

Oct. 31, 1950

J. D. NIXON

2,527,954

WELL SPIDER

Filed Oct. 4, 1946

3 Sheets-Sheet 1

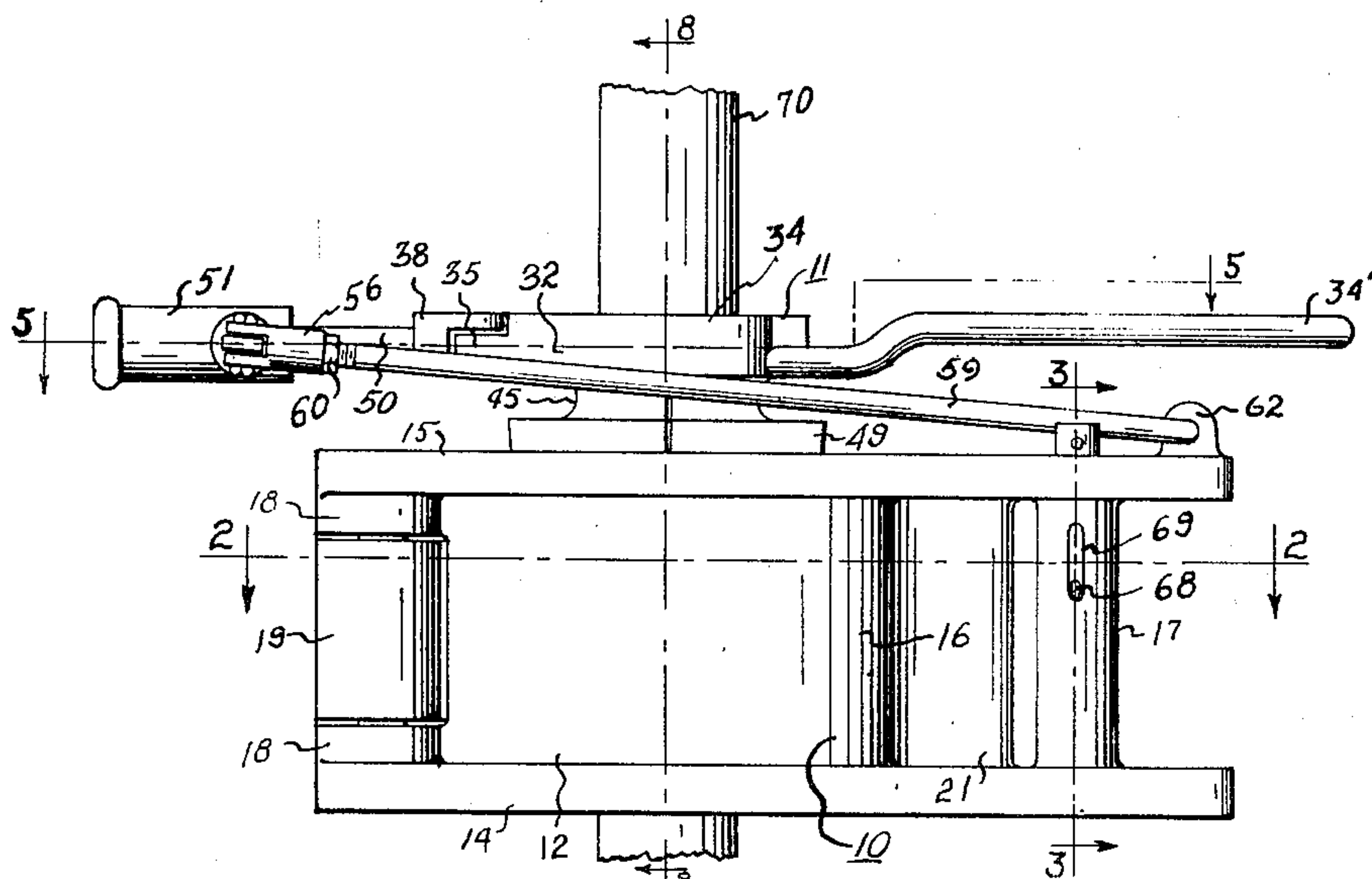


Fig. 1.

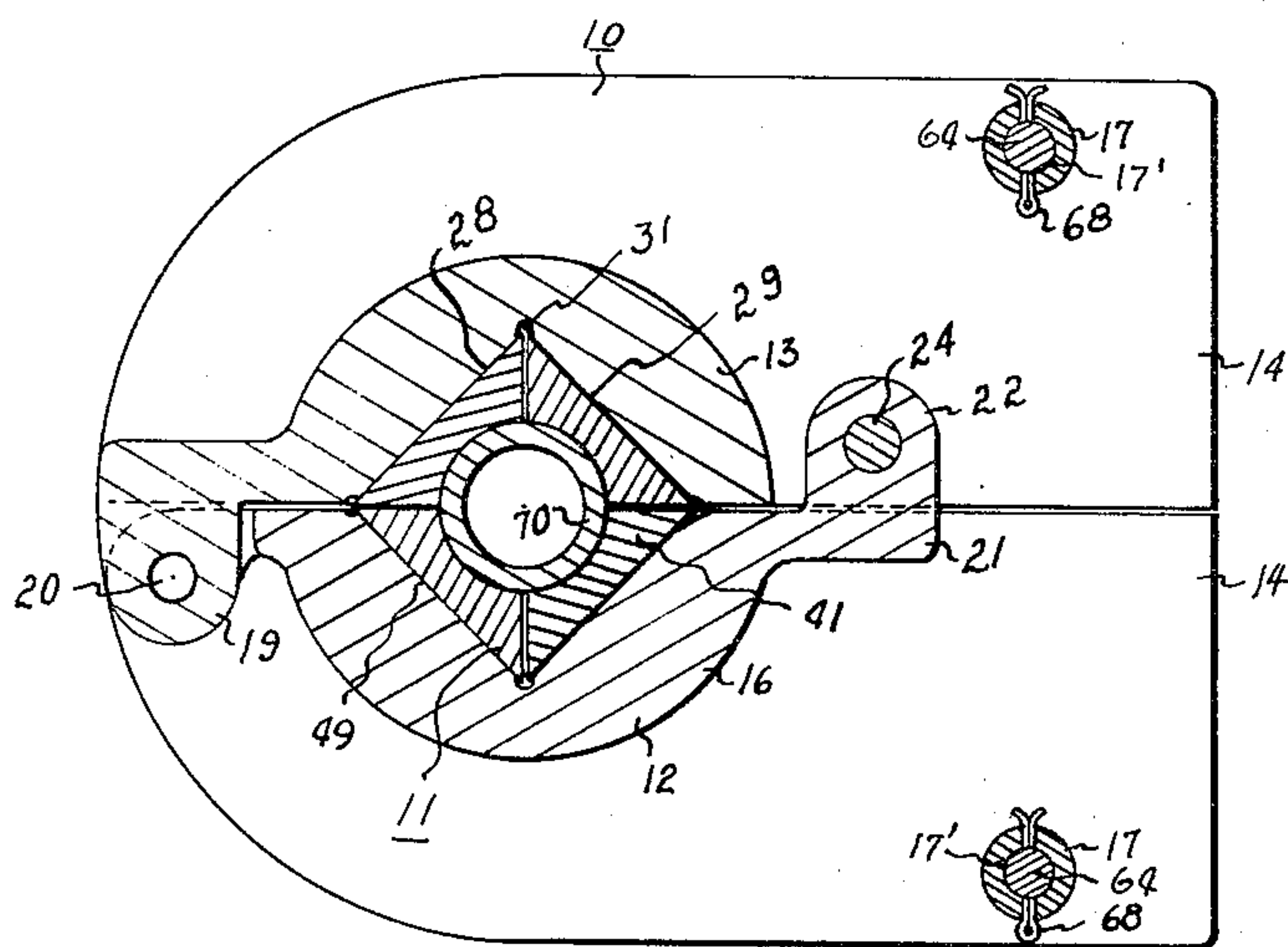


Fig. 2.

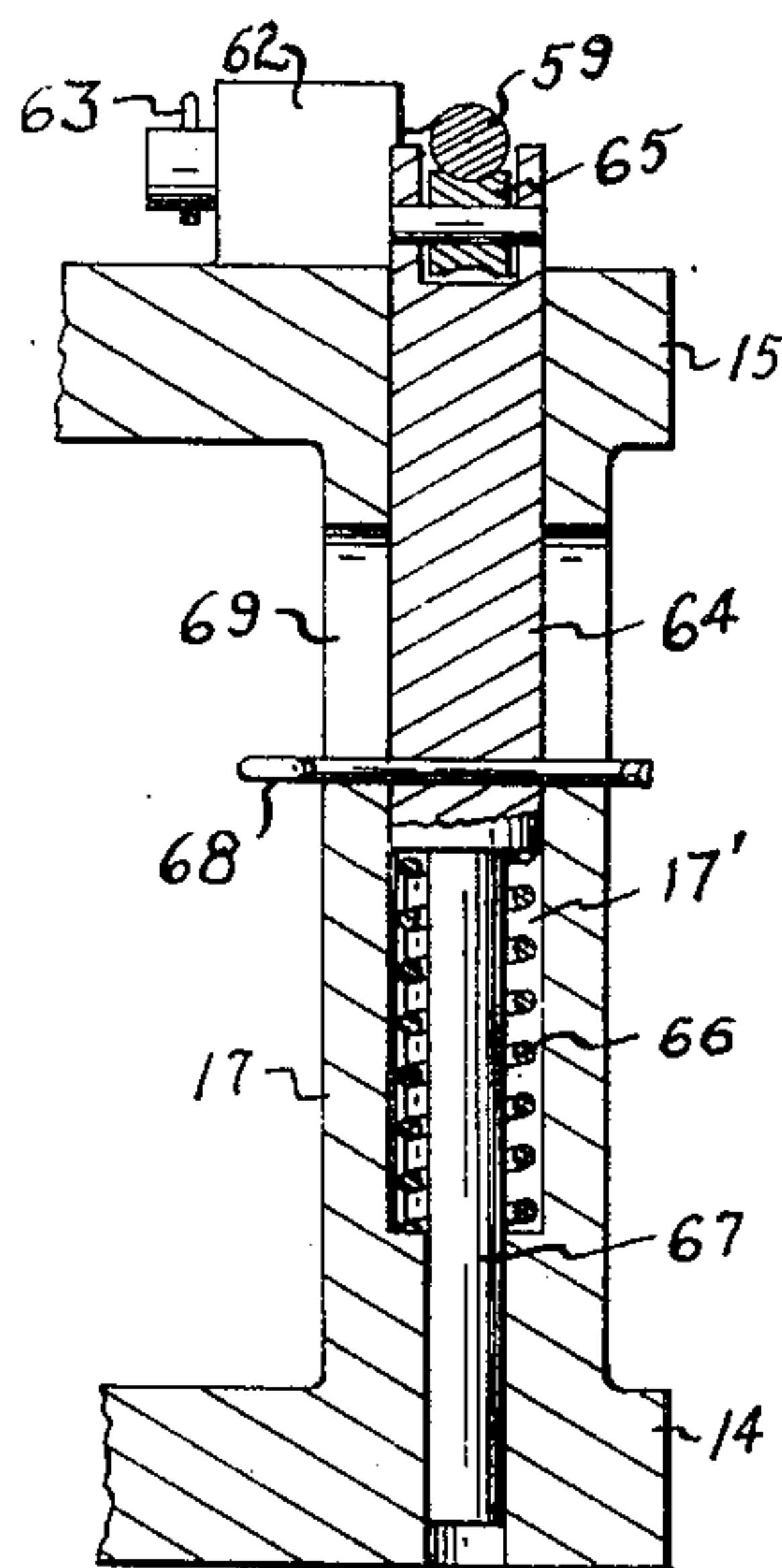


Fig. 3.

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3 Sheets-Sheet 2

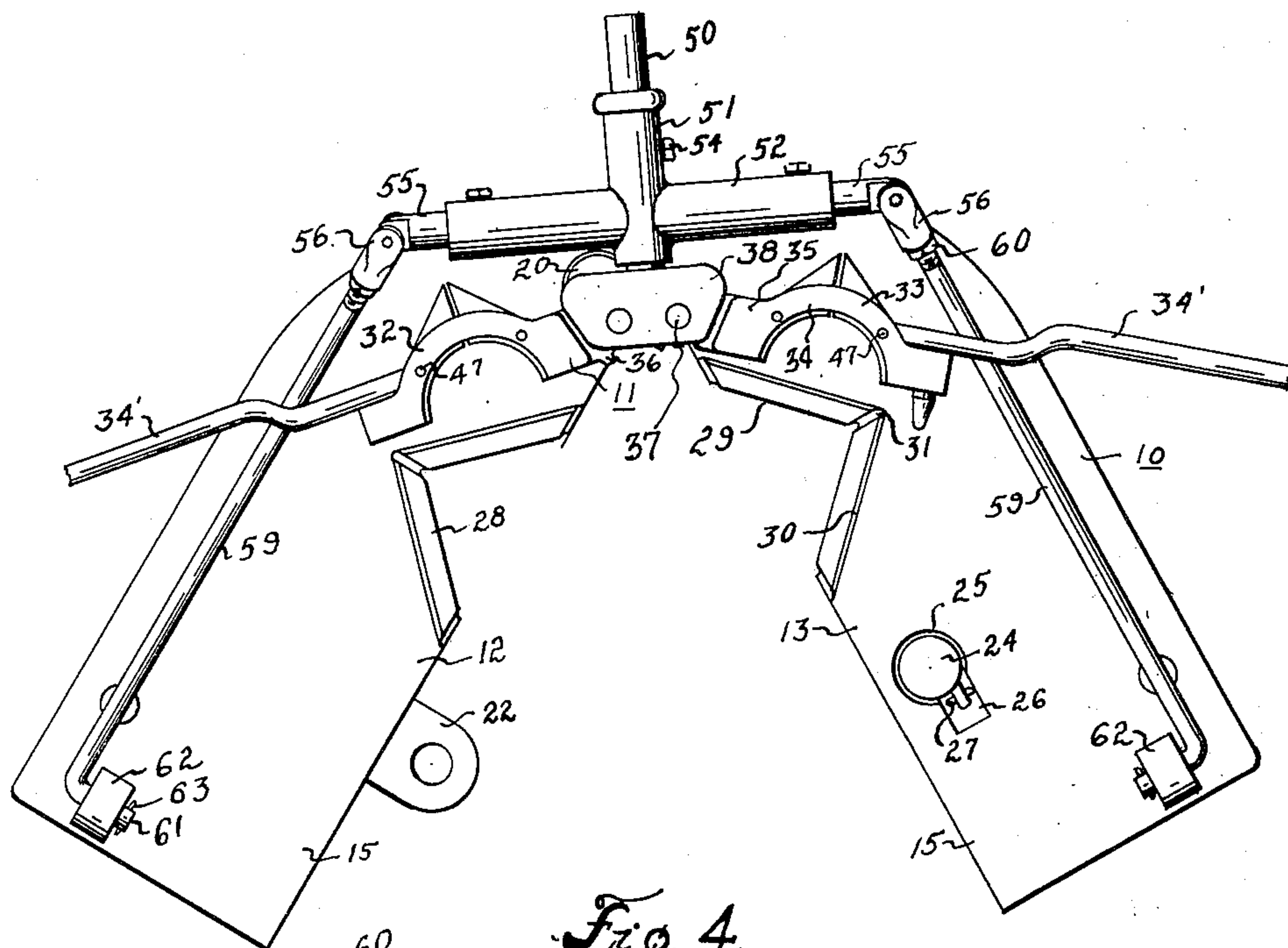


Fig. 4.

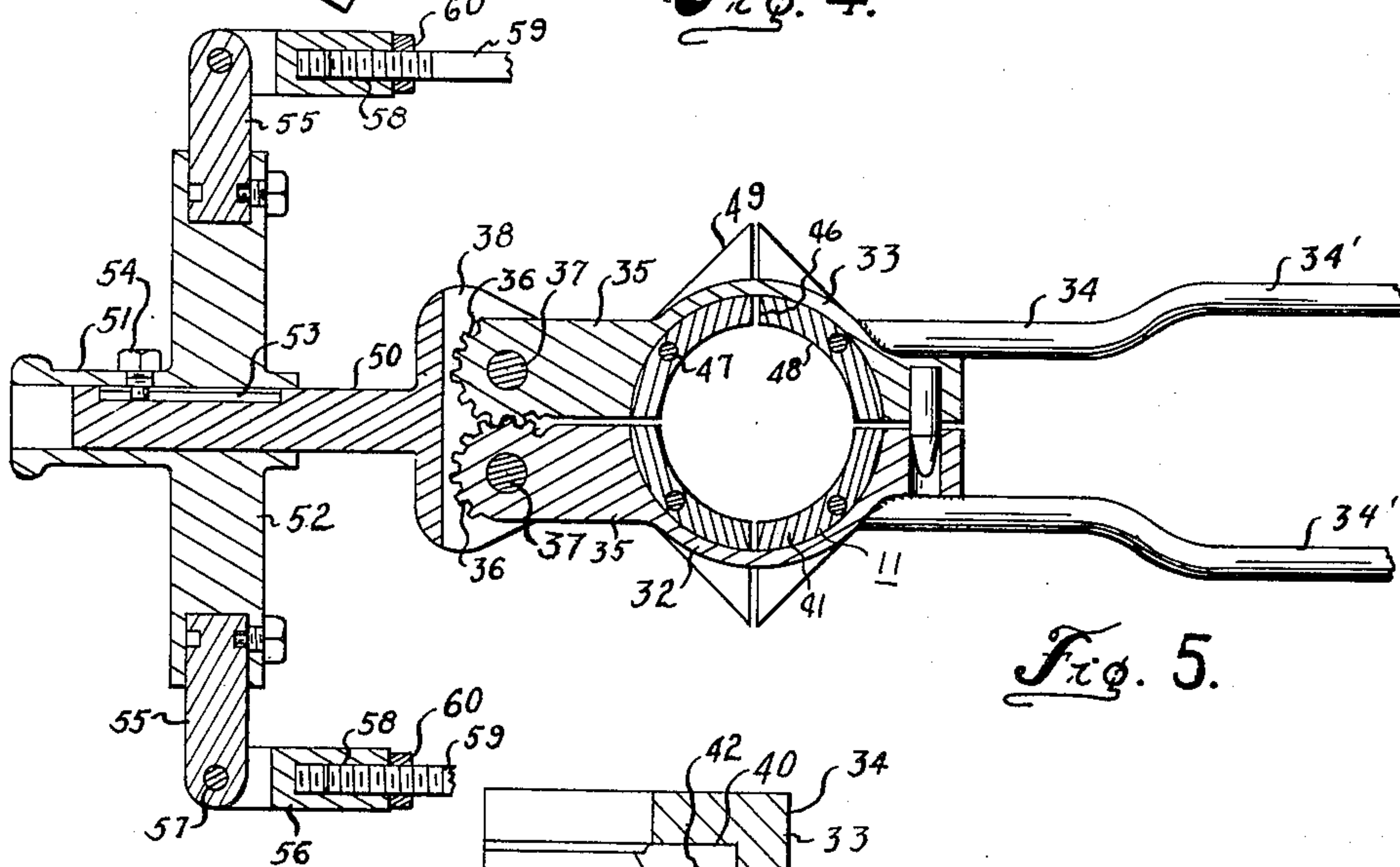


Fig. 5.

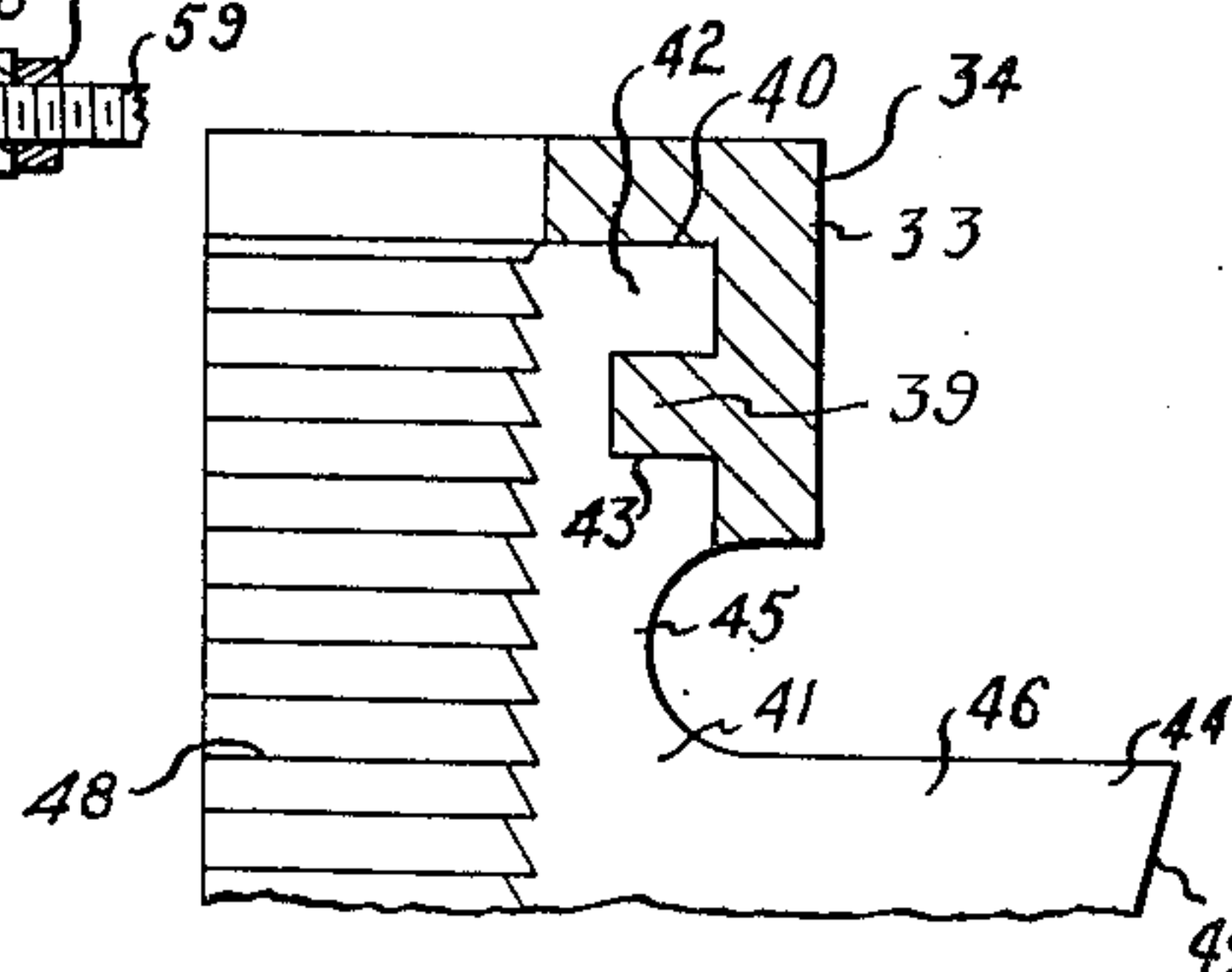


Fig. 6.

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3 Sheets-Sheet 3

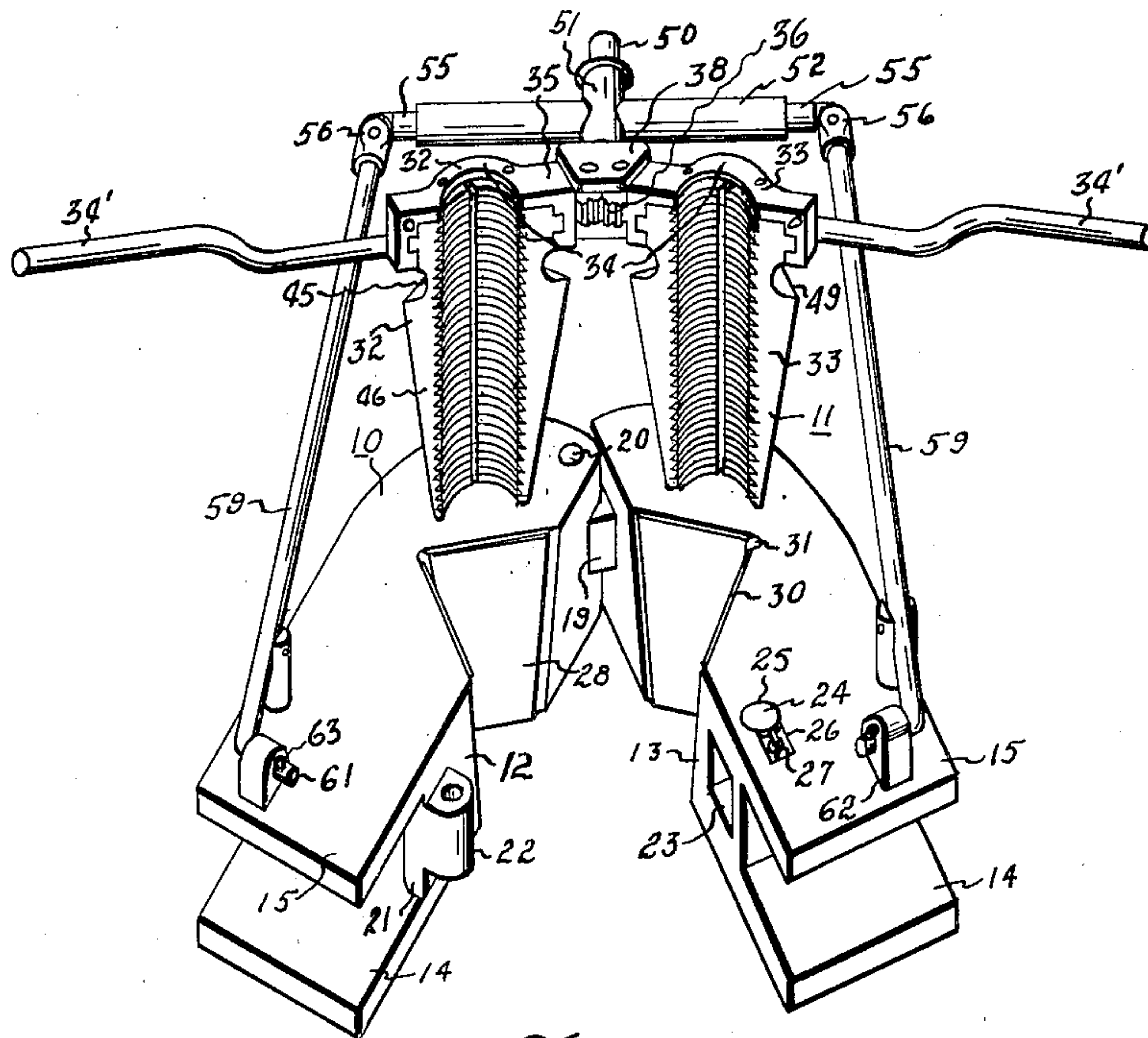


Fig. 7.

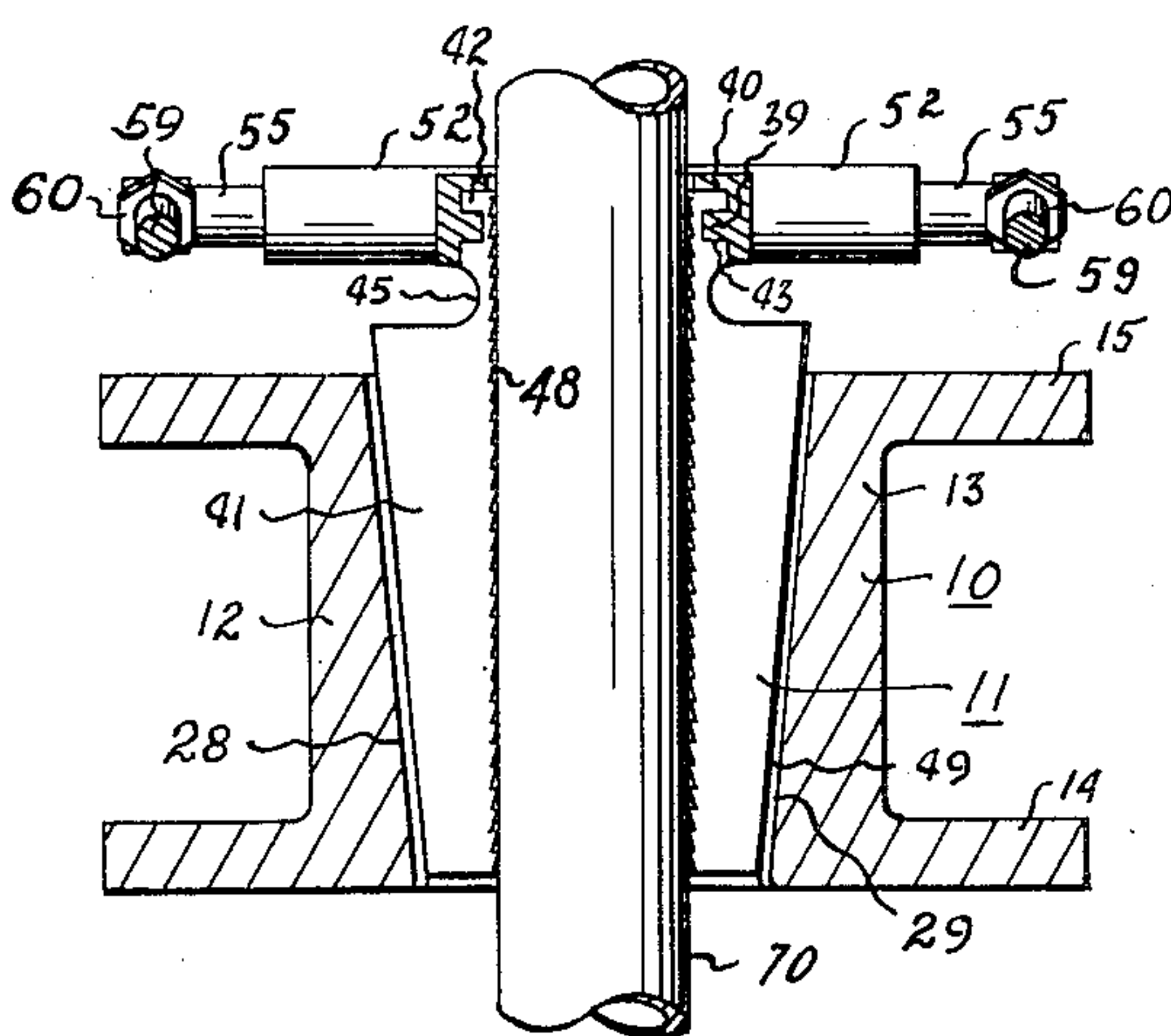


Fig. 8.

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## UNITED STATES PATENT OFFICE

2,527,954

## WELL SPIDER

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Application October 4, 1946, Serial No. 701,123

10 Claims. (Cl. 24—263)

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This invention relates to new and useful improvements in well spiders for pipes.

One object of the invention is to provide an improved well spider, particularly adapted to handling well pipes and arranged to facilitate such handling by one workman with safety and a minimum of labor.

A particular object of the invention is to provide an improved well spider including a base or head and slips pivoted to a cross member, which member is positively linked to the head in such a manner as to provide guards on each side, preventing lateral displacement of the slips from the head, as well as maintaining the slips, when open, in an upright position and holding them against forward and rearward tilting.

Another object of the invention is to provide an improved well spider involving a hinged base or head co-acting with a pair of slips which are hinged to the base by spring sustained members which latter not only aid the workman in lifting the slips, but maintain the slips in working relation to the base at all times.

A further object of the invention is to provide an improved well spider including, a separable hinged base or head and hinged slips connected to the base by spring sustained members pivoted at their ends to the base and slips, whereby the base may be freely opened and closed and the slips readily manipulated.

A still further object of the invention is to provide an improved slip mounting, wherein the slip members are geared together in a bridle member, which member is supported in position so that upon swinging or laterally moving either slip member, the other slip member will be moved likewise.

An important object of the invention is to provide an improved well spider wherein the slip members are geared and bridled together and linked to a base having a slip bowl, in such a manner that slips when open and resting on the base, cannot be jarred or accidentally displaced into the bowl because of the pipe striking one side of said bowl, when being moved through said bowl.

Still another object of the invention is to provide an improved slip mounting including a yoke-shaped support hinged to the base and to which, the slip members are connected so as to slide longitudinally, whereby the slips may not only be swung upwardly and downwardly, but moved forwardly and rearwardly, with respect to the slip bowl of the base, which permits the slips to be readily pulled forward and dropped into the

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bowl in registering position with the sides thereof.

A construction designed to carry out the invention will be hereinafter described together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawing, wherein an example of the invention is shown, and wherein:

Fig. 1 is a side view of a well spider constructed in accordance with the invention and in its closed position,

Fig. 2 is a horizontal, cross-sectional view taken on the line 2—2 of Fig. 1,

Fig. 3 is an enlarged transverse, sectional view taken on the line 3—3 of Fig. 1,

Fig. 4 is a plan view showing both the head and the slips in open position,

Fig. 5 is a horizontal, cross-sectional view through the slips taken on the line 5—5 of Fig. 1,

Fig. 6 is a vertical, sectional view of a portion of one of the slip jaws,

Fig. 7 is a perspective view of the spider, the slips and head being in open position, and

Fig. 8 is a transverse sectional view taken on the line 8—8 of Fig. 1.

In the drawings, the numeral 10 designates generally, a base or head and 11, generally, pipe slips, co-acting therewith; the head and slips constituting a well spider for pipes, such as well pipe or tubing. The head comprises substantially complementary members 12 and 13, which are hinged together and are alike, except as to certain minor details. Each head member is elongated and the other hinged end of the head 11 (being the end farthest away from the workman) is semi-circular in plan. Each head member includes a flat bottom plate 14 and a flat top plate 15, connected by a semi-circular bowl section 16 and a tubular post 17, which are integral therewith.

The head member 12 has a pair of spaced bosses 18 at its outer end between its plates and integral with said plates; while the member 13 has an integral hinge lug 19 between its plates engaging between said bosses. The bosses and lug are axially bored to receive a hinge pintle 20 which has its ends upset and countersunk in the outer faces of the plates, as is customary. This hinge arrangement permits the head members to be readily swung and the flat under faces of the bottom plates 14, permit the members to slide on the flat top of the tubing head or hanger (not shown).

The head member 12 has an integral, vertical



web 21 extending from its bowl section 16, flush with the inner edges of its plates and integral therewith. A latch lug 22 extends laterally from the web, intermediate the plates and freely engages between the bosses 23, integral with the plates of the member 13. The lug and bosses are axially bored to receive a headed latch pin 24, seated in a counter-bore 25 in the top plate 15 of the member 13. The said top plate has a slot 26 contiguous to the counterbore, so that a keeper chain 27 attached to the head of the pin, may extend through said slot. The head of the pin being flush with the upper face of the top plate and the chain being below said face, no upstanding obstruction is present on said face. The lower end of the chain is secured within the member and sufficient slack is left to permit vertical lifting of the pin, by the chain, to unlatch the members.

When the head members are swung together their inner edges contact, a smooth, flat working surface is provided around the bowl sections 16. Each section is offset longitudinally of the head from its hinge with its inner edges contiguous to the inner edge of its plate. When the head members are swung together, a substantially semi-circular bowl is formed. The bowl sections are provided with internal, inclined slip faces 28, as is customary in this art, so that when the head members are latched together, a substantially rectangular or polygonal, downwardly converging socket 29, is formed. In order to accommodate irregularities in the slips, the flat inclined slip faces 28, which are rectangular in shape, have their edges beveled as is indicated at 30; the upright bevels between the faces being merged into upright clearance grooves 31. The slip faces are preferably treated to harden them.

The slips 11 resemble those shown in my Letters Patent No. 2,217,072, but differ therefrom in many respects. The slips include substantially complementary hinged members or jaws 32 and 33, respectively, each having a handle 34', preferably welded thereto and an arcuate slip hanger 34. Each jaw has an outwardly or forwardly extending shank 35 having its outer end rounded and provided with inwardly facing, intermeshing gear segments 36, each concentric with its respective pintle 37. The gear segments are pivoted in a transverse bridle 38, which is slotted to receive them and carries the pivot pintles.

The slip hanger 34 of each jaw is generally arcuate in plan and has its inner face recessed at 40 and provided with an arcuate rib 39 (Fig. 6). A pair of slip sections 41 are carried by each hanger and each section has an arcuate head 42 inserted in the recess 40, as well as an arcuate groove 43 receiving the rib 39. The head 42 of each slip section is connected to the body 44 thereof by a reduced neck 45. The vertical edges 46 of the sections are radial and the sections are spaced apart so that the outer sides of each pair are substantially flush with the ends of the jaws (Fig. 5). Each section is held in its recess by a countersunk machine screw 47.

The inner faces of the slip sections are formed with the usual arcuate gripping teeth 48 so that when the slips are closed these teeth will assume a circular shape around a pipe. Each body 44 has an outer flat back or face 49 inclined inwardly and downwardly and of approximately the same width as the correlated face 28 of the head 10. The faces 28 and 49 are inclined at substantially the same angle to the perpendicular so that the slip sections will wedge in the socket 29 when

the jaws are gripped around a pipe. Since the outside diameters of pipes of a given size vary more or less to a slight degree, the radial disposition of the slip bodies on the pipes will likewise vary and consequently said bodies will not always sink to the same level, when lowered into the socket 29. It will be observed that the sides 46 of the bodies 44 and the faces or backs 49 intersect at acute angles (Fig. 5) and when the slips are closed form apexes which register with the upright bevels 30 and the grooves 31. This structure allows radial expansion and contraction of the slip bodies, due to irregularities in pipe diameters.

The bridle 38 in which the jaws are hinged, is provided with an outwardly extending medial stem 50, which is preferably cylindrical in shape. This stem has sliding engagement in a sleeve 51 forming part of a crosshead 52. The stem has a longitudinal keyway 53 and a screw-threaded key 54 mounted radially in the sleeve, has its reduced end engaging in said keyway, whereby the longitudinal sliding movement of the stem is limited. This arrangement permits the slips, when grasped by the handles 34', to be pulled forwardly or pushed rearwardly, to a limited extent.

The crosshead extends transversely of the outer end of the base or head 10 and studs 55 are rotatably confined in its ends. The outer ends of the studs are reduced and pivoted in clevises 56 by pins 57. Each clevis includes an internally screw-threaded barrel 58 into which the outer screw-threaded end of a link 59, is screwed; said clevis being fastened against rotation by a jamb nut 60. The links overlie the top plates 15 of the head members 12 and 13 and have their inner or lower ends bent inwardly to form cranks 61, which are journaled in ears 62, cast on the inner ends of said plates; said cranks being retained by cotters 63. The crosshead 52, bridle 38, stem 50 and links 59, constitute a slip mounting. The crosshead 52 and the links 59 pivoted to the upper ends of the crosshead constitute a yoke and when the cranks 61 are pivoted to the head 10, these elements constitute a swinging or hinged yoke.

Even when the slips 11 are in the socket 29 of the head, the links incline upwardly from their cranks. The tubular posts 17 have their bores 17' extending through the plates 15 (Fig. 3), so as to receive vertical plungers 64. The upper end of each plunger is slotted and has journaled therein, a small grooved roller 65 on which the overlying link 59 rests. The plungers engage the links a short distance from the ears 62. Each plunger rests upon a coiled spring 66, seated in the bore of its correlated post and surrounding a guide stem 67 slideable in the base of the post. A cotter 68 extends through each plunger, as well as, through vertical slots 69 in the post and limits the vertical movement of said plunger.

One purpose of the spring sustained plungers is to cushion the downward swing of the slips, when they are released from the pipe and swung down to rest upon the head members 12 and 13. The most important function of the plungers is to aid the workman in lifting the slips from their open position on the head to engage them around the pipe. In releasing slips it is customary to elevate the pipe, which may or may not, carry the slips from the socket, even though the workman is grasping the handles 34. When the slips are moved down into the socket, the links will be swung downwardly and consequently the springs



66 will be compressed to a considerable degree, thus if the slips remain in the socket or fall down thereunto said springs will be compressed and this stored spring force will aid the workman in lifting the slips.

The springs may be proportioned so as to be compressed to some extent, when the slips are lowered from elevated position, so as to cushion them as they come to rest on the head 10. This compression of the springs will aid the workman in lifting the open slips, when swinging them into position around the pipe; however both the upward and downward movements of the plungers 64 are limited by the travel of the cotters in the slots 69.

In describing the operation it will be assumed that the slip support has been placed on a tubing head, such as is shown in my Patent No. 2,153,770, and is open, as is shown in Figs. 4 and 7 of the drawings hereof. The workman first swings the head members 12 and 13 together and fastens them with the pin 24; the well pipe being located centrally of the socket 29, as is indicated at 70 in Figs. 1 and 8. During this operation the slips 11 will remain open and the flat faces of the head members will slide under the bottoms of the slip sections 41; the said bottoms being smooth and usually covered with some grease. However, the slips may be partially closed during the closing of the head.

It will be noted that the handles 34' of the slips 11 are relatively long and offset upwardly so as to leave ample hand space between said handles and the links 59. The elongate handles provide increased leverage over those shown in my Patents Nos. 2,153,770 and 2,217,072. The elongate head members 12 and 13 are much easier to handle and position on the tubing head, than the circular heads shown in my patents, supra.

In order to engage the slips all round the pipe, the workman grasps the handles 34' and pulls the slip members 32 and 33, toward him. This pulling movement may cause the slips to swing upwardly, since the workman will usually lift them when pulling them toward the bowl; however owing to the sliding movement of the stem 50 in the crosshead 52, the slip sections 41 may be slid on the head 10 to the socket 29. Due to the geared connection between the slip members and the holding of the bridle 38 against lateral swinging by reason of the crosshead and links, the workman may grasp one handle 34' and swing the slip members to a closed position, whereby they will drop into the socket, particularly if said slips have been moved so that their sections 41 stand on each side of the socket. By observing Fig. 7, it will be obvious that the links 59 incline upwardly at a sufficient elevation to offer little resistance to the pulling or swinging movement of the slips. The springs 66 of the plungers 64 being under compression will exert their expansive force against the links and aid the workman in lifting the slips.

When the jaws and slip sections 41 have been positioned on each side of the pipe, they are swung toward each other and either lowered or dropped into the bowl socket, which will cause the teeth 48 to engage around the pipe. The swinging and positioning of the slips on the pipe, may be a substantially continuous operation, since the workman may continuously swing the handles 34' toward each other and time his movements to accomplish this result.

When the jaws are closed around the pipe and lowered into the bowl socket, the inclined backs or

faces 49 will ride down the faces 28, whereby the sections will be slightly compressed and wedged in the socket 29, which will cause the teeth 48 to grip the surface of the pipe. After the slips are in place, the lines supporting the pipe will be released and the weight of the pipe will be imposed on the teeth 48, which will cause said teeth to bite into the pipe and set the slips.

In releasing the slips it is customary to elevate the pipe and usually the slips will be raised by the pipe. This is due to the "bite" or "set" of the teeth 48 in the surface of the pipe. However after the pipe has been elevated the slips may be jarred and fall back into the socket. Since the springs 66 of the plungers 64 are compressed, any downward movement of the slips would be cushioned and obviously the compressed springs would aid the workman from lifting the slips from the bowl. It is to be understood that when the slip sections 41 are out of the bowl, the springs must not be under sufficient compression to interfere with free manipulation of the slips.

Assuming that the slips remained closed on the pipe when the latter was elevated, the workman grasps the handles 34' and swings the members 32 and 33 to an open position. With the aid of the hinged links 59, the workman swings the slips downwardly until they come to rest on the head 10. As the lower ends of the sections 41 approach the plates 15, the springs 64 will be slightly compressed and thus cushion the downward swing of said slips.

The advantage of tying the slips 11 to the head 10 by means of the links 59, is considerable. In the first place it makes a unitary structure whereby the parts are properly assembled and connected at all times. Next, the sections 41 are always in proper position to register with and slide down the faces 28. This avoids rotating the slips or the head to register the faces 49 with socket faces 49 so that the slip sections will slide down into the socket. It also eliminates any torsional strain due to lowering the slip sections into the socket, when the faces are not correctly aligned.

The setting and releasing of the slips is faster, more simple and easy and much safer. Since the base or head as shown in my patents supra, is usually small in diameter, the ordinary unattached slips frequently fall or are knocked off of the head causing injury to workmen and increasing the labor in replacing them. The links 59 being located on side of the slip sections 41, prevent the slips from being displaced laterally from the head 10. In opening and lowering the slips, the workman may rest the sections 41 on the base close to the socket or he may pull them to this position before lifting them. When the string of pipe is moved vertically through the bowl, a collar often strikes against one of the faces 28 thus jarring the open slips and causing them to be displaced laterally on the base, which results in canting the slips, whereby one of the sections 41 drops into the socket. This cannot occur with the slips herein set forth because of the gears 36 and the supported bridle 38. When one of the slip members is displaced laterally, the other member is well away from it.

When the slips are released from the pipe and lowered to the head they may be offset from the socket 29 and the pipe, a sufficient distance to be out of the way and to leave ample working space around the pipe. A single workman may grasp the handles 34' of the open slips and with



a minimum effort pull them forwardly or swing said slips upwardly and engage them on the pipe. The slip sections are automatically alined with the socket and little or no mechanical skill is required in operating them.

The foregoing description of the invention is explanatory thereof and various changes in the size, shape and materials, as well as in the details of the illustrated construction may be made, within the scope of the appended claims, without departing from the spirit of the invention.

What I claim and desire to secure by Letters Patent is:

1. In a well spider, the combination of a head including hinged members and a socket, a pair of slip jaws hinged together and having handles, slip sections carried by the jaws for engaging in the head socket, a crosshead to which the jaws are pivoted, and links on each side of the slips pivoted to the crosshead, each link being pivoted at one end to the crosshead and pivoted at its opposite end to one of the head members.

2. A well spider as set forth in claim 1, wherein the jaws are slideably connected to the crosshead.

3. In a well spider, the combination of a head including separable hinged members and a socket, a pair of slip jaws hinged together and having handles, slip sections carried by the jaws for engaging in the head socket, a crosshead to which the jaws are connected, links free of the handles on each side of the jaws pivoted to the crosshead and also pivoted to the head members, and coiled springs supporting the links housed in the head members adjacent the pivotal connections of said links to the head members.

4. In a well spider, the combination of a head including, separable hinged members and a socket, a pair of slip jaws geared together and having handles, a bridle in which the jaws are pivoted, slip sections depending from the jaws for engaging in the head socket, a stem extending from the bridle, a crosshead slideably connected with the stem, inclined links overlying the head members on each side of the slip jaws, the upper ends of the links being pivoted to the crosshead, and pivotal connections between the lower ends of the links and the head members.

5. In a well spider, the combination of a head including, separable hinged members and a socket, a pair of slip jaws geared together and having handles, a bridle in which the jaws are pivoted, slip sections depending from the jaws for engaging in the head socket, a stem extending from the bridle, a crosshead slideably connected with the stem, inclined links overlying the head members on each side of the slip jaws, the upper ends of the links being pivoted to the crosshead, pivotal connections between the lower ends of the links and the head members, and coiled springs housed in the head members and sustaining the links.

6. In a well spider, the combination of a head, including, separable hinged members and a socket, a pair of slip jaws geared together and having handles, a bridle in which the jaws are pivoted, slip sections depending from the jaws for engaging in the head socket, a stem extending from the bridle, a crosshead slideably connected with the stem, inclined links overlying the head members on each side of the slip jaws, the upper ends of the links being pivoted to the crosshead, pivotal connections between the lower ends of the links and the head members, tubular posts in the head members, and spring pressed plungers mounted in the posts and having rollers at their upper ends engaging the links.

7. In a well spider, the combination of an elongate head having a front end and a rear end with a slip socket nearer its forward end, a swinging yoke overlying the head having one end hinged to the rear end of the head and including a transverse member overhanging the forward end of said head, hinged slip supports carried at their front ends by the transverse member of the yoke, slips depending from the slip supports and engaging in the head socket, and handles extending rearwardly from the slip supports.

8. A well spider as set forth in claim 7 wherein the head includes a pair of hinged members to each of which the yoke is hinged and also wherein the transverse member is hinged at its end to the yoke.

9. In combination in a well spider, a head having a slip socket, an elongate swinging support hinged at one end to the base, whereby its opposite end may be swung upwardly, a hinged slip support carried at one end by the free swinging end of the swinging support and extending toward the hinged end of said swinging support, handles extending from the opposite end of the slip support and slips depending from the slip support into the head socket, whereby lifting of the handles swings both supports and lifts the slips from the socket.

10. The combination set forth in claim 9, with a sliding connection between the supports, whereby the slip support may be shifted relatively of the swinging support when the slips are elevated from the sockets to rest said slips on the head.

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