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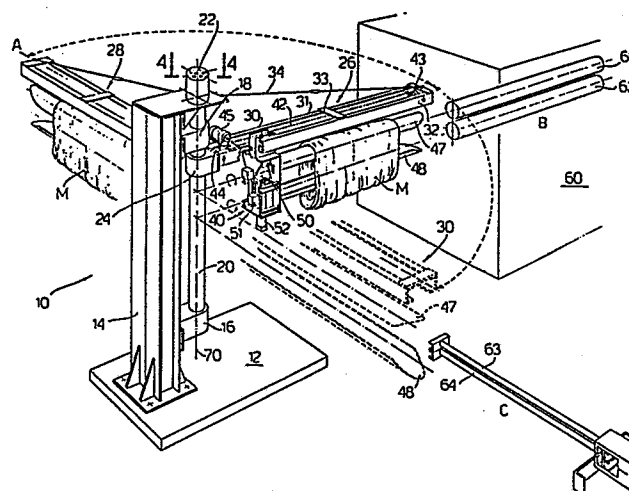
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54 **A blade apparatus for loading and unloading skeins.**

57 An apparatus for handling yarn skeins (M), particularly in connection with a mercerizing machine (60) or the like, on which the skeins are presented as supported on two cylinders (61, 62) having parallel axes, which at loading and unloading position are substantially horizontal, one over the other and spaced apart from each other, includes at least one arm (26, 28) comprising two skein holding elements (47, 48), said elements being elongated and having the longitudinal axes substantially parallel and arranged on one another; each element is rotatable about a longitudinal axis and longitudinally movable therealong; at least one element is a concave blade.



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TITLE MODIFIED
see front page

"A BLADE APPARATUS FOR HANDLING YARN SKEINS, PARTICULARLY FOR SKEIN
LOADING AND UNLOADING ON PARALLEL CYLINDERS OF A MERCERIZING MACHINE"

This patent application relates to the field of systems or plants for treating yarn skeins or hanks.

- Some skein yarns are subjected to a mercerization process in a mercerizing machine; therein each series of skeins is
5. supported on two cylinders having axes parallel to each other and, at skeing loading and unloading position, a cylinder is arranged over the other, the horizontal axes of the cylinders lying in a vertical plane.

- At present, the most widely used way for skein loading in a mercerizing machine is a manual way, using a cylindrical arm mounting or support and a pair of concave blades for matching the surfaces of said cylindrical arms. An operator presets a
5. blade on a cylindrical arm; then draws the skeins to be processed from a store or container and positions such skeins on the blade, so that the hanks may bear on the convex portion of the blade (in turn bearing on the cylindrical arm) and dependent therefrom. A second blade is introduced into and bearing on the bottom of
 10. the dependent skeins and the second blade is arranged facing the first blade, that is with its concavity facing the first blade. Then, the operator has to displace and rotate the mounting or support to align the cylindrical arm with the upper cylinder of a pair of cylinders of a mercerizing machine. Then,
 15. by means of the blades, the operator moves the skeins from the cylindrical supporting arm to the cylinders of the mercerizing machine and then withdraws the blades, one at a time, generally causing them to rotate a few degrees about their longitudinal axes.
20. For unloading, following mercerization process, the operator slips the blades between the cylinders of the mercerizing machine and the skeins. This is a particularly long and complex operation, since at this time the inner threads of the skeins stick onto the mercerizing machine cylinder, are
25. entangled in the space between one cylinder and the other and have to be manually displaced. Upon blade slipping, the operator shall withdraw the same with the skeins thereon from the mercerizing machine cylinders and, completely carrying the weight
 30. thereof (about 12 kg) has to arrange the same on dyeing sticks and position the latter in the dyeing cabinet at a height of about 2 meters. This arrangement on sticks is generally hindered

- by the entangling of the inner threads in the skeins. The whole of these operations is particularly burdensome for the involved weights and inconvenience of positions; it particularly requires a long time and thus causes a slowdown in the production
5. cycle.

It is the object of the present invention to overcome the above mentioned drawbacks and particularly to improve the working conditions and reducing the work time in connection with loading and unloading of skeins in a mercerizing machine.

10. It is another object of the invention to reduce the possibility of thread entangling in connection with skein unloading from a mercerizing machine and to facilitate the thread separation from the cylinders of the mercerizing machine.

- In order to achieve said objects, the apparatus according
15. to this application has been designed, which substantially comprises an arm including two skein gripping elements, said elements being elongated and having the longitudinal axes substantially parallel and vertically positioned on one another, each element being rotatable about its own longitudinal axis
20. and longitudinally movable therealong, at least one element being a concave blade; rotation means for rotating said elements about the respective longitudinal axes, and movement means for moving said elements along the respective longitudinal axes.

- In an embodiment, the elements are a pair of elongate
25. concave blades with axes parallel to each other and vertically arranged one above each other, each blade rotatable about a longitudinal axis. A carriage carries said blades and is movable parallel to the axis thereof, and means are provided

- to vary the distance between said blades to tension said skeins. Said carriage is movable along a crosspiece cantilever extended from a supporting structure and the arm, comprising the crosspiece, carriage and blades, is rotatable about a
5. vertical axis. The rotation about the vertical axis is provided by supporting the arm on a rotatable vertical shaft. The rotatable vertical shaft carries two cantilever arms generally rigidly located at 90° from each other. Moreover, each blade is preferably rotatable about its own horizontal axis through
10. 180° to pass from an "open" condition, in which the blades have the concavities facing one another, to a "closed" condition, in which the blades have the convexities facing one another. In a modified form, the arms are also movable according to a direction substantially transversely of the axes of the mercer-
15. ing machine cylinders. Preferably, the blades are of rounded tapered shape at the distal end thereof and, as seen in cross-sectional view, have a regular semi-polygonal configuration.

According to a second embodiment, an apparatus for handling of skeins includes an arm extended parallel to the axis

20. of the mercerizing machine cylinders, said arm comprising an elongate concave blade and a rod parallel to the blade, said blade and rod being each rotatable about an axis and said axes being parallel to each other, the blade and rod being also movable along said axes.

25. Preferably, at least the outer surface of the blade and the entire surface of the rod are coated with antifriction material.

An apparatus according to the present application allows to carry out with minimum use of labour and fatigue the opera-

- tion of skein loading on the cylinders in a mercerizing machine and skein unloading therefrom. It also allows automatic slipping of the skeins so loaded on the sticks of a dyeing apparatus. Moreover, an apparatus of this invention provides for said
5. operations avoiding tangles for the yarn, both when the latter is placed on the cylinders of the mercerizing machines and when transferred of the sticks of the dyeing cabinet.

- A more detailed description of the invention will now be given with reference to exemplary embodiments in unrestrictive
10. sense of the invention, as shown in the accompanying drawings, in which:

- Fig. 1 is a perspective view of an embodiment of the machine, with parts broken away, drawn by full line at an operating position and by dashed line at another position; the figure also shows
15. a pair of cylinders of a mercerizing machine (only schematically shown) and a pair of sticks of a dyeing cabinet;
- Fig. 2 is a fragmentary view, similar to Fig. 1, showing the machine blades partially placed about the mercerizing machine cylinders;
20. Fig. 3 is a schematic sectional view transversely of Fig. 2, showing an "open" condition of the blades about the mercerizing machine cylinders (by full line) and a "closed" condition of the blades in the space between the cylinders (by dashed line), while a detail of the blades is shown on enlarged scale;
25. Fig. 4 is a horizontal sectional view substantially taken along line 4-4 of Fig. 1, schematically showing the mechanism for rotation of the pairs of blades about a vertical axis;
- Fig. 5 is a horizontal cutaway sectional view taken along line 5-5 of Fig. 1;
30. Fig. 6 is a side view of the carriage, partly in sectional view

- according to a plane containing the blade axes;
- Fig. 7 is a vertical sectional view taken along line 7-7 of Fig. 6;
- Fig. 8 is a horizontal sectional view along line 8-8 of Fig. 7;
5. Fig. 9 is a perspective view of a variant of the apparatus;
- Fig. 10 is a perspective view of a further variant at present preferred of the apparatus, in which the apparatus is drawn by full line at a first position, while some parts thereof are drawn by dashed line at a second position; and
10. Fig. 11 is an enlarged sectional view, in an orthogonal plane to the longitudinal axis of the blades and cylinders of the mercerizing machine, showing said cylinders and a blade rod assembly of the apparatus of Fig. 1 placed about the cylinders, while an open position is shown by full line and another
15. (closed) position is shown by dashed line.

An apparatus 10 according to this application comprises on a fixed base 12 a fixed upright 14. By means of brackets 16, 18 provided with bearing (not shown), this upright carries a shaft 20 having a vertical axis, which may be of any desired

20. length. Said shaft 20 is rotatable about its own vertical axis through an arc of about 90° and the rotation thereof is caused by a device 22, to be further explained in the following.

The shaft 20 has integral therewith a support 24 (thus rotating with the shaft), which carries two cantilever arms, respectively indicated as a whole at 26 and 28, arranged at

25. 90° from each other, as shown in the horizontal sectional view of Fig. 5.

The two cantilever arms are identical to each other, whereby hereinafter only the arm 26 will be described.

This arm 26 includes an upper crosspiece 30, generally comprising two C-sections 31 and 32, opposite and secured to each other by plates 33. The crosspiece is also supported by a tie rod 34. The C-sections form runways for a carriage 40 driven along the crosspiece 30 by means of a continuous chain 42 extended between two gear wheels 43 and 44 on the crosspiece 30, the chain being driven by a motor 45.

The carriage 40 carries a pair of skein gripping or holding elements in the form of longitudinal elongated blades 47 and 48 with axes parallel to each other. In cross-section, each blade is of concave or convex shape and, in the arrangement of Fig. 1, the blades have the concavities facing each other at a position referred to as "open" position. Each blade is supported on the carriage to rotate about its own longitudinal axis through an arc of about 180°. The rotation of each blade about its own longitudinal axis is provided by any known means, such as fluid means 50 and 51. The upper blade 47 is substantially fixed in height on the carriage 40, except for adjustment displacements for accommodation to the mercerizing machine cylinders. The blade 48 is vertically movable for a length, under control of a means indicated at 52, generally a cylinder-piston unit.

Fig. 1 also shows a mercerizing machine schematically drawn and indicated at 60, of which two parallel cylinders are shown at 61 and 62. The figure also shows two coupled stiks 63 and 64 for a dyeing cabinet.

Referring to Figs. 4, 5, 6 and 7, some parts of the machine will now be described in detail.

Fig. 4 shows a mechanism 22 for rotation of shaft 20 about a vertical axis, shown at 70. A wheel 71 with toothed sector 72 is rotatably integral with shaft 20. A rack 73 meshes with said toothed sector 72 and is driven by any known means, such as by
5. a cylinder piston unit 74. Stroke limiting means 75, 75' are arranged on the path of the rack to set the range of rotation for the shaft 20, and the position thereof may be adjusted in any known manner.

Figs. 5 and 6 show how each carriage 40 is supported and
10. moved along the respective crosspiece 30. Rotatably supported on its own casing 78, said carriage 40 has four rollers or wheels 80 running on the bottom area of said C-section 31 and 32. The ends of the feeding chain 42 are secured to the casing at 81 and 82 and for said chain, in Fig. 5, there is shown the gear
15. wheel 44 integral with the further gear wheel 84, driven through chain 85 by the motor 45, carried on the crosspiece 30, for movement to and away from the shaft 20. In longitudinal sectional view, Fig. 6 also shows the blades 47 and 48, each of which preferably formed by a sheet or plate bent to polygonal
20. shape as seen in cross-section (Fig. 3). Each blade is integral with a spindle 87, 88.

Particularly referring to Figs. 7 and 8, said carriage 40 comprises vertical guides 91 and 92, having engaging thereon rollers 94 of a slide 95, on which the spindle 88 of the lower
25. blade is rotatably carried. The slide 95 upward and downward moves along the carriage 40 under control of the cylinder piston unit 52 shown in Figs. 1 and 7. On the other hand, the upper blade is rotatably carried on a plate 98 of the carriage, which is adjustable in height by pins and slots, but, once adjusted,
30. remains substantially fixed or stationary through the machine

work cycle. The operation of the machine will be briefly described.

Initially, the adjustment of rotation of shaft 20 is effected, for a correct alignment with the mercerizing machine cylinders, and the position of the other adjustable parts is adjusted.

5. At a cycle start, with the machine arms rotated as shown in Fig. 1, an operator places a series of skeins M to be mercerized on the preferably "closed" blades of arm 28 (loading arm in station A). At the same time, arm 30 independently carries out the unloading operations at B of a series of mercerized skeins, as better understood from the following reading. Upon loading of skein M, the blades are opened by a control and the rotation is caused for the arms through 90° about the vertical axis 70. Arm 28 then moves to position B and arm 30 to position C. The carriage of arm 28, with open doors and upper blade carrying the skeins, is forward moved to the arm end and the blades are placed about the cylinders 61 and 62, as better shown in Figs. 2 and 3. Now, the simultaneous rotation is caused for each blade about its own longitudinal axis by means of devices 50 and 51 to the "closed" position shown by dashed lines in Fig. 3. This movement lays the skeins M on cylinder 61 and about cylinder 62. The closed blades can be withdrawn in a straight return movement of carriage 40. At the same time, for arm 26 the operation is carried out of displacing the previous series of mercerized skeins from the blades to the dyeing sticks 63 and 64. Then, the machine can move back to the initial position of Fig. 1.

The mercerizing machine skein unloading is now more particularly discussed. With the machine arms at the position of Fig. 1, the blades 47 and 48 of arm 26 at B, at approached condition to each other, are rotated at closed condition and introduced into between

- the cylinders 61 and 62 carrying the mercerized skeins. This introduction does not involve any drawbacks since the theads of the skeins, not tensioned on said cylinders 61 and 62, however occupy positions leaving a free area just under the upper cylinder and
5. just over the lower cylinder, which is sufficient for the introduction of the champered end of each blade which spreads the threads apart, thus enabling the introduction of the entire blade. Then the opening rotation is caused for the blades, which thereby take the skeins M thereon. The carriage 40 is then moved back and the blades are
10. moved away from each other by the cylinder 52, simultaneously with rotation of arm 26 from station B to station C. Thus, at station C, the skeins are under tension and without having loose or entangled threads inside. Thus, they can be readily slipped on the sticks 63 and 64.

- Fig. 9 shows a variant of the apparatus. In such a variant,
15. like reference numerals with suffix a indicate similar parts to those of the first embodiment. Thus, the machine 10a comprises arms 26a and 28a, each including a carriage 40a longitudinally sliding along the arm and identical to the above described carriages 40. The arms 26a and 28a are rigidly carried by a support or mounting
20. 24a integral to a hub 20a rotatably driven by a device 22a. The hub 20a and relative rotation devices are carried on the movable framework 100, horizontally slidable generally transversely of the axes of the mercerizing machine cylinders. At 100, the framework is movable and carried by rollers 101 and 102 engaged
25. in horizontal guides 103 and 104 carried on uprights 14a, 14'a and 14''a. A chain 106, controlled by a motor 108, provides for movement along the guides.

Referring now to Figs. 10 and 11, a further variant 210 of the apparatus according to the present application comprises a first skein loading arm 212 and a second skein unloading arm 214,

both of which being supported on a head 215 of an upright 216.

- The arm 212 comprises a crosspiece 218 cantilever fixed to said head 215 and possibly supported by a tie rod 220, and also comprises a carriage 222 longitudinally movable on guides 223
5. along said crosspiece 218, and finally comprises a pair of elongate blade gripping elements 224 and 226 carried on the carriage and each rotatable about a longitudinal axis which is generally parallel to the crosspiece axis.

- Generally, each blade 224, 226 is of semicircular or polygonal
10. shape in cross-section, as above mentioned, and is cantilever carried on the carriage. Any known means, such as a rotary piston, may be provided for rotating each blade about its own longitudinal axis. Preferably, the rotation is through 180°. The carriage movement along the guides 223 can also be carried out
15. by any known means. In the figures, reference M indicates yarn skeins and C the parallel cylinders of a mercerizing machine.

- The arm 214 comprises a crosspiece 228 cantilever fixed to said head 215 and possibly supported by a tie rod 230. It also comprises a carriage 232 longitudinally movable on guides 233
20. along the crosspiece 228, and finally comprises an elongate blade like gripping or holding element 234 and a stick or rodlike gripping or holding element 236, in case tubular, parallel to the blade and spaced apart therefrom. In cross-section, said blade 234 is of a same shape as the above mentioned blades 224 and 226 and is
25. rotatable about a longitudinal axis. The rod 236 is rotatably carried on the carriage about a longitudinal axis, not coincident with its own longitudinal axis of symmetry. At least the outer surface of blade 234 and the entire surface of rod 236 are coated with antifriction material, such as polytetrafluoroethylene

(PTFE) or the like.

- The mutual arrangement of blade 234 and rod 236 and the movements thereof are better shown in Fig. 11. Said blade 234 is rotatable about an axis coincident with the axis of the upper cylinder, and the stick 236 is rotatable about an axis coincident with the axis of the lower cylinder. At open condition, said blade 234 matches the upper surface of the upper cylinder C and is arranged thereon symmetrically to a vertical plane, while said stick 236 is at the lower surface of the lower cylinder at an angle with respect to the vertical plane. Preferably, this angle is about 30°, but also other values could be possible.

- In order to pass from open to closed position, said blade 234 rotates clockwise or counterclockwise through 180° (Fig. 2) and said rod 236 clockwise rotates through 180° to the position shown by dashed line. At the latter position, it will be seen that the blade and rod occupy a minimum overall size and can be readily slipped into the space defined between a pair of cylinders of the mercerizing machine and a skein or group of skeins thereon. The reverse rotation of blade 234 from the position shown by dashed line to the position shown by full line provides for separating the skein threads from the upper cylinder. The simultaneous counterclockwise rotation of rod 236 from the position shown by dashed line to the position shown by full line provides for sufficiently separating the skein threads from the lower cylinder to enable the removal of the skeins.

In the exemplary embodiment, the upright 216 is movable between a position defined by the axis a-a (position shown by full line in Fig. 10) and a position defined by the axis b-b (shown by dashed line) on a fixed base 240, by any known means,

such as a cylinder piston unit 242. However, it would be possible and in the reach of those skilled in the art to provide an upright 216 rotatably movable instead of linearly movable, for example as described above.

5. With said upright 216 at the position shown by full line, with said axis a-a and hence the loading arm 212 at the position ahead of the mercerizing machine cylinders, an operator can load a group of skeins on the blades 224 and 226 since the mercerizing machine cylinders move from vertical to horizontal position. At
10. the same time, the mercerized skeins carried by the blade 234 of the unloading arm 214 can be unloaded, and said upright 216 moves from position a-a to position b-b. At the end of the mercerization cycle, said blade 234 and rod 236 at closed position forward move between the cylinders C of the mercerizing machine,
15. rotate to arrive at open position and take the mercerized skeins thereon, then move back. The upright 216 moves to the position shown by full line with axis a-a. The carriage 222 forward moves bringing the blades 224 and 226 in position about the cylinders C, then the blades close leaving the skeins on said cylinders
20. and are retracted. At the same time, an operator or mechanical means can draw the skeins carried on said arm 214. During a next mercerization cycle, there would occur again a loading of skeins to be mercerized on said blade 224 and a translation from a-a to b-b and skein unloading from said arm 214.

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WHAT IS CLAIMED IS:

1. An apparatus for skein handling, particularly in connection with a mercerizing machine (60) or the like, on which the skeins (M) are carried on two cylinders (61, 62) having parallel axes, which at loading and unloading position are
 5. substantially horizontal, one over the other and spaced apart from each other, characterized by comprising at least: an arm (26; 28; 26a; 28a; 212; 214) including two skein gripping or holding elements (47, 48; 224, 226; 234, 236), said elements being elongate and having the longitudinal axes substantially
 10. parallel and arranged on one another; each element being rotatable about a longitudinal axis and longitudinally movable therealong; at least one element being a concave blade; rotational means (50, 51) for rotating said elements about the respective longitudinal axes; and movement means for moving said
 15. element along the respective longitudinal axes.

2. An apparatus as claimed in Claim 1, characterized by further comprising spreading means (52) to vary the distance between said elements for skein tensioning.

3. An apparatus as claimed in Claim 1, characterized in that also the second element is a concave blade, the two blades being arranged with opposite concavities.

4. An apparatus as claimed in Claim 1, characterized in that
5. the second element is a rod (236).

5. An apparatus as claimed in Claim 1, characterized by comprising further rotational means (22) for rotating said two gripping elements about a vertical axis.

6. An apparatus as claimed in Claim 1, characterized by
10. comprising translational means for translating said arm(s) transversely of said longitudinal axes.

7. An apparatus as claimed in Claim 1, characterized in that said rotational means provide a rotation of about 180° about said longitudinal axes.

15. 8. An apparatus as claimed in Claim 5, characterized by comprising two said arms fixedly arranged to each other at about 90° in a horizontal plane and rotatable about a vertical axis through about 90° .

9. An apparatus as claimed in Claim 1, characterized by
20. comprising two said arms, each including guides on which a carriage carrying said gripping elements slides, the movement along the longitudinal axes being carried out by chain means.

10. An apparatus as claimed in Claim 9, characterized in that said carriage vertically carries one said gripping element

at fixed position and the other element carried on a vertically sliding slide.

11. An apparatus as claimed in Claim 1, characterized in that in cross-section each blade is of polygonal profile and has
5. a rounded tapered distal end.

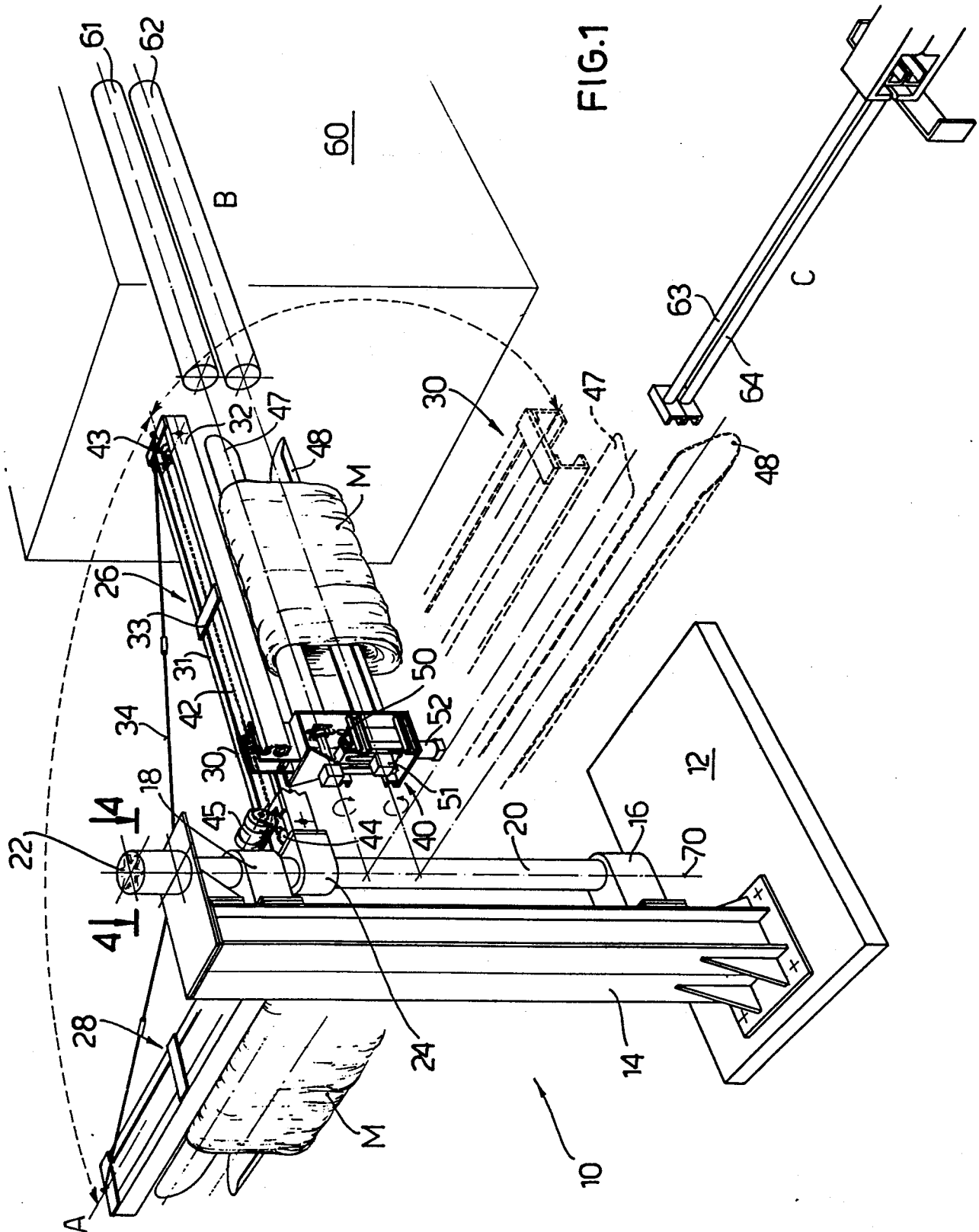
12. An apparatus as claimed in Claim 1, characterized in that each arm comprises a crosspiece longitudinally extended along said longitudinal axes, longitudinal guides on the crosspiece, a carriage movable along said guides, said carriage
10. carrying said gripping elements and said second rotational means.

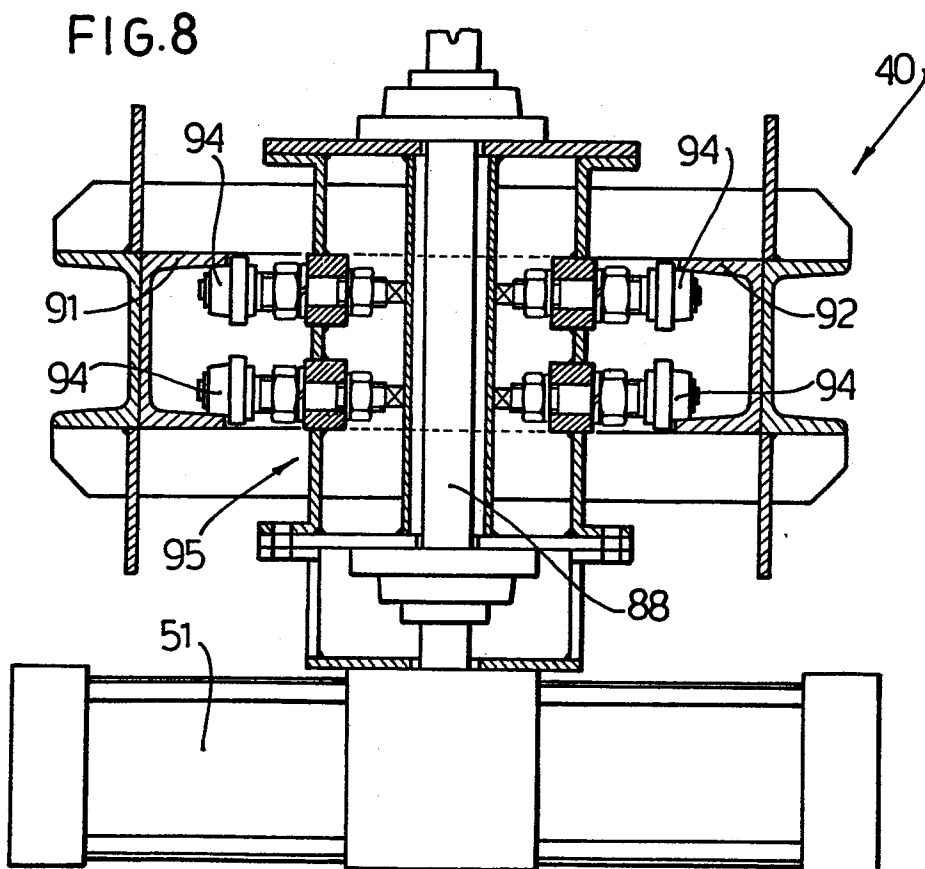
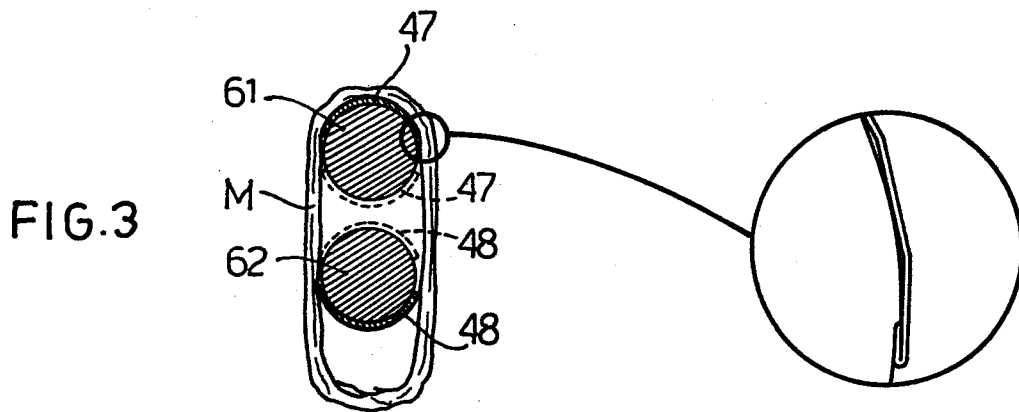
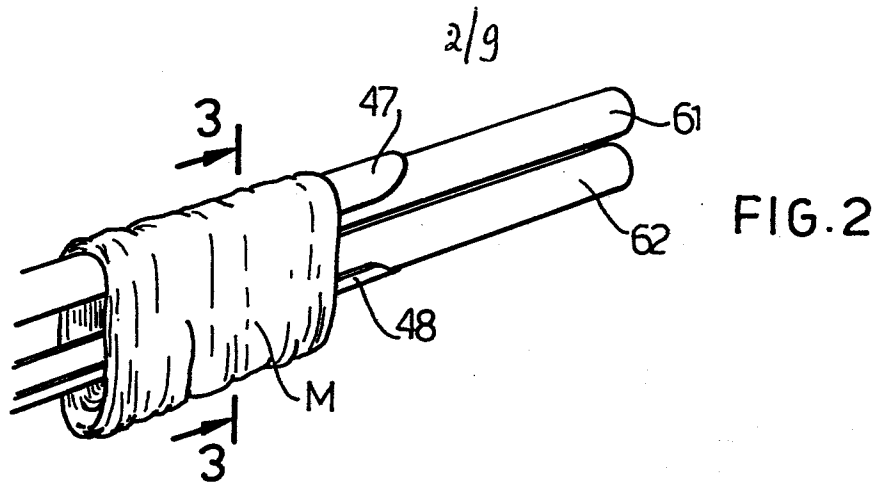
13. An apparatus as claimed in Claim 1, characterized by comprising two said spaced apart arms, one arm comprising a pair of said elements in the form of elongated concave blades, and the other arm comprising a blade element and a rod element.

15. 14. An apparatus as claimed in Claim 4, characterized in that, when considering a first plane containing the longitudinal rotational axes of said blade and rod, and a second plane containing the longitudinal axis of symmetry of the rod and the rotational axis of the rod, at one of the two extreme open or
20. closed conditions for the rod, this second plane is arranged at an angle to said first mentioned plane.

15. An apparatus as claimed in Claim 14, characterized in that said angle is about 30°.

16. An apparatus as claimed in Claim 1, characterized in
25. that at least some outer surfaces of the gripping elements are coated with antifriction material.





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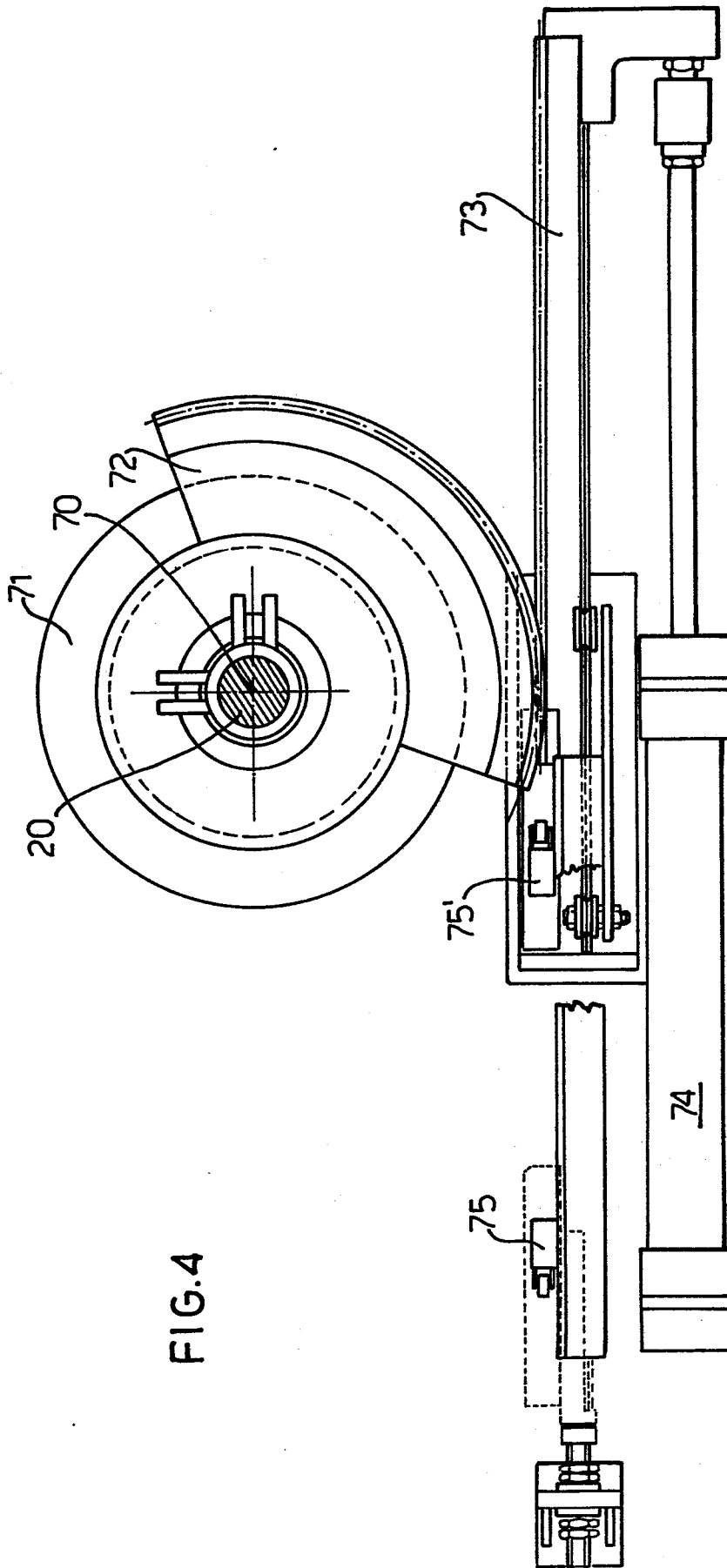


FIG. 4

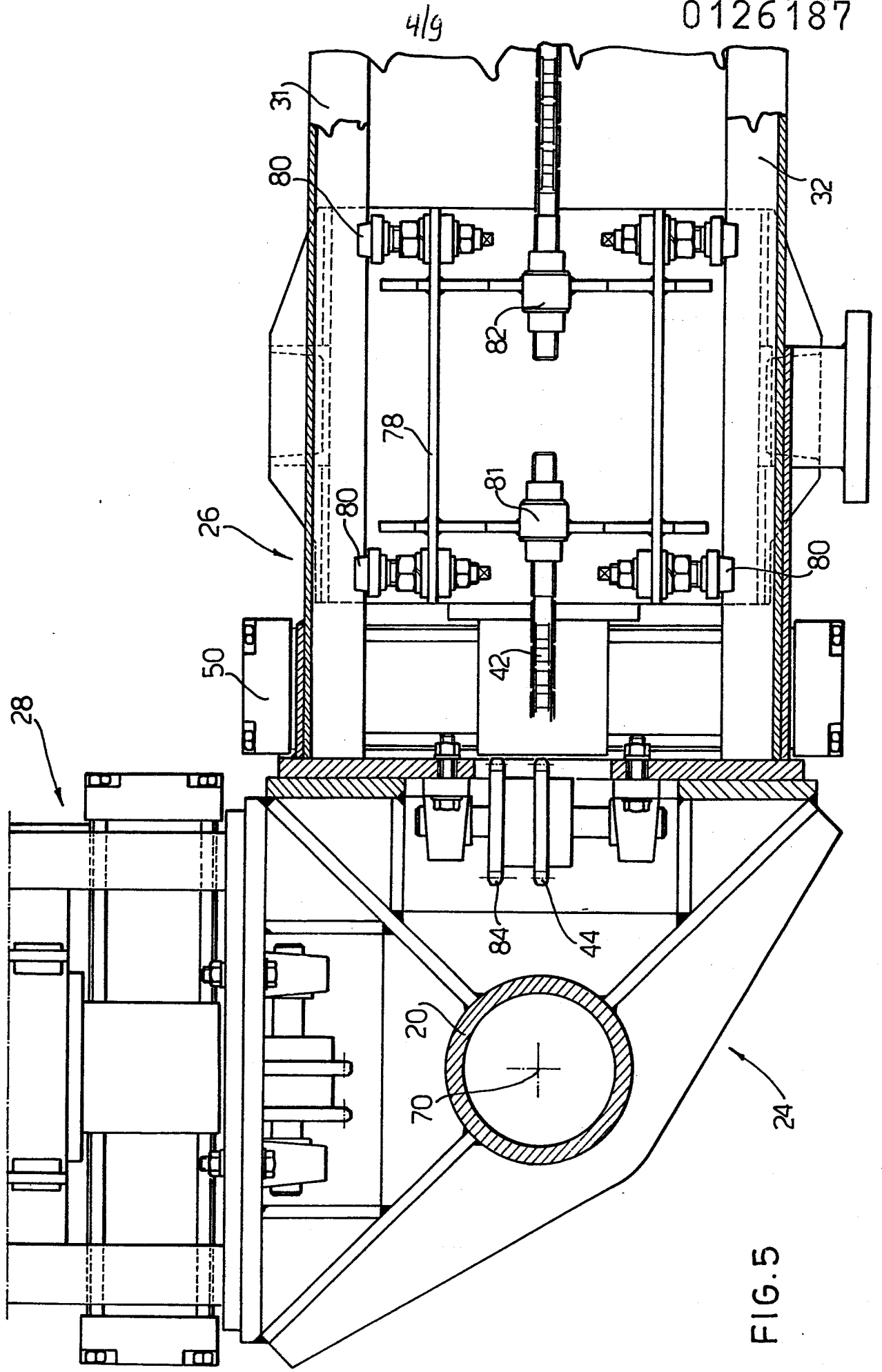


FIG. 5

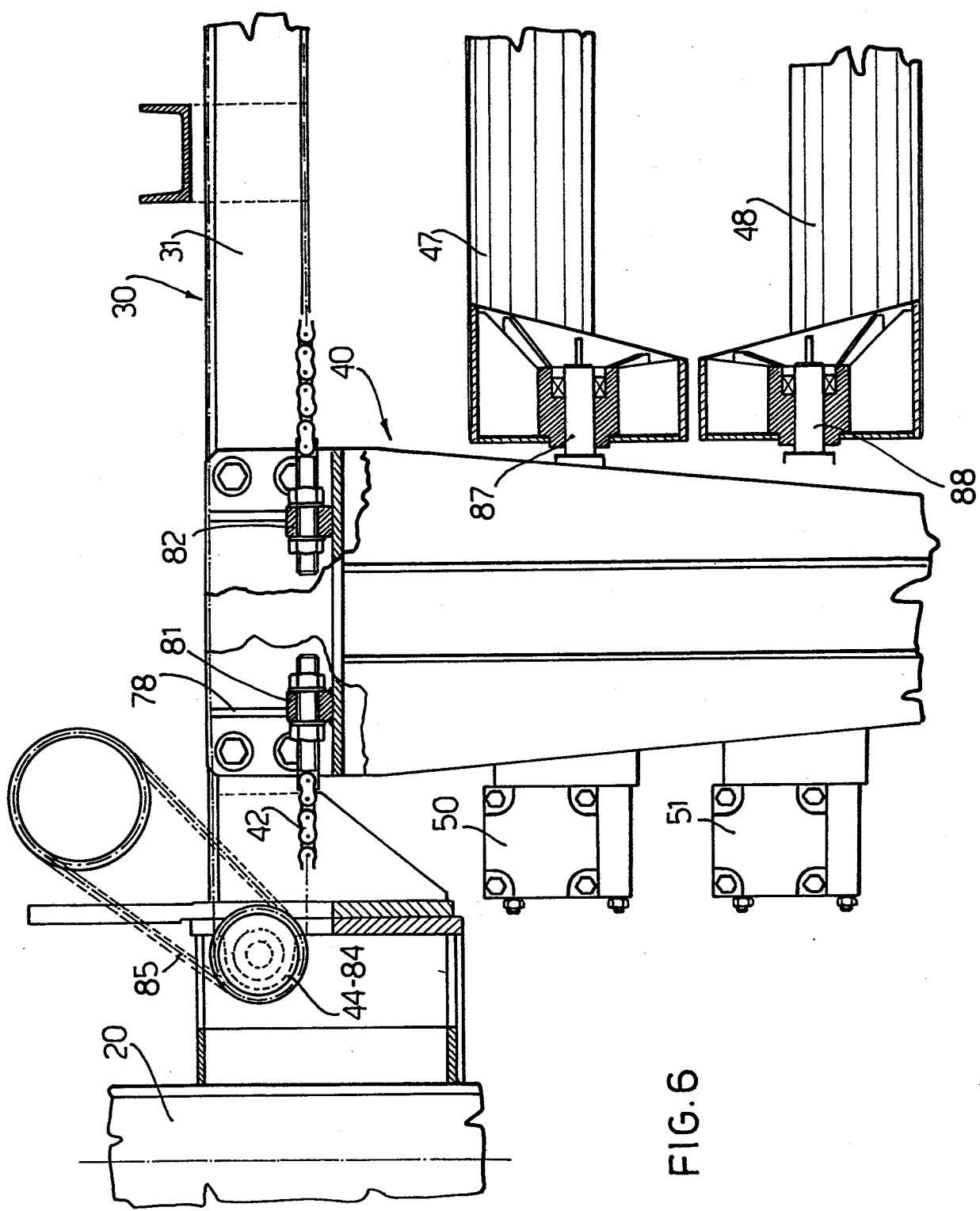
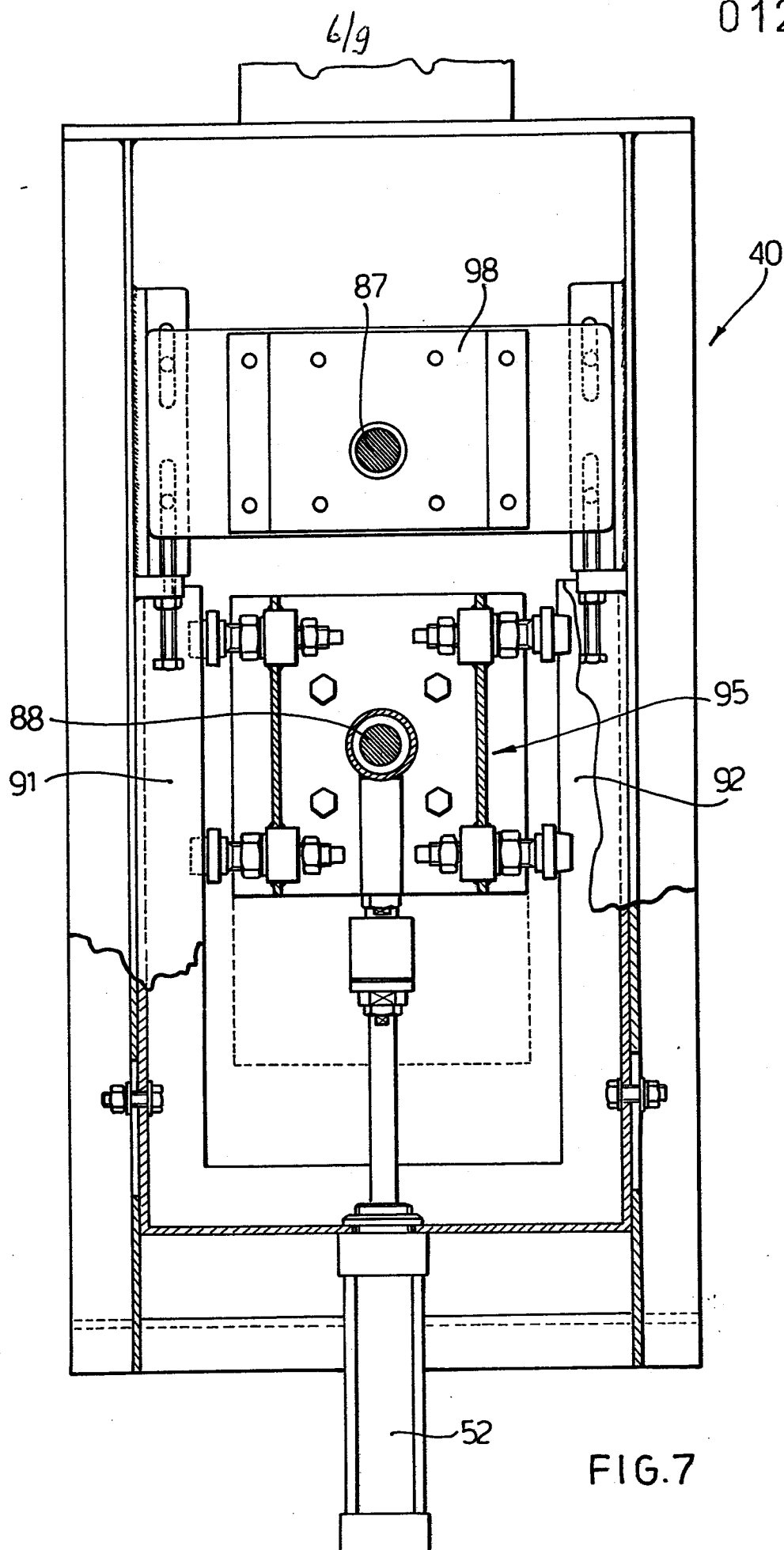


FIG. 6



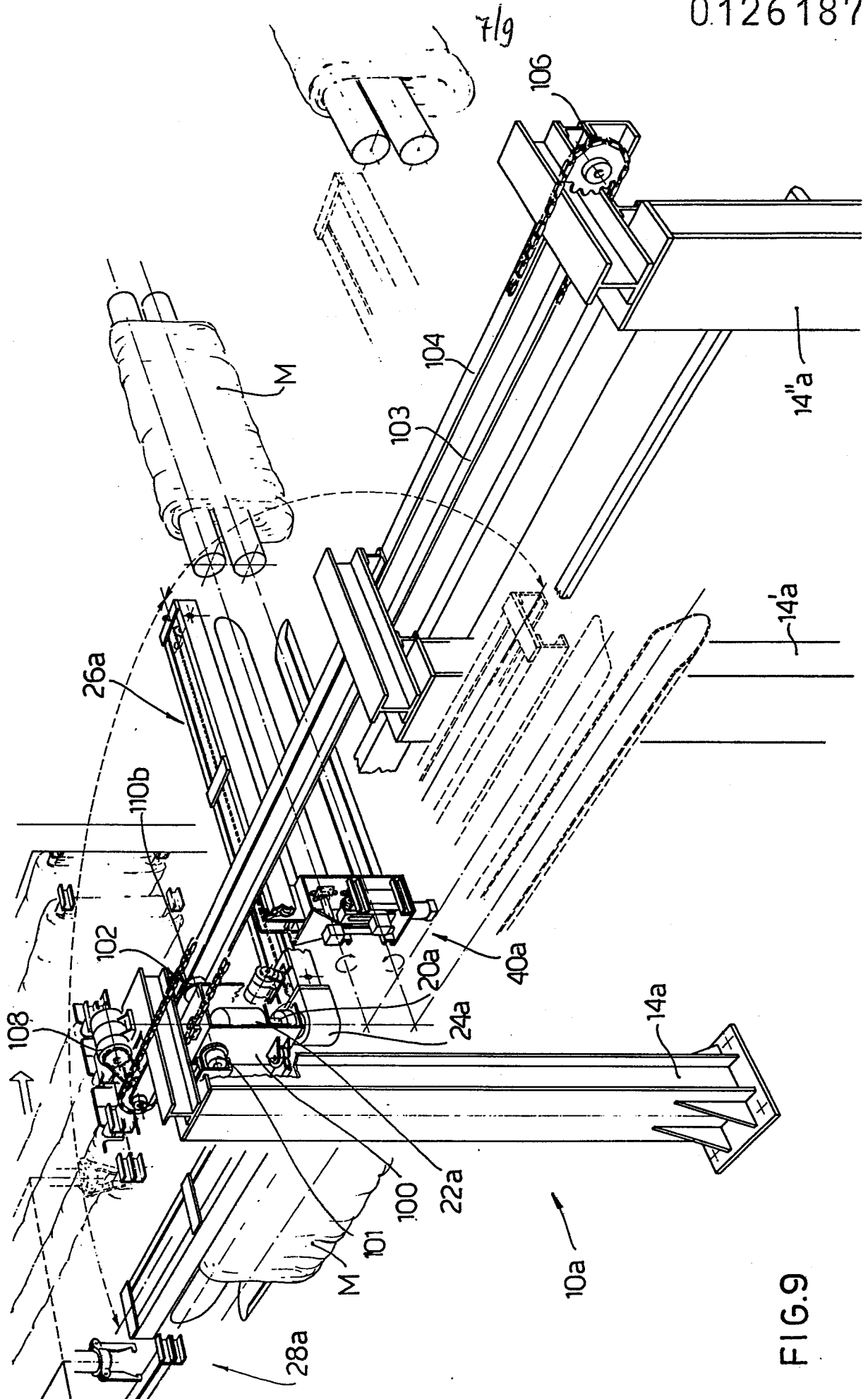


FIG. 9

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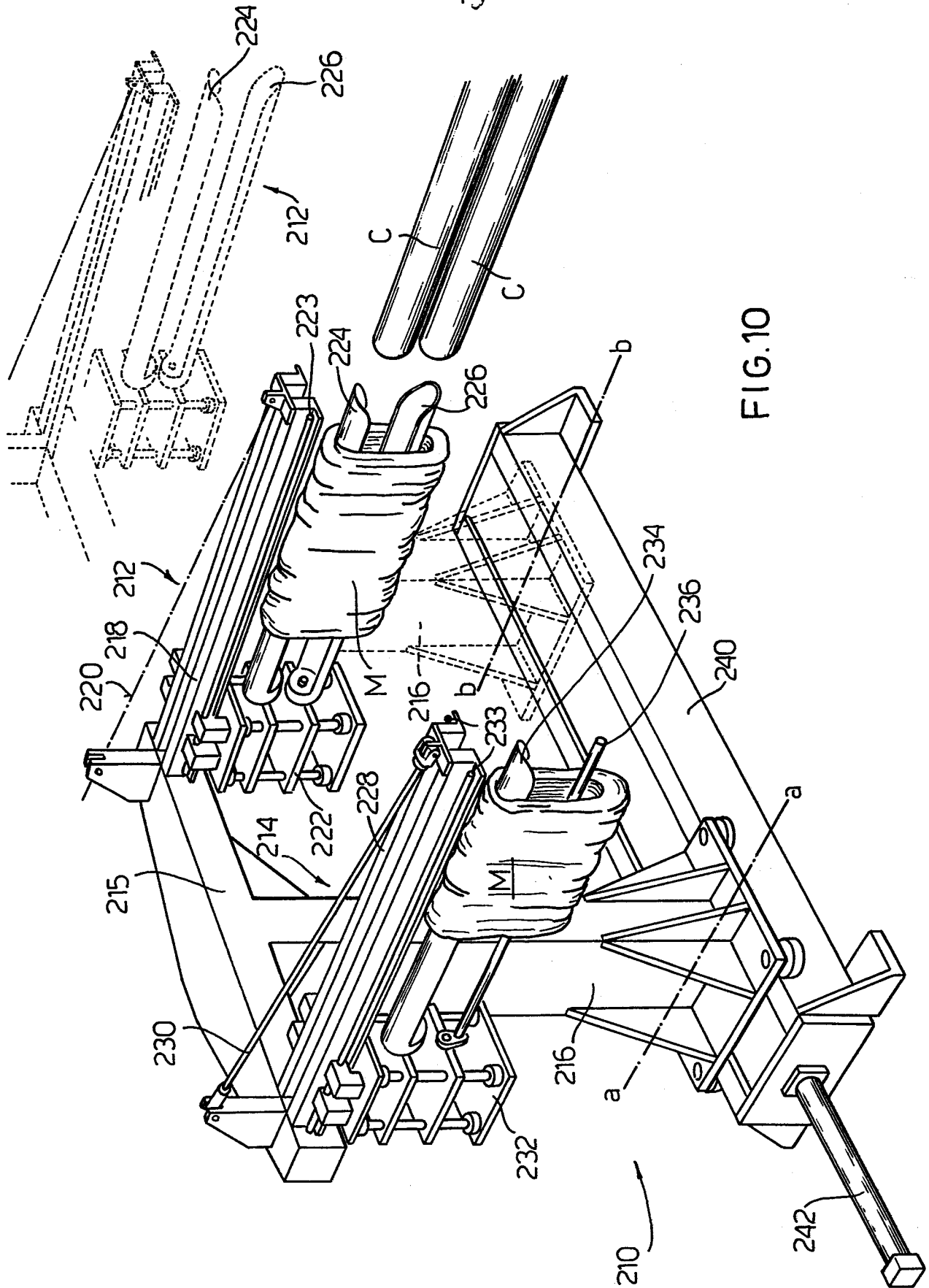


FIG. 10

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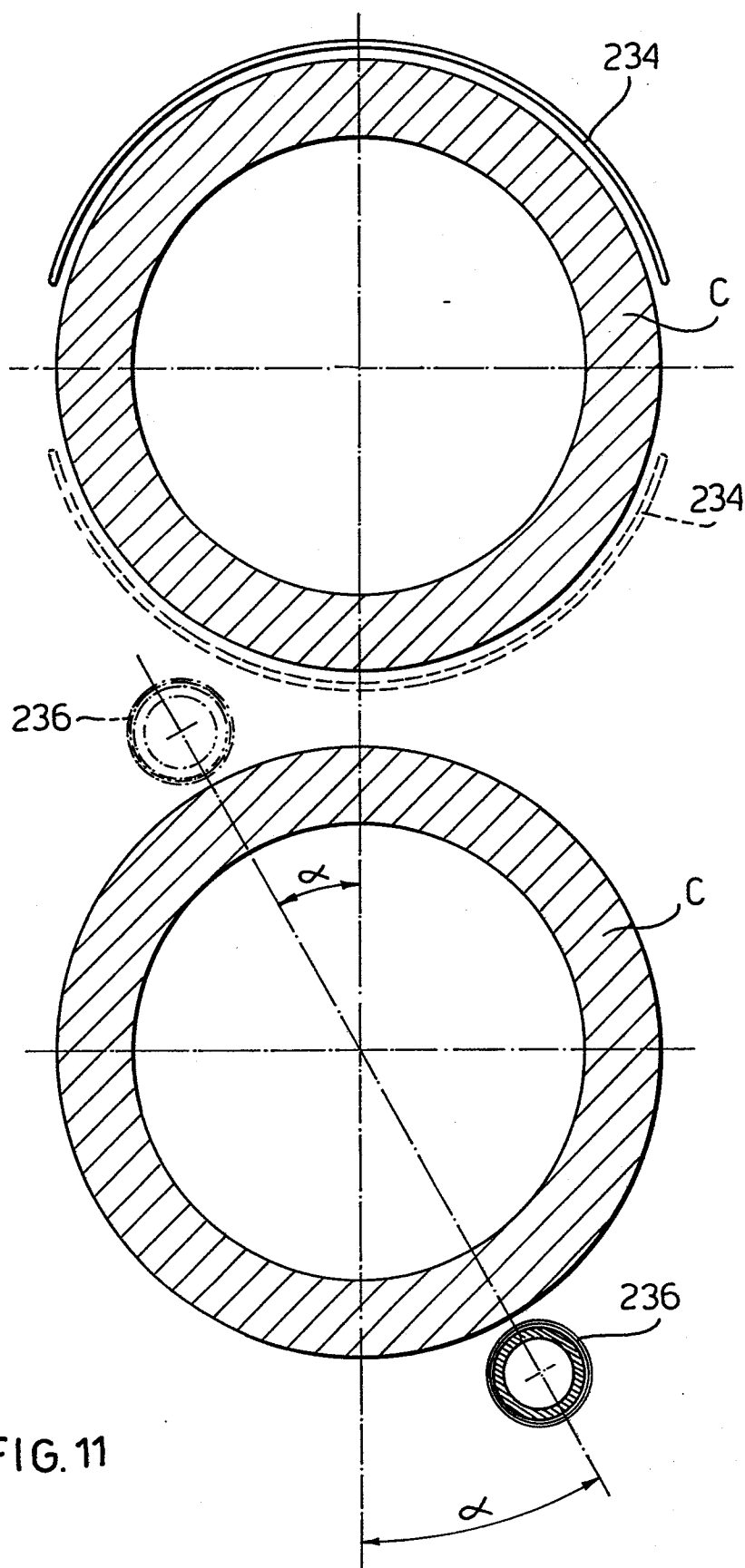


FIG. 11



European Patent
Office

EUROPEAN SEARCH REPORT

0126187
Application number

EP 83 11 3200

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. 7)
A	EP-A-0 033 461 (OFFICINE MINNETTI DI ORNELLA RAVEGGI)		D 06 B 7/06 D 06 B 23/04

A	EP-A-0 019 009 (OFFICINE MINNETTI DI ORNELLA RAVEGGI)		

A	EP-A-0 036 440 (OFFICINE MINNETTI DI ORNELLA RAVEGGI)		

A	EP-A-0 019 823 (OFFICINE MINNETTI DI ORNELLA RAVEGGI)		

			TECHNICAL FIELDS SEARCHED (Int. Cl. 7)
			D 06 B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 27-04-1984	Examiner PETIT J.P.
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	