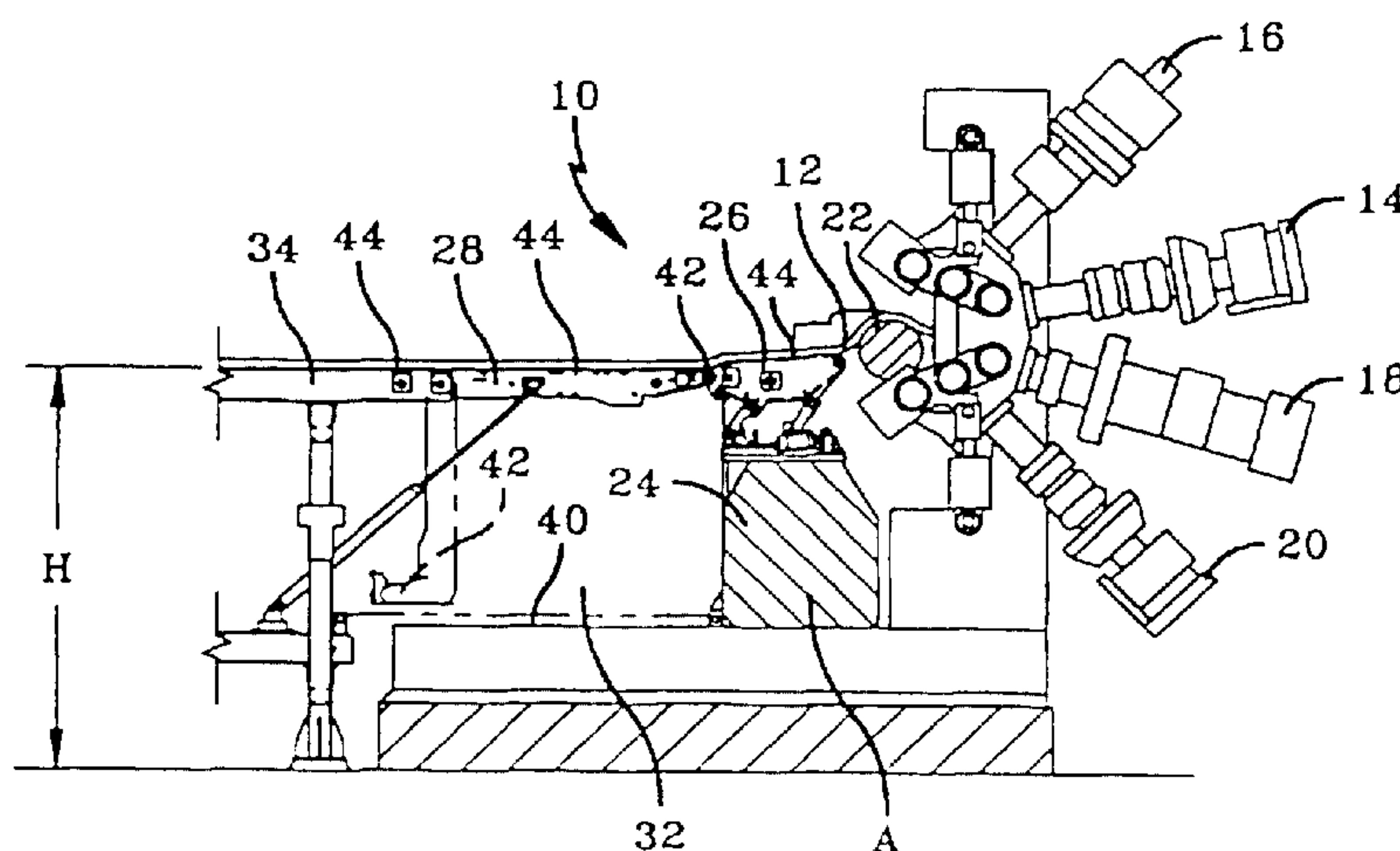




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(51) Int.Cl.<sup>6</sup> B29C 47/34, B29C 47/32, B65G 15/22  
(54) **TRANSPORTEURS POUR EXTRUDEUSE A VIS PLANETAIRE**  
(54) **CONVEYORS FOR A ROLLER DIE EXTRUDER**



(57) L'invention concerne un transporteur articulé (28) et un transporteur (26) montés sur un dévidoir (24) pour une extrudeuse à vis planétaire qui transportent un extrudat quasiment sans étirement. Les transporteurs (28, 24) sont amovibles et peuvent être retirés de la zone de service pour donner accès à un utilisateur à l'extrudeuse à utiliser avec le dévidoir (24) retiré de l'extrudeuse et pour donner accès au rouleau (22) pendant le début du fonctionnement de l'extrudeuse.

(57) A hinged conveyer (28) and a conveyer (26) mounted on a movable roll stand (24) for a roller die extruder convey an extrudate with substantially no stretching. The conveyers (28, 24) are movable out of a service area to provide access by an operator to the extruder for service with the roll stand (24) moved away from the extruder and to provide access to the roll (22) during start up of the extruding operation.



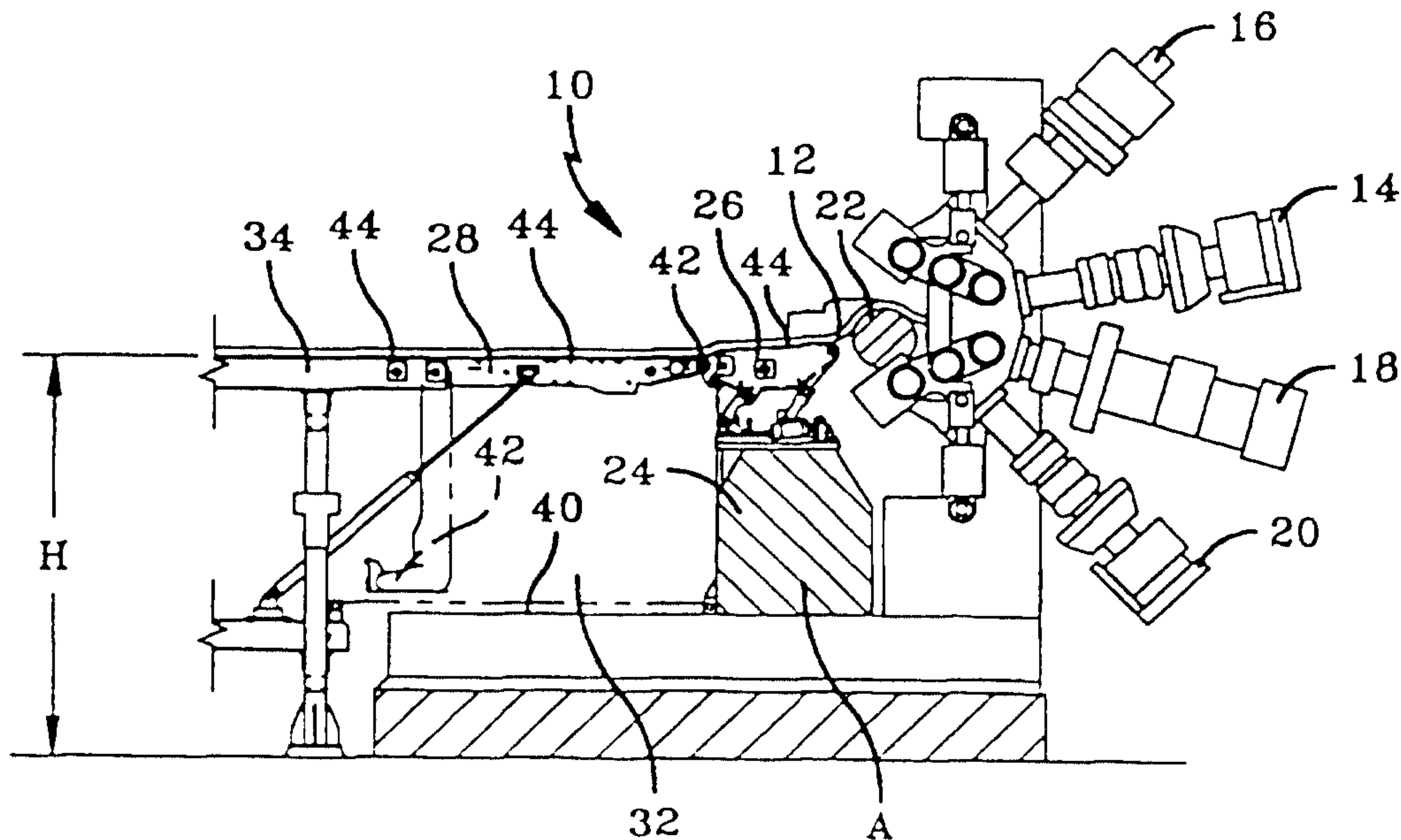
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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/US98/03917 (22) International Filing Date: 27 February 1998 (27.02.98) (71) Applicant (for all designated States except US): THE GOODYEAR TIRE AND RUBBER COMPANY [US/US]; 1144 East Market Street, Akron, OH 44316-0001 (US). (72) Inventors; and (75) Inventors/Applicants (for US only): BANAS, Mark, Daniel [US/US]; 1550 Bridgeview Circle, Cuyahoga Falls, OH 44223 (US). BURG, Gary, Robert [US/US]; 3205 Waterford Avenue, N.W., Canton, OH 44708 (US). ECKMAN, Raymond, Patrick [US/US]; 2538 Fox Circle, Stow, OH 44224 (US). STOKES, James, Dale [US/US]; 4127 Idlebrook Drive, Akron, OH 44333 (US). (74) Agent: LACHER, Frederick, K.; c/o Robert W. Brown, The Goodyear Tire and Rubber Company, 1144 East Market Street, Akron, OH 44316-0001 (US).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report.</p>

(54) Title: CONVEYORS FOR A ROLLER DIE EXTRUDER



(57) Abstract

A hinged conveyer (28) and a conveyer (26) mounted on a movable roll stand (24) for a roller die extruder convey an extrudate with substantially no stretching. The conveyers (28, 24) are movable out of a service area to provide access by an operator to the extruder for service with the roll stand (24) moved away from the extruder and to provide access to the roll (22) during start up of the extruding operation.

## CONVEYORS FOR A ROLLER DIE EXTRUDER

Technical Field

5 This invention relates to a method and apparatus for conveying a strip of material such as a tire component extruded from one or more extruders and formed in a roller die which has a movable roll stand for providing access to the extruders by an operator. Access to the roller at the start of a roller die operation is required to separate the end of the strip of material from the roller and apply it to the first conveyor. The strip of material may be conveyed in a continuous operation or in a stop-and-go intermittent operation. Continuous support by the  
10 conveyors is desirable so that the material does not sag and stretch. Furthermore, the strip of material is preferably supported at the same level it leaves the roller die, so as to prevent sag and uncontrolled stretch. The strip of material is preferably conveyed on driven belts which do not stretch or contract the material.

Background Art

15 Heretofore, roll stands for roller dies have been movable to provide access to extruders supplying a strip of material to a roller die as shown in U.S. Patent 4,539,169. The conveyor receiving the strip of material has been spaced from the roller die, causing the unsupported strip of material to sag and stretch. The strip of material has been delivered in a continuous flow, which has resulted in a substantially uniform stretching, however, where the delivery of the strip  
20 material is intermittent, the stop-and-go feeding of the unsupported strip of material may cause non-uniform stretching in the unsupported area. This is not desirable for tire components where it is essential that the material applied to the tire is uniform throughout.

Disclosure of Invention

25 The present invention is directed to an extruder, roller die and conveyor assembly and a method of conveying hot rubber extrudate from a roller die extruder to a take-away conveyor system. An extruder roll stand is movable towards and away from the extruder in the service space area between the roller die extruder and the take-away conveyor. One conveyor is mounted on the roll stand to support the extrudate over the roll stand. A second conveyor is positioned between the roll stand and the take-away conveyor. This second conveyor swings out of the  
30 service space area so that the operator can stand in this area and strip extrudate from the roller die at the start of the extruding operation. The service space also provides room for the roll stand when it is moved away from the extruders to change screws or otherwise service the extruders.

In accordance with one aspect of the invention, there is provided a conveyor assembly for conveying a strip of hot rubber extrudate from a roller die extruder to a take-away conveyor

comprising an extruder roll stand, a die roller mounted on the roll stand, means for moving the roll stand from an operating position adjacent the roller die extruder to a servicing position adjacent the take-away conveyor, a first conveyor mounted on the roll stand for conveying the extrudate over the roll stand and a second conveyor for conveying the extrudate from the roll stand to the take-away conveyor, the second conveyor having a first end pivotally mounted at a position adjacent the take-away conveyor and a second end movable from a position below the take-away conveyor to a position adjacent the roll stand in the operating position, and means for driving the first conveyor and the second conveyor at the same velocity to carry the extrudate from the extruder to the take-away conveyor with substantially no stretching.

In accordance with another aspect of the invention, there is provided a method of conveying a strip of hot extrudate material from a roller die extruder to a take-away conveyor having a predetermined height wherein a roller is supported on a roll stand disposed adjacent the extruder, a first conveyor is mounted on the roll stand and a second conveyor is disposed between the first conveyor and the take-away conveyor comprising:

- (a) extruding the strip through a roller die onto a roller with the first conveyor in a lowered position and the second conveyor retracted to a position adjacent the take-away conveyor so as to provide a service area for the operator,
- (b) rotating the roller until a leading edge of the strip is in an exposed position adjacent the first conveyor characterized by,
- (c) stopping rotation of the roller,
- (d) transferring the leading edge to the first conveyor,
- (e) raising the first conveyor to substantially the predetermined height of the take-away conveyor,
- (f) extending the second conveyor to the predetermined height of the take-away conveyor,
- (g) rotating the roller, and
- (h) driving the first conveyor and the second conveyor at substantially the same speed as the take-away conveyor to convey the strip without stretching of the material.

### **Brief Description of Drawings**

Fig. 1 is a schematic elevation of the roller die conveyor system embodying the invention, showing the conveyors in the horizontal operating position in full lines and the conveyors in the retracted condition in dot-dash lines.

Fig. 2 is a view like Fig. 1 showing the first conveyor lowered and the second conveyor retracted and rotated out of the service area with the roll stand moved away from the extruder and the operator shown in position for servicing the extruders.

Fig. 3 is a detailed view like Fig. 1 with the second conveyor rotated out of the service area and showing the operator stripping the extrudate from the die roller.

Fig. 4 is a plan view of the second conveyor.

Fig. 5 is a sectional view taken along line 5-5 in Fig. 4.

Fig. 6 is a sectional view taken along line 6-6 in Fig. 4 showing the nose portion in the retracted position in full lines and in the extended position in dot-dash lines.

Fig. 7 is a plan view of the first conveyor mounted on the roll stand.

Fig. 8 is a sectional view taken along line 8-8 in Fig. 7.

Fig. 9 is a sectional view like Fig 8 showing the first conveyor in the lowered position.

#### Detailed Description of the Invention

Referring to Figs. 1 and 2, a conveyor assembly 10 is shown for conveying a strip 12 of hot extrudate material, such as rubber, from a roller die extruder 14, which in this embodiment includes multiple extruders 16, 18 and 20 feeding material onto an extruder roll 22 where it is formed into the strip of material 12.

The extruder roll 22 is mounted on an extruder roll stand 24, which is movable from an operating position A, as shown in Fig. 1, to a servicing position B, as shown in Fig. 2.

A first conveyor 26 is mounted on the roll stand 24. A second conveyor 28 is pivotally mounted on a take-away conveyor frame 30 for spanning the space over a service area 32 between the roll stand 24 in the operating position A and the take-away conveyor frame 30. A take-away conveyor 34 is mounted on the take-away conveyor frame 30 for carrying the strip of material 12 to another tire building system position.

Referring to Fig. 1, the assembly 10 is shown in the operating position with the strip 12 of material conveyed from the extruder roll 22 to the first conveyor 26, to the second conveyor 28 and then to the take-away conveyor 34. The first conveyor 26, second conveyor 28 and take-away conveyor are all driven at the same speed, which is substantially the same as the velocity of the strip of material 12 as it leaves the extruder roll 22 so as to avoid stretching of the strip of material. The first conveyor 26 and the second conveyor 28 are also raised to a position having substantially the same height as the predetermined height H of the take-away conveyor 34. In this way, stretching due different heights of the conveyor is avoided.

Referring to Fig. 3, the operator O is shown standing in the service area 32 with the first conveyor 26 lowered, so that the extruder roll 22 is exposed to a 9 o'clock position 36, for stripping the strip of material 12 from the extruder roll and applying a leading end 38 to the first conveyor.

5 To service the extruders 14, 16, 18 and 20, the extruder roll stand 24 is moved to a position adjacent the take-away conveyor frame 30 as shown in Fig. 2. The second conveyor 28 is in the retracted position, leaving the service area 32 open for access by the operator O. Access is necessary for servicing the roller die and the extruders, such as changing of extruder screws. The height of the floor 40 is preferably raised so that the operator O can reach the leading end  
10 38 of the strip 12 as shown in Fig. 3 and have access to the extruders, as shown in Fig. 2. A nose portion 42 of the second conveyor is hinged to retract when the conveyor is lowered and to extend when the conveyor is raised, thereby providing the length necessary to span the distance from the take-away conveyor 34 to the first conveyor 26 and at the same time provide the necessary height of the floor 40 for the operator O, as shown in Figs. 2 and 3.

15 With reference to Figs. 4, 5 and 6, a more detailed illustration of the second conveyor 28 is shown. Preferably the second conveyor 28 and the first conveyor 26, as well as the take-away conveyor 34, have open mesh modular plastic belting 44 to provide as much support as possible to the strip 12 of hot extrudate material while allowing air cooling through the open mesh belting. The belting 44 of the second conveyor 28 extends around drive sprockets 46, and 48, 50, 52 and  
20 idler sprocket 54 mounted on the main frame 56 and a nose frame 58 of the nose portion 42. The nose frame 58 is hinged around the axis of the pulley 52 mounted on the main frame 56 and has an arm 60 connected to a piston-cylinder 62, pivotally mounted on the take-away conveyor frame 30 for moving the nose frame 58 from the extended position shown in dot-dash lines to the retracted position shown in solid lines in Fig. 6. A spring-loaded pulley 64 is mounted on the  
25 main frame 66 for providing additional extension of the belting 44 of the second conveyor 28 when the nose frame 58 is extended from the retracted position.

As shown in Fig. 3, an air cylinder 66 mounted on the take-away conveyor frame 30 is connected to a bracket 66 for lifting the main frame 56 of the second conveyor 28 from the lowered position shown in Fig. 3 to the raised position shown in Fig. 1. The drive sprockets 46  
30 of the second conveyor 28 are mounted on a drive shaft 68 which may be connected by a drive chain to a sprocket 72 of a drive shaft for the take-away conveyor 34.

Referring to Figs. 7, 8 and 9, the first conveyor 26 is shown in more detail. The first conveyor housing 74 has side plates 76 and 77 connected by cross beams 78 and 79. Rotatably mounted between the side plates 76 and 77 is a drive shaft 80 having sprockets 82 for engaging a belt 84 of the open mesh modular plastic belting 44. The drive shaft has a pulley 86 for a drive belt 88 which is trained around a pulley 90 driven by a motor 92. The belt 84 is also trained around pulleys 96, 98 and 100, extending between the side plates 76 and 77. Suitable controls (not shown) are provided for rotating the motor 92 at a speed, so that the belt 84 is driven at the same velocity as the belt 44 of the take-away conveyor 34 and the belt 44 of the second conveyor 28.

The first conveyor housing 74 is raised from a lowered position shown in Fig. 1 to the raised position shown in Fig. 3 by a four bar linkage 102, having parallel links 104 and 106, pivotally mounted on the first conveyor housing and the extruder roll stand 24. A piston-cylinder assembly 108 is connected to an arm 110 for rotating links 104 to move the first conveyor housing between the raised position shown in Fig. 1 to the lowered position shown in Fig. 3.

With reference to Fig. 3, the extruder roll stand 24 is slidably mounted on rails (not shown) in the floor 40 and moved along the floor by a chain 112 connected to a bar 114 fastened to a chain driven by a sprocket 118 mounted on the take-away conveyor frame 30 and driven by suitable means such as a motor to move the extruder roll stand from the operating position A to the servicing position B. A chain drive (not shown) or other suitable means may be provided for returning the extruder roll stand 24 to the operating position, as shown in Fig. 3.

After the extruders 14, 16, 18 and 20 are serviced with the roll stand 24 in the service position B, shown in Fig. 2, the extruder roll stand is moved to the operating position A, shown in Fig. 3. The first conveyor 26 is lowered to the position shown in Figs. 3 and 9, providing access to the extruder roll 22. The extruders 14, 16, 18 and 20 are operated to extrude a strip of hot rubber extrudate 12 and onto the roller 22, which is carried by the roller to a position where the operator O can reach the leading end 38, as shown in Fig. 3. The rotation of the extruder roll 22 is then stopped while the operator O pulls the end away from the surface of the roll and places it on the belt 84 of the first conveyor 26. The operator then moves out of the servicing area 32 and the second conveyor 28 is lifted from the position shown in Fig. 3 to the position shown in Fig. 1. At the same time the first conveyor 26 is raised from the position shown in Fig. 3 to the position shown in Fig. 1, providing a horizontal surface across the first conveyor 26, second conveyor 28 and take-away conveyor 34. Each of these conveyors is driven

at the same speed and accordingly, there is no sag or stretching of the strip of material 12.

After the strip of material 12 has been extruded and conveyed away by the take-away conveyor 34, the second conveyor 28 may be lowered to the position shown in Fig. 2 and the extruder roll stand 24 moved to the servicing position B, so that the operator O may step into the servicing area 32 and service the extruders 14, 16, 18 and 20, as shown in Fig. 2.

While a certain representative embodiment and details have been shown for the purpose of illustrating the invention, it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the scope of the invention.

Having thus described the invention, it is now claimed:

## CLAIMS

1. A conveyor assembly for conveying a strip of hot rubber extrudate from a roller die extruder to a take-away conveyor comprising an extruder roll stand and extruder roll mounted on said roll stand, means for moving said roll stand from a operating position adjacent said roller die extruder to a servicing position adjacent said take-away conveyor, characterized by a first conveyor mounted on said roll stand for conveying said strip of extrudate over said roll stand, a second conveyor for conveying said strip of extrudate from said roll stand to said take-away conveyor, said second conveyor having a first end pivotally mounted at a position adjacent said take-away conveyor and a second end movable from a position below said take-away conveyor to a position adjacent said roll stand in said operating position, and means for driving said first conveyor and said second conveyor at the same velocity to carry said strip of extrudate from said extruder to said take-away conveyor with substantially no stretching.
2. The conveyor assembly according to claim 1, further characterized by second conveyor having a hinged nose portion at said second end for rotating under said second conveyor as it is moved to said second position below said take-away conveyor.
3. The conveyor assembly according to claim 1, further characterized by elevating means for raising said first conveyor to a strip of extrudate conveying position and for lowering said first conveyor to a roller access position, whereby said first conveyor is moved away from said extruder roll to permit easy access to the face of said extruder roll at the start of the extruding operation.
4. The conveyor assembly according to claim 3, further characterized by said first conveyor having a housing mounted on a four bar linkage and means for rotating said linkage to raise and lower said first conveyor.
5. The conveyor assembly according to claim 3, further characterized by said first conveyor in said extrudate conveying position and said second conveyor in said position adjacent said take-away conveyor being generally horizontal and disposed at the same elevation.
6. A method of conveying a strip of hot extrudate material from a roller die extruder to a take-away conveyor having a predetermined height, wherein a roller is supported stand disposed adjacent said extruder, a first conveyor is mounted on said roll stand and a second conveyor is disposed between said first conveyor and said take-away conveyor, comprising

(a) extruding said strip through a roller die onto a roller with said first conveyor in a lowered position and said second conveyor retracted to a position adjacent said take-away conveyor to provide a service area for an operator to reach said roller,

(b) rotating said roller until a leading edge of said strip is in an exposed position adjacent said first conveyor, characterized by

(c) stopping rotation of said roller,

(d) transferring said leading edge to said first conveyor,

(e) raising said first conveyor to substantially said predetermined height of said take-away conveyor,

(f) extending said second conveyor to said predetermined height of said take-away conveyor, and

(g) rotating said roller,

(h) driving said first conveyor and said second conveyor at substantially the same speed as said take-away conveyor to convey said strip to said take-away conveyor.

7. A method of claim 6 further characterized by rotating said second conveyor downwardly about a horizontal axis adjacent to said take-away conveyor to clear said service area.

8. The method of claim 7 further characterized by said second conveyor having a hinged nose and retracting said nose upon rotation downwardly of said conveyor to clear the floor of said service area.

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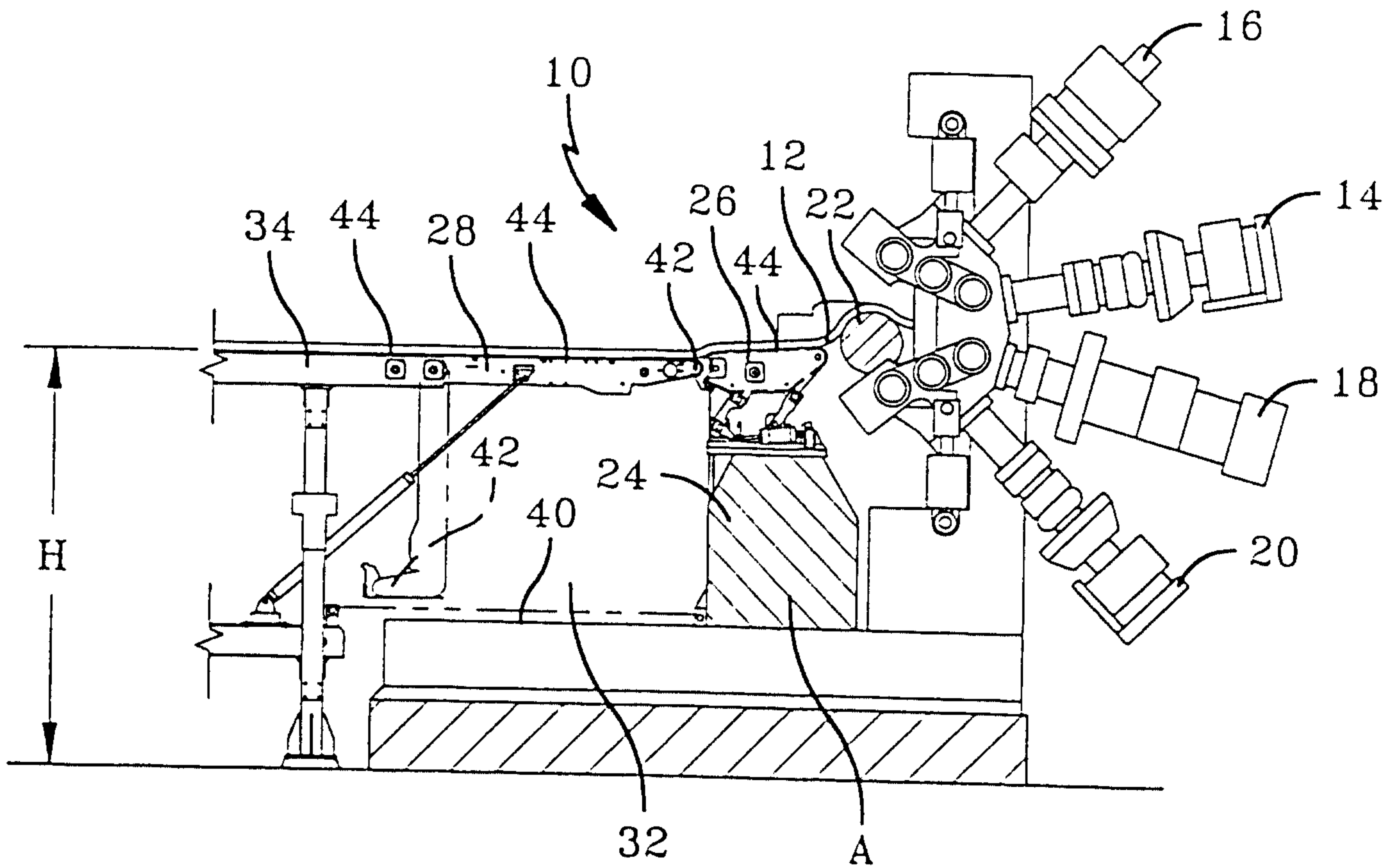


FIG-1

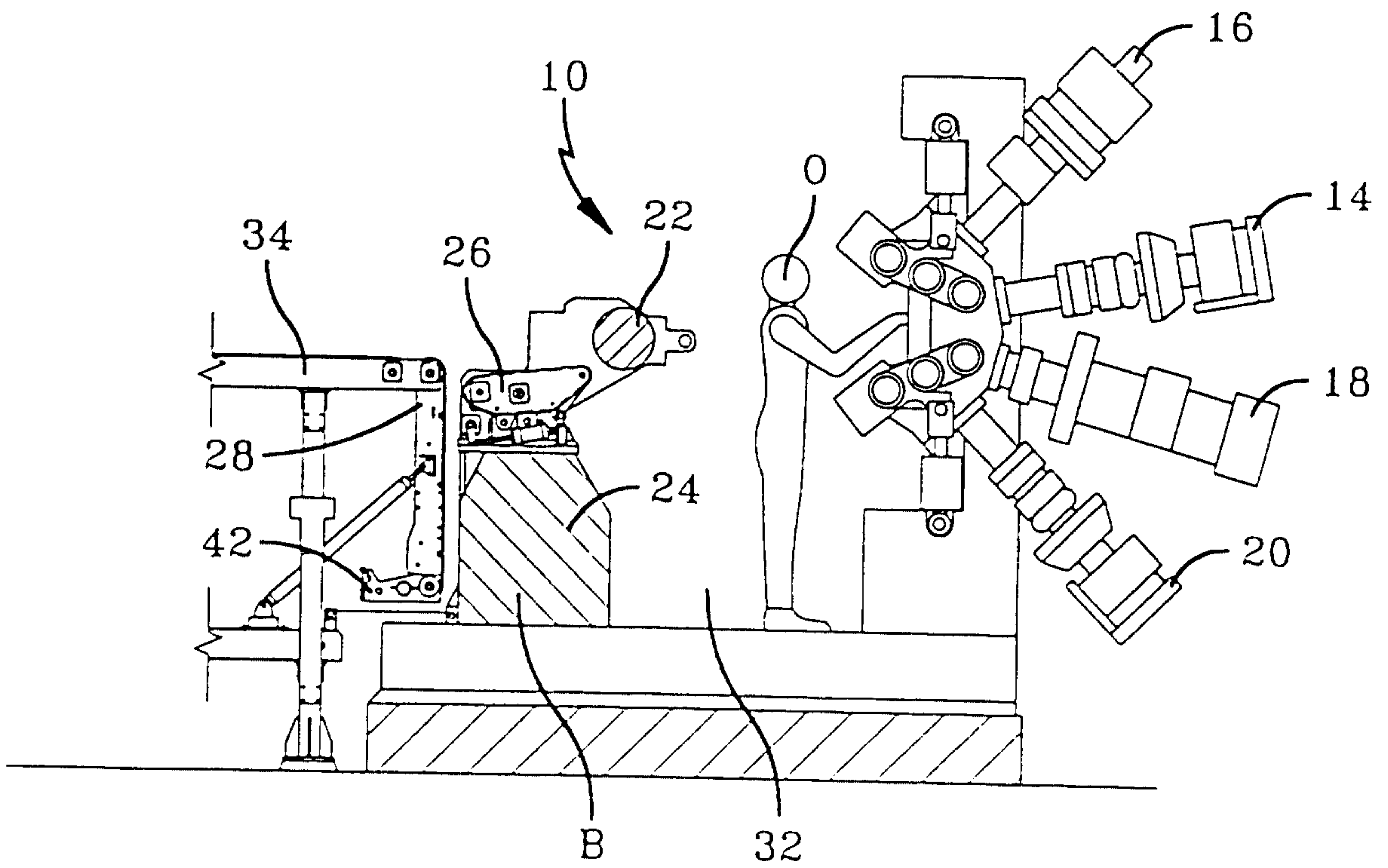


FIG-2



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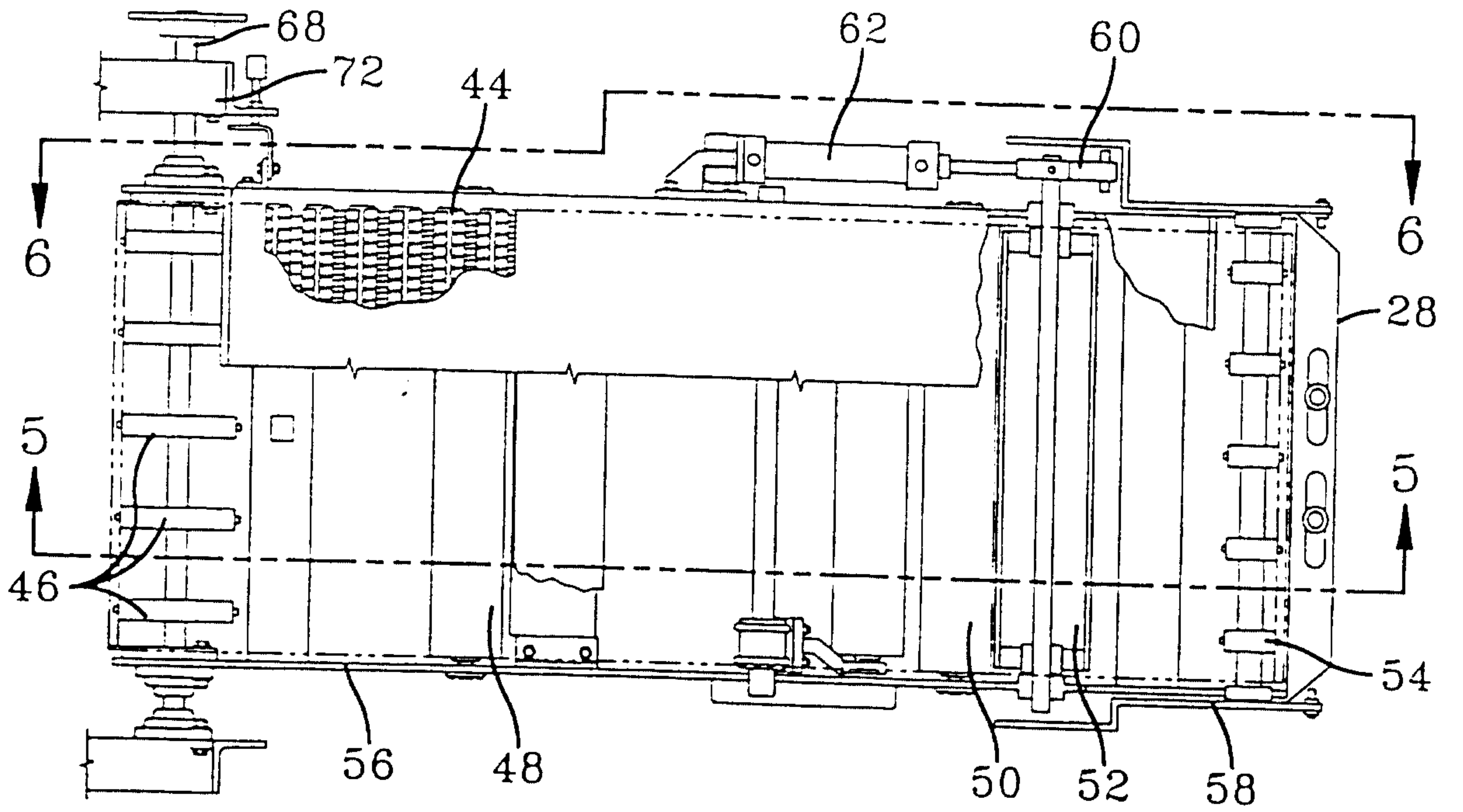


FIG-4

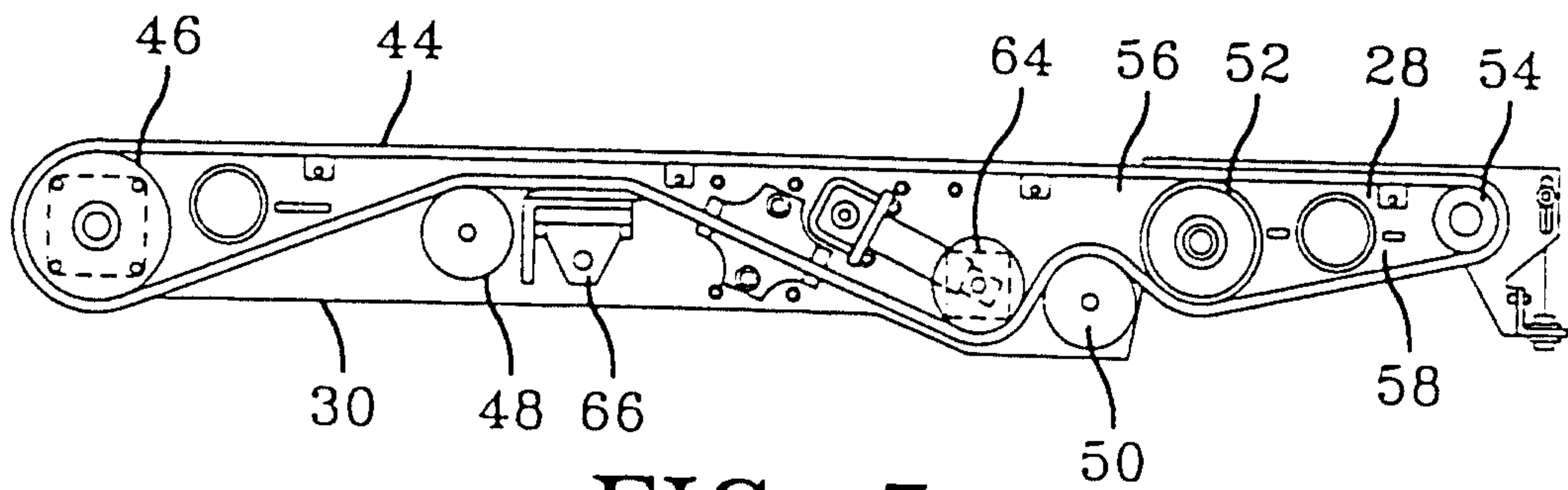


FIG-5

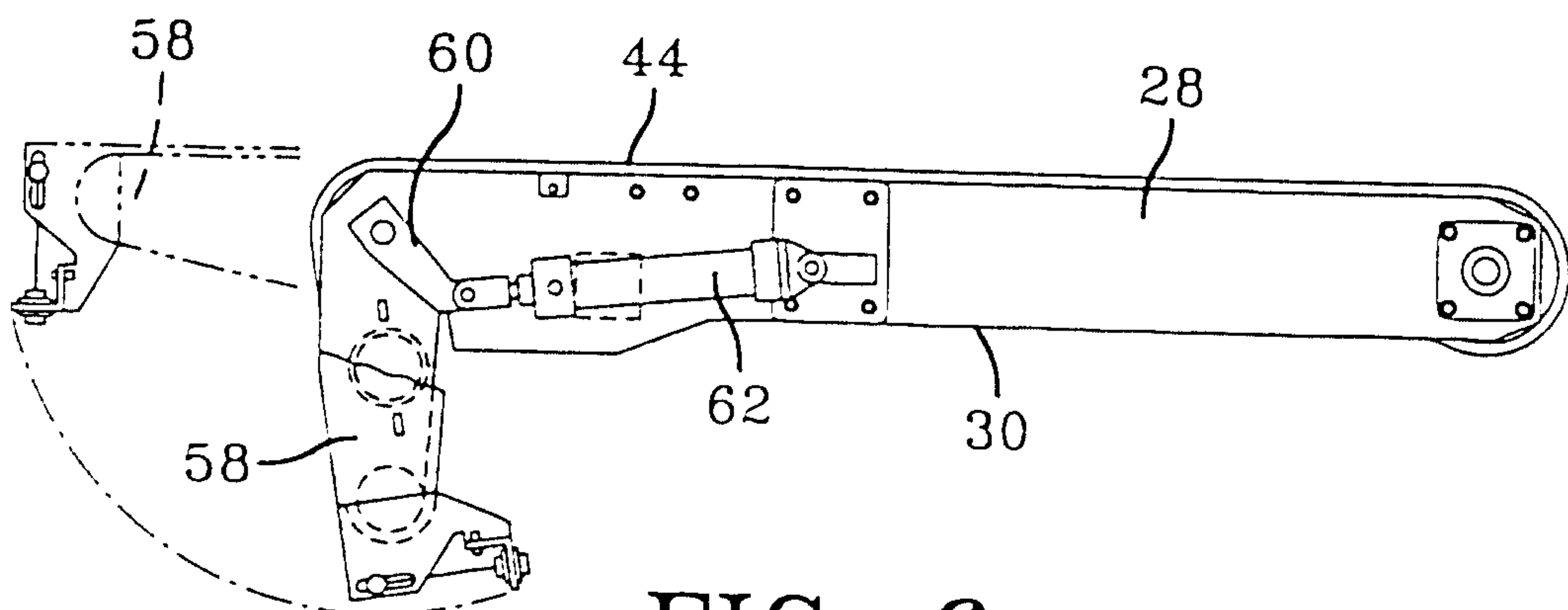


FIG-6

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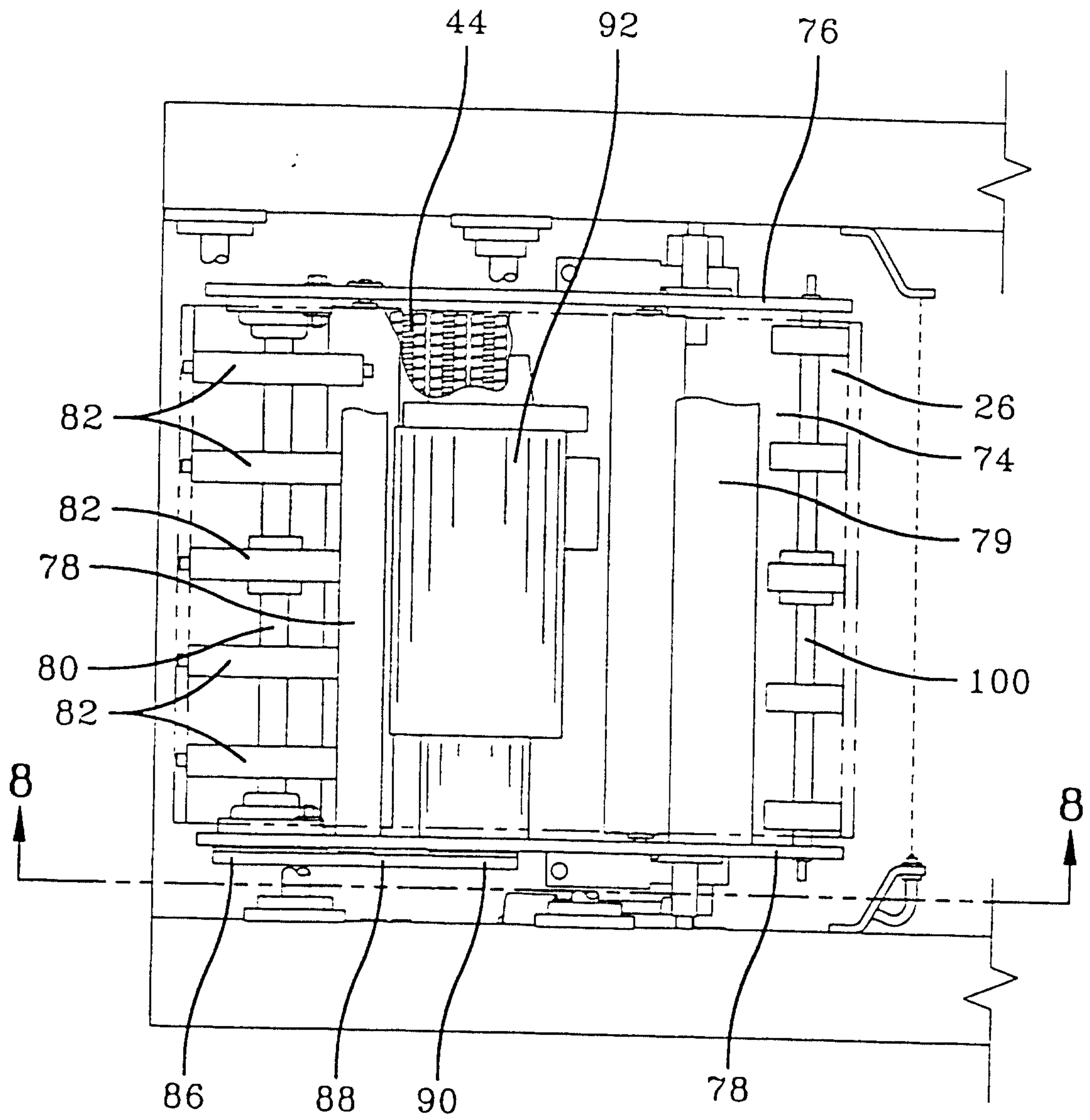


FIG-7

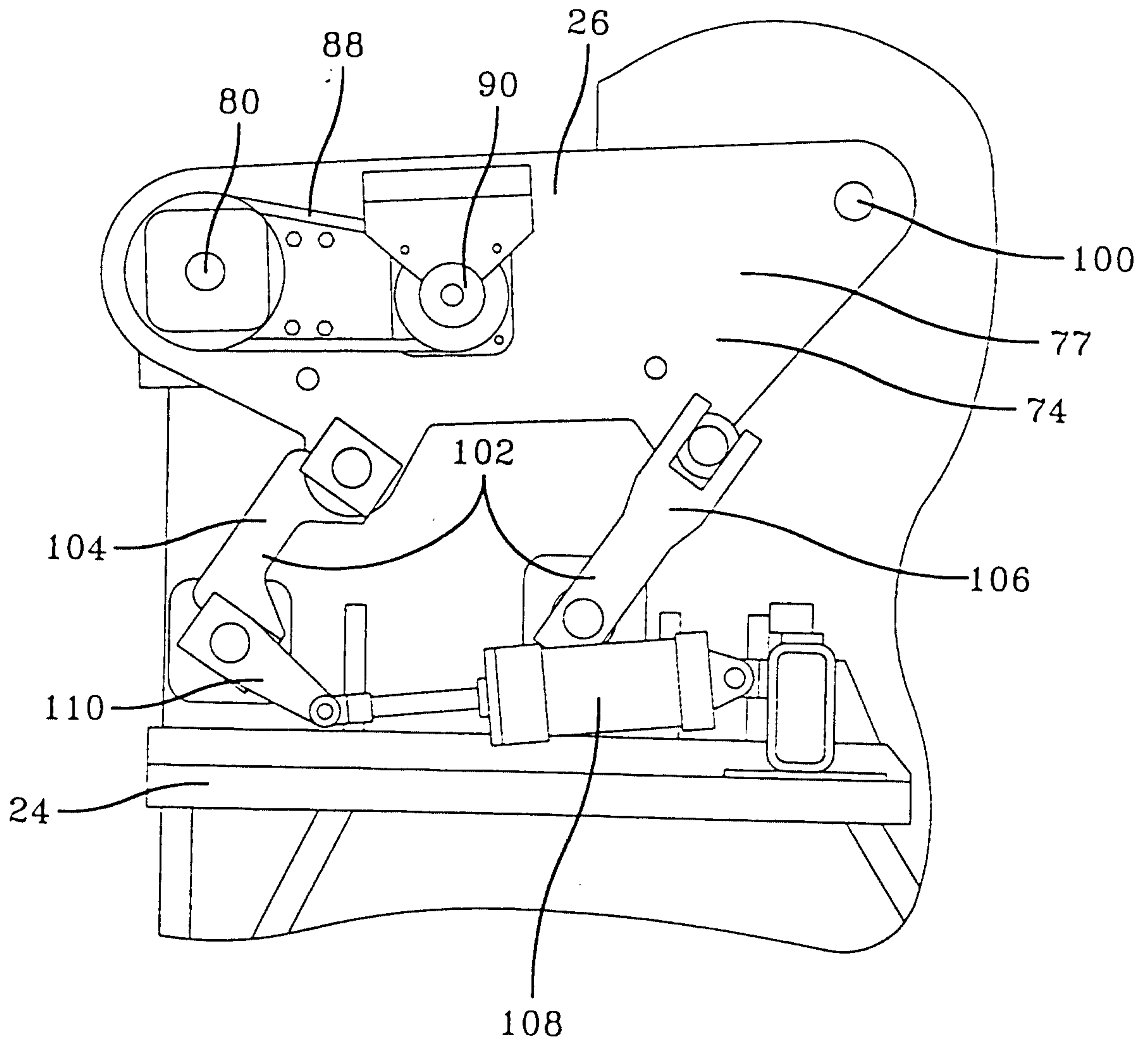


FIG-8

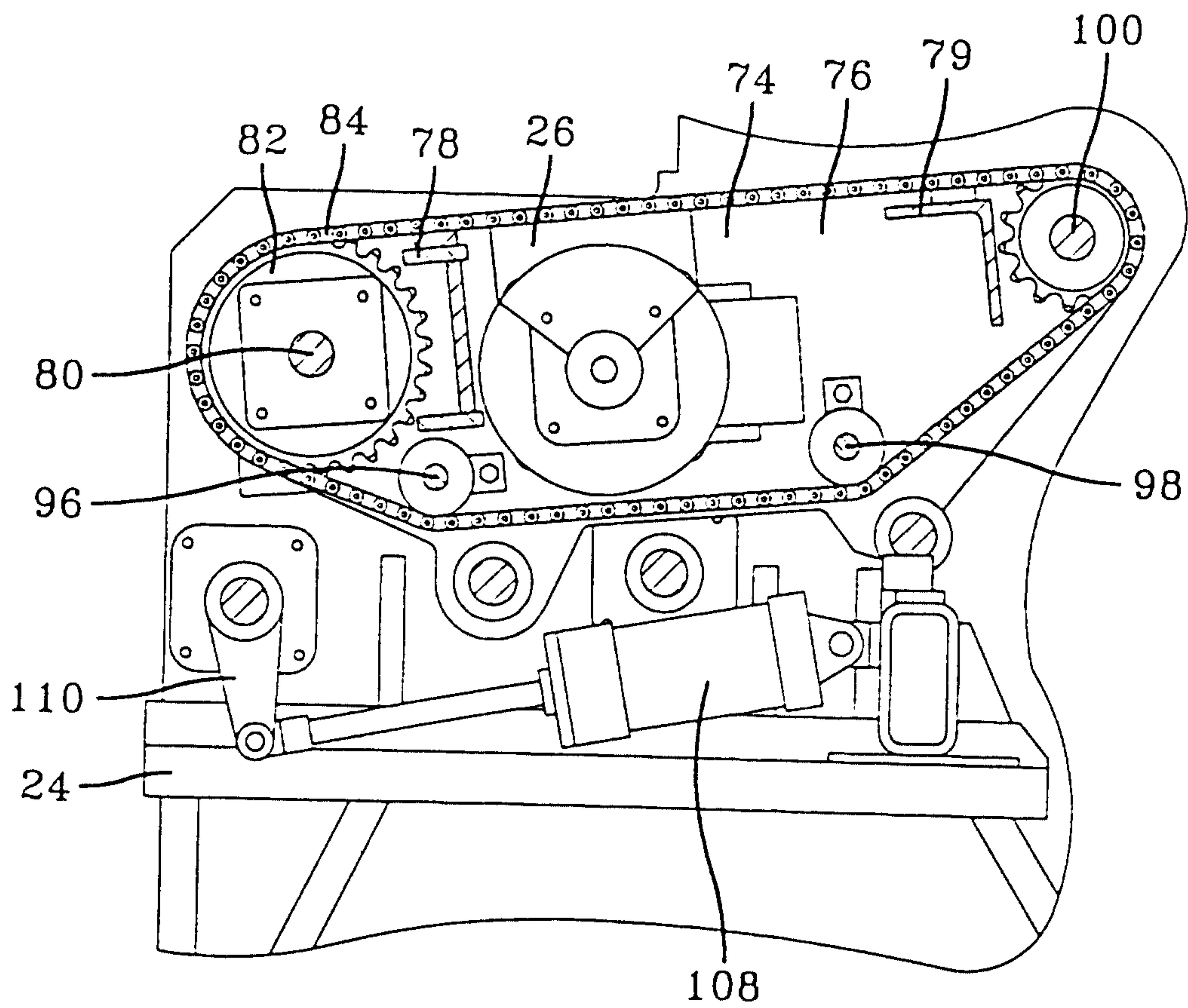


FIG-9

