating the pipe (21) comprises a nut-like portion (211) on the pipe which is engageable by a spanner (S).

6. A guiding unit according to any one of claims 1 to 5, characterised in that additional rollers (7a, 7b) are
15 rotatably mounted on said pivots (3).

7. A guiding unit according to claim 6, characterised in that said pivots (3) are formed by eccentric shafts which are coupled with worm and worm wheel arrangements (4a, 4b; 6) operable to adjust the lateral spacing
20 between the additional rollers (7a, 7b).

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FIG. 1

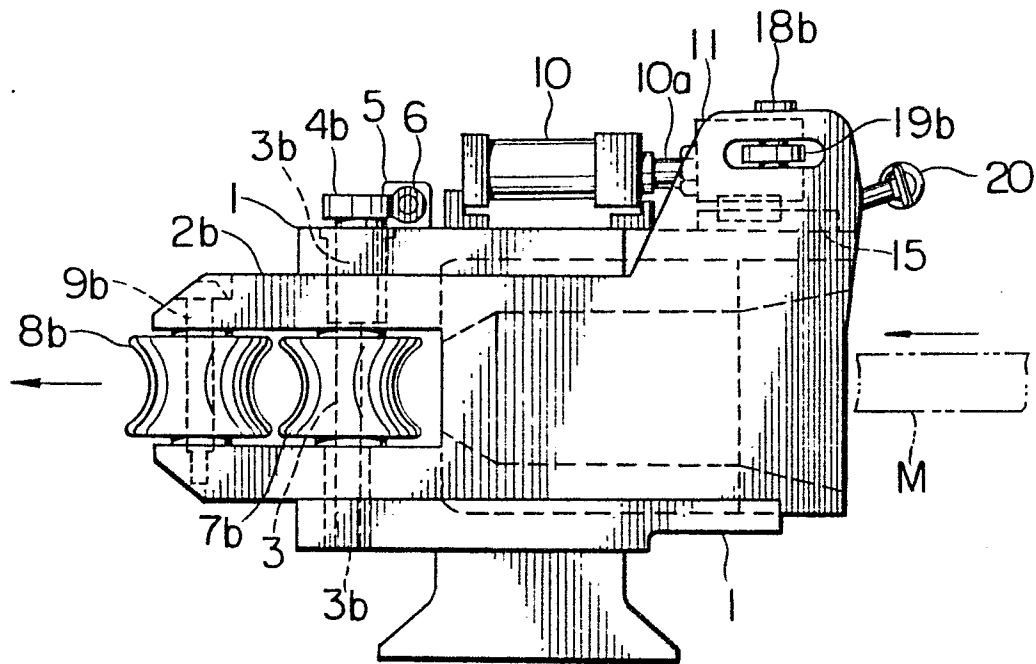


FIG. 2

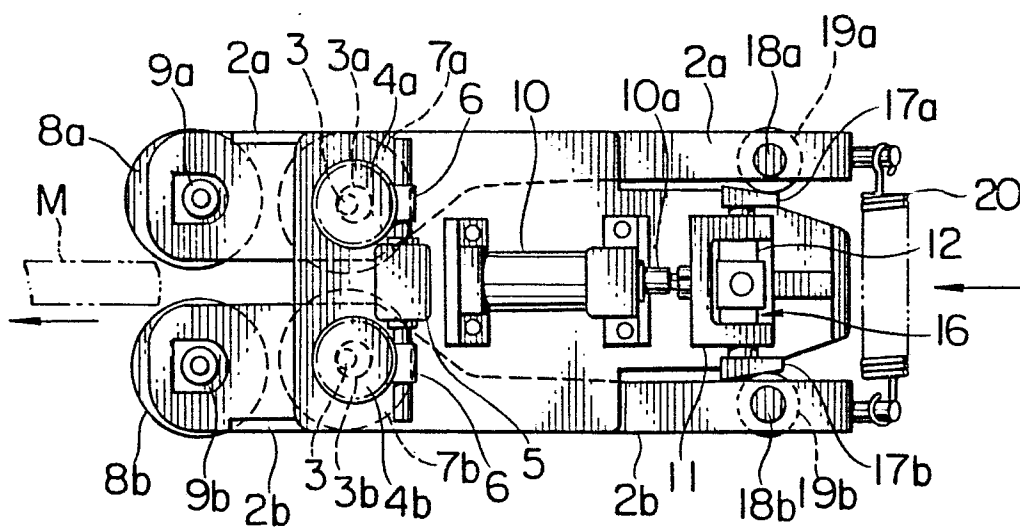


FIG. 3

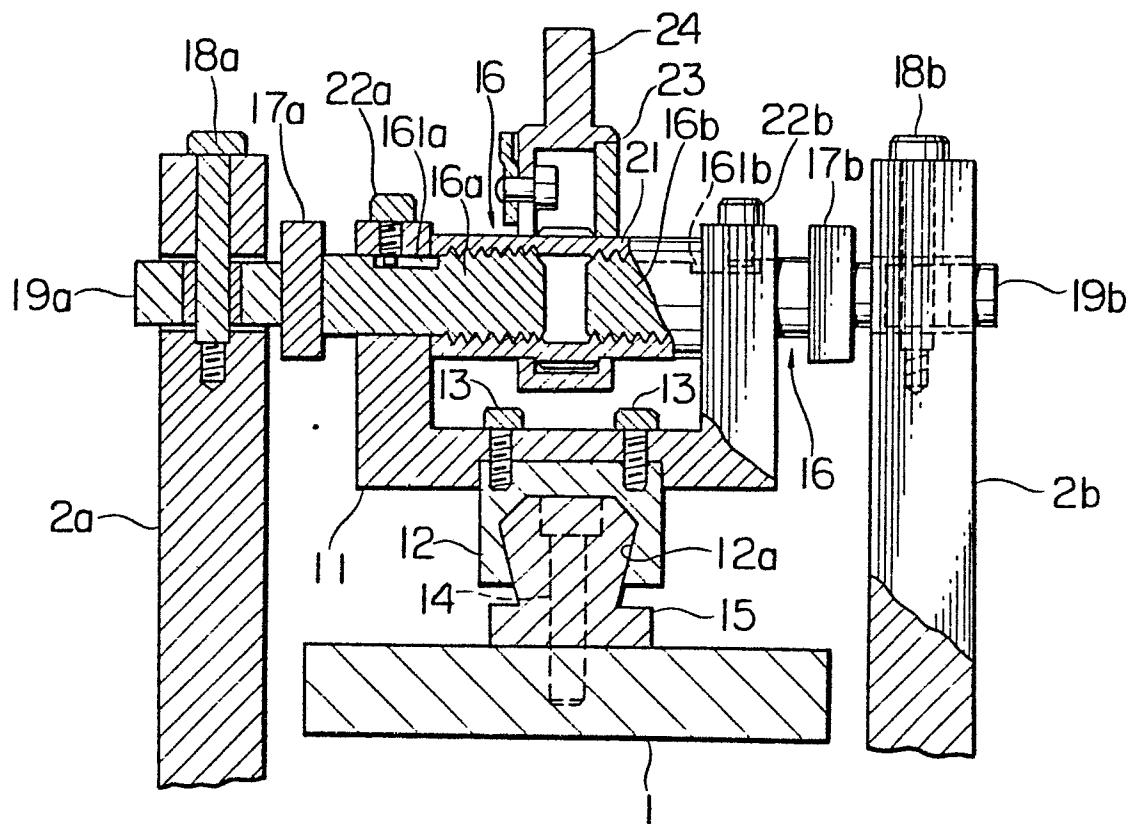


FIG. 4

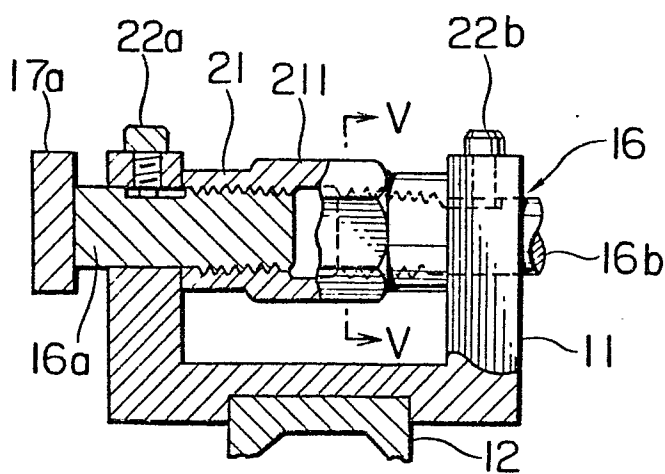


FIG. 5

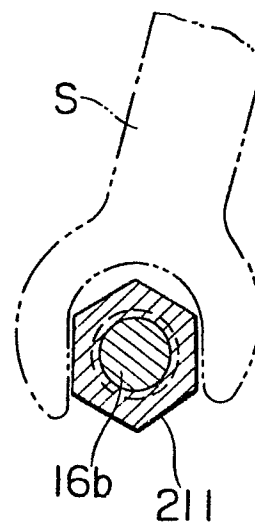


FIG. 6

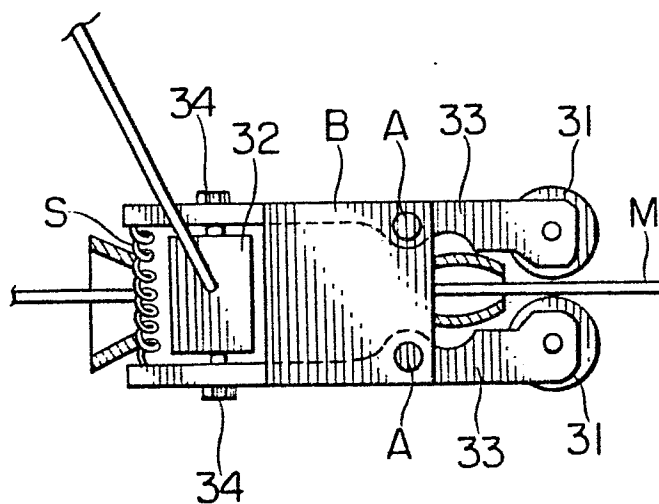
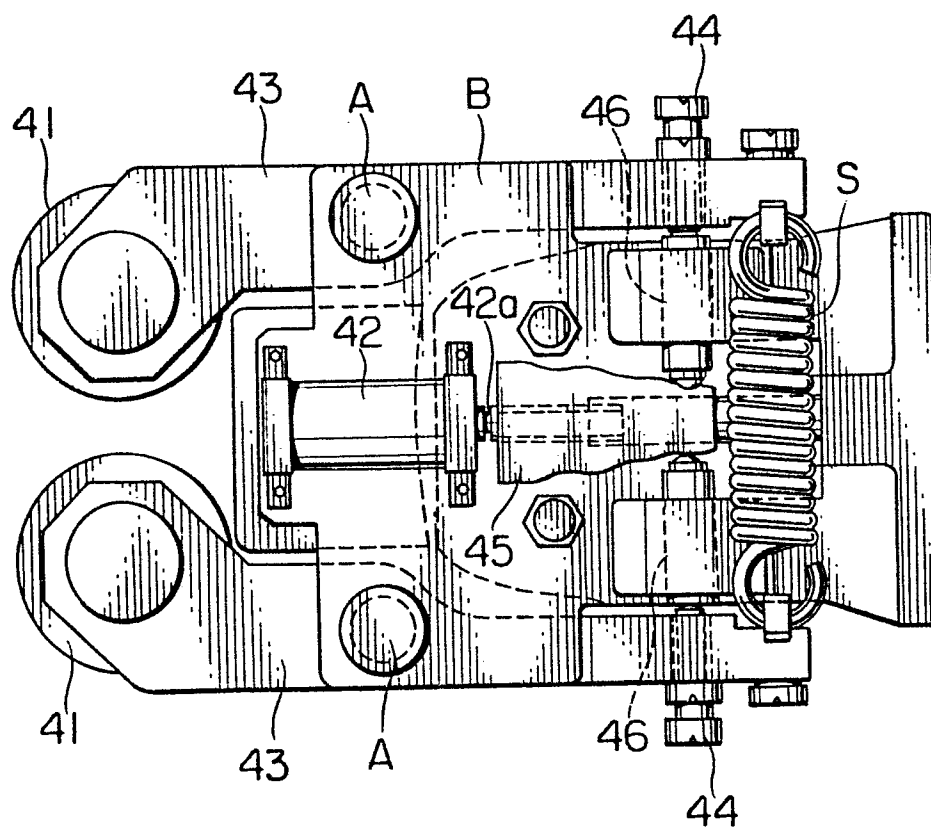


FIG. 7





European Patent
Office

EUROPEAN SEARCH REPORT

0202377

Application number

EP 85 30 6238

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
Y	DE-C-1 048 251 (MOELLER) * figures 1, 2; column 3, line 45 - column 4, line 58 *	1, 2	B 21 B 39/16 B 21 B 39/14
A	---	3, 5	
Y	PATENT ABSTRACTS OF JAPAN, vol. 7, no. 223 (M-247)[1368], 4th October 1983; & JP - A - 58 116 921 (KOTOBUKI) 12-07-1983	1	
Y	PATENT ABSTRACTS OF JAPAN, vol. 7, no. 173 (M-232)[1318], 30th July 1983; & JP - A - 58 77709 (SHIN NIPPON) 11-05-1983	1	
Y	SOVIET INVENTIONS ILLUSTRATED, Mechanical Section, Week 84/25, P 51, 1st August 1984, abstract no. 84-157749, Derwent Publications Ltd., London, GB; & SU - A - 435 254 (DON FERR METAL) 15-10-1983	1, 2	TECHNICAL FIELDS SEARCHED (Int. Cl. 4) B 21 B 39/00
Y	DE-A-2 646 006 (BRITISH STEEL) * figures 1, 2; page 5, paragraph 2 - page 6, paragraph 4 *	1	
A	EP-A-0 013 672 (KOTOBUKI) * claim; figures 1-5 *	3, 4, 6, 7	
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 26-06-1986	Examiner SCHLAITZ J
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			



DOCUMENTS CONSIDERED TO BE RELEVANT			Page 2
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
A	EP-A-0 013 671 (KOTOBUKI) * claims 1, 2; figures 1-5 * -----	3, 4, 6, 7	
			TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 26-06-1986	Examiner SCHLAITZ J
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			