

J. C. WILSON.
TUBE BENDING MACHINE.
APPLICATION FILED JAN. 29, 1909.

Patented Feb. 7, 1911.
7 SHEETS—SHEET 1.

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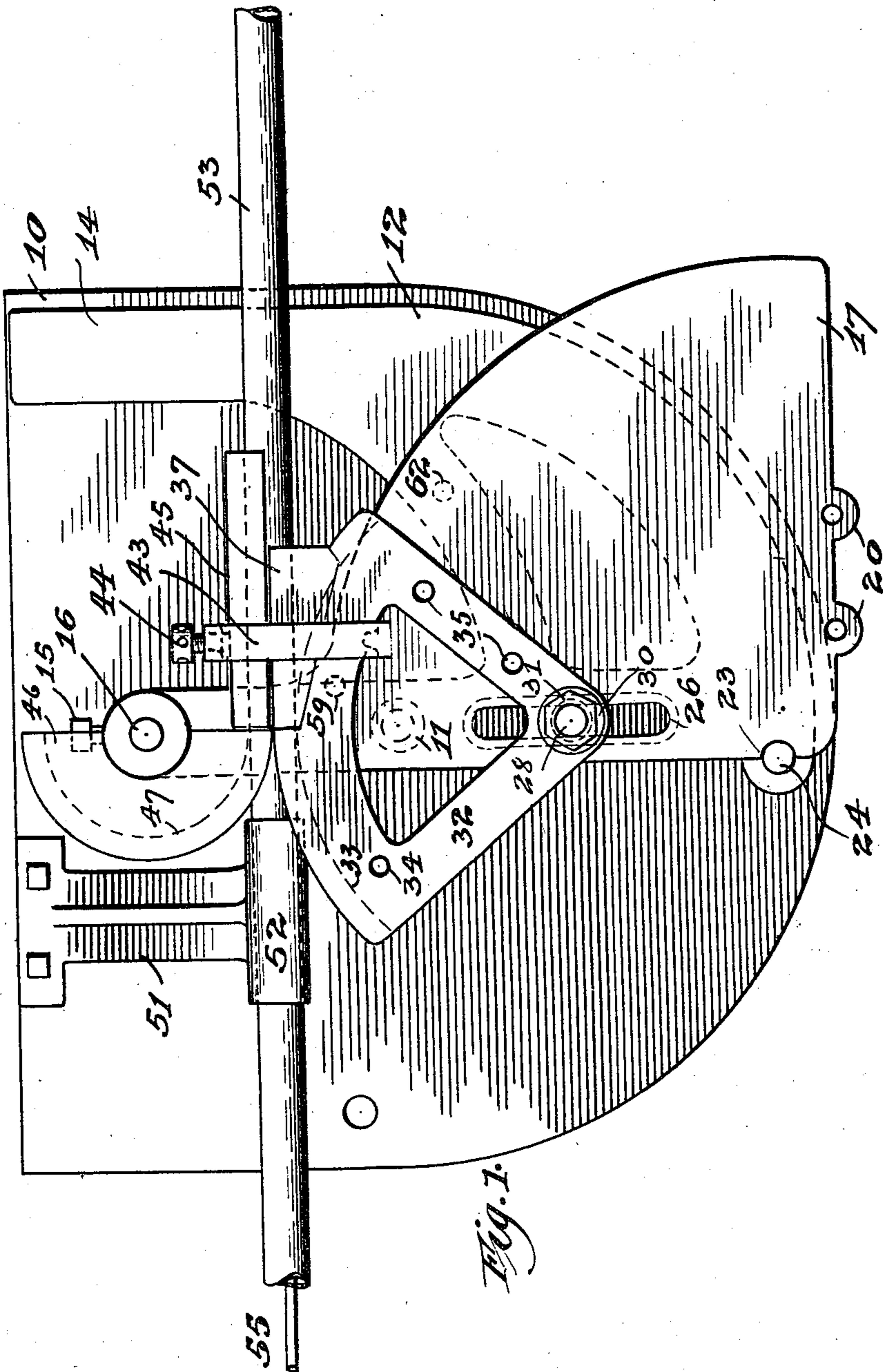
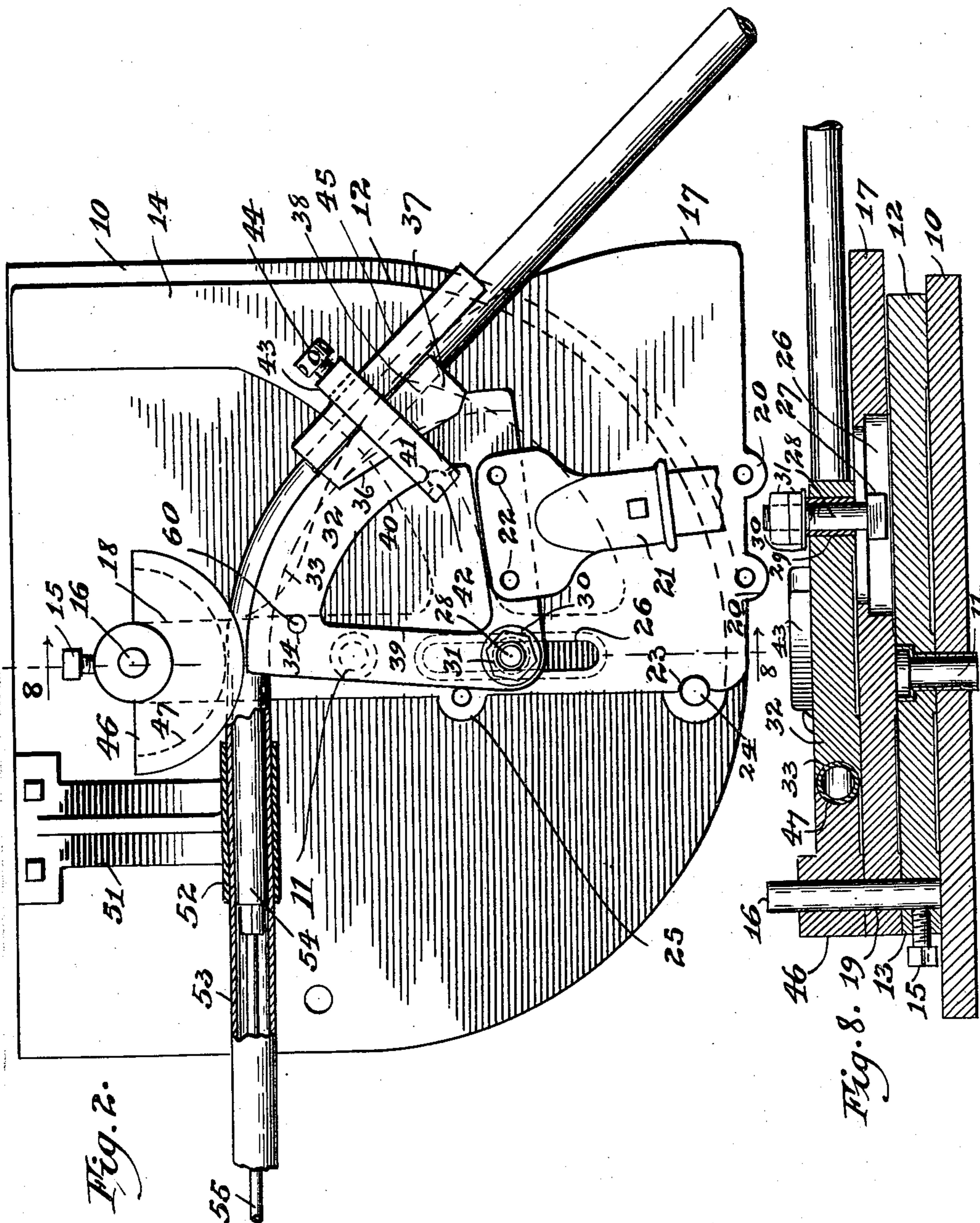


Fig. 1.

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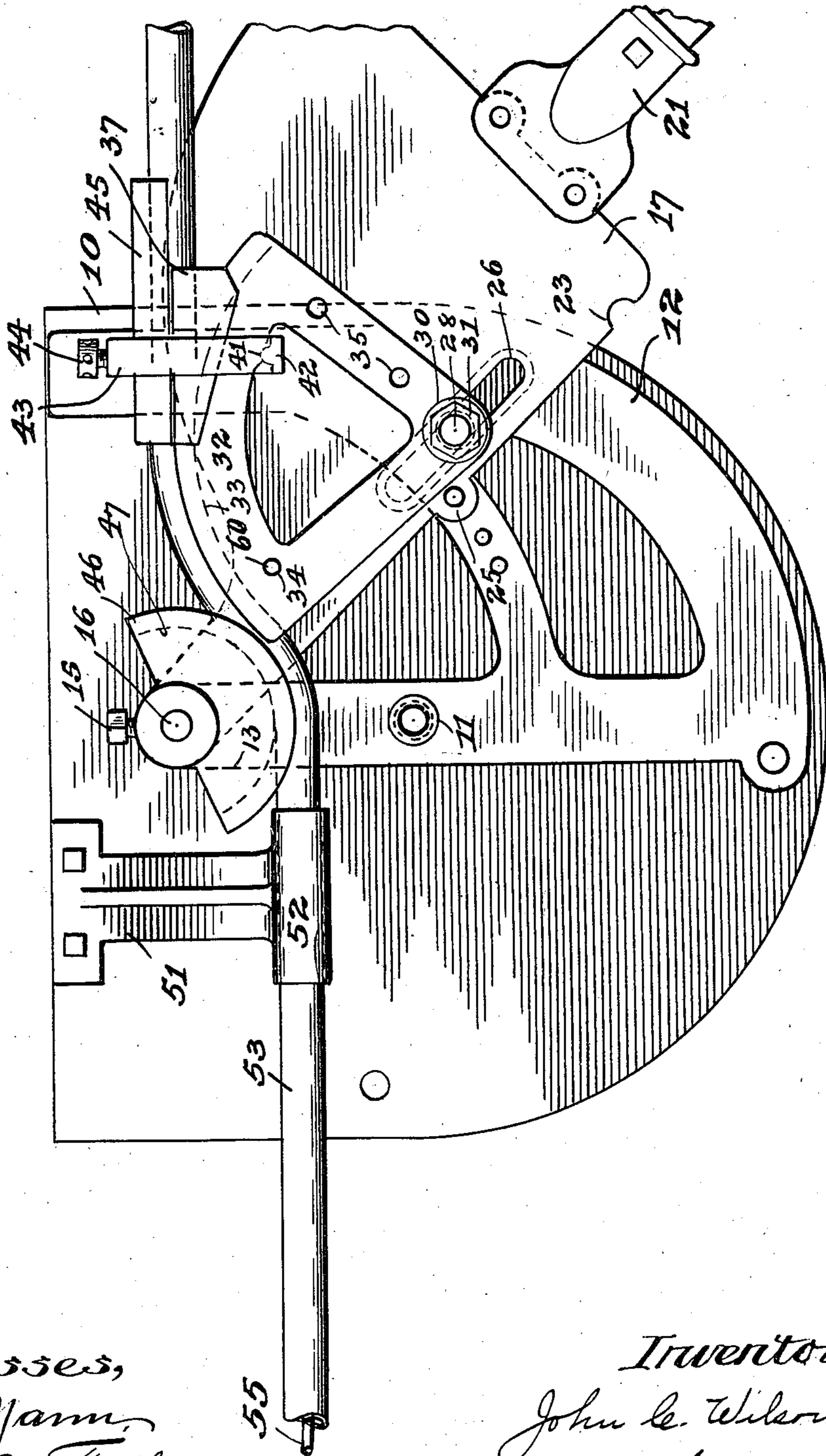
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Fig. 3.



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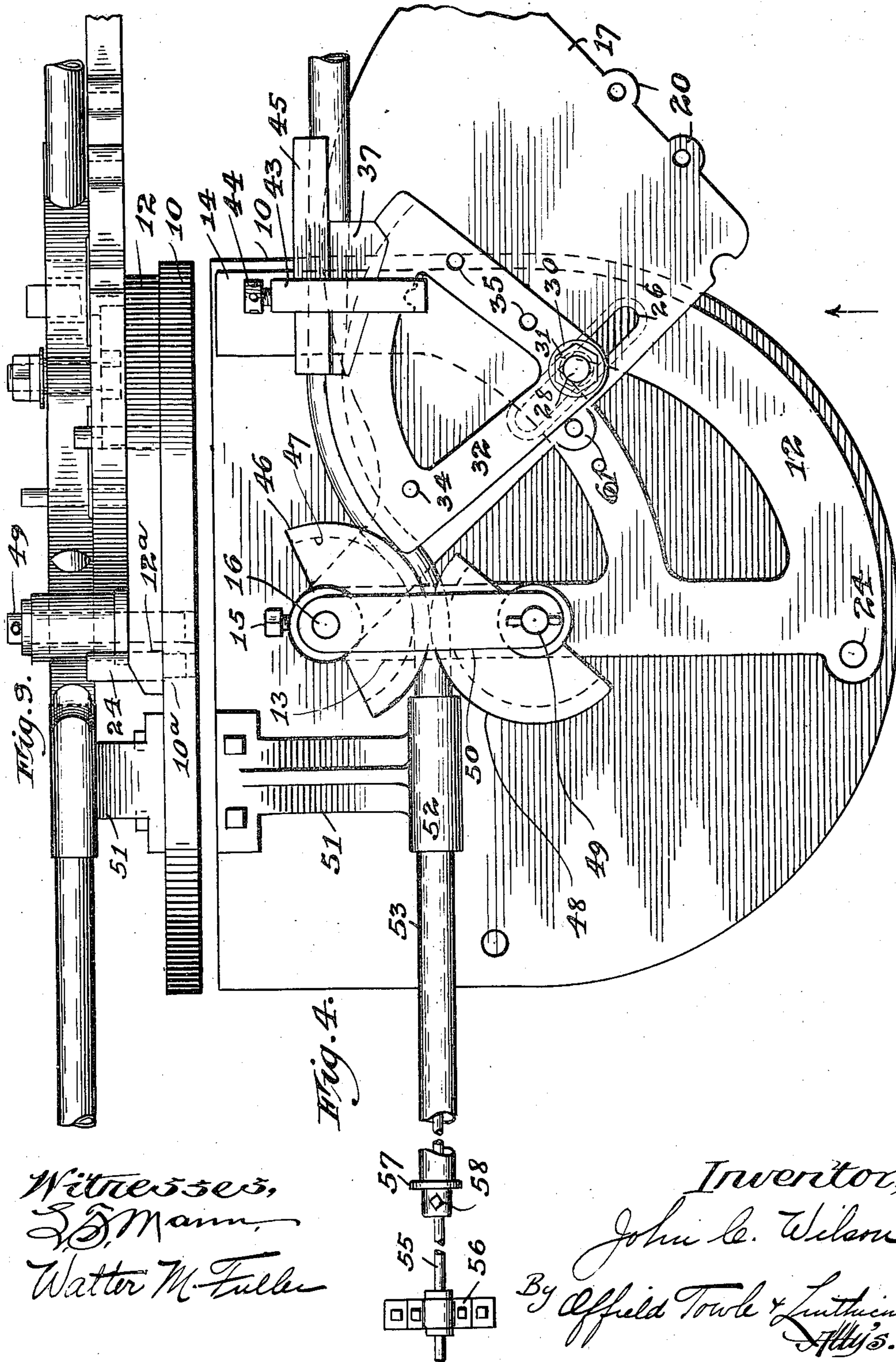
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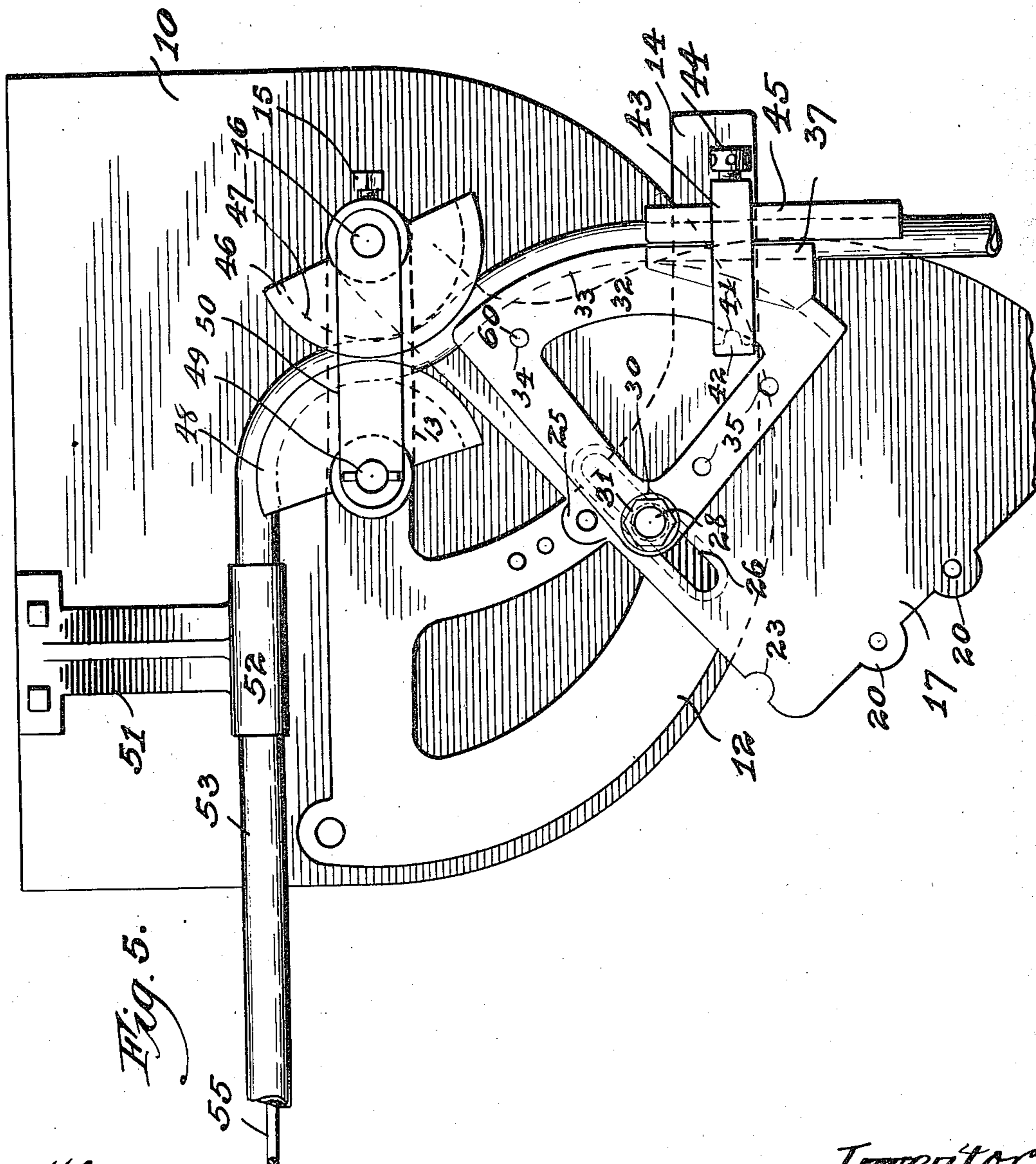


Fig. 5.

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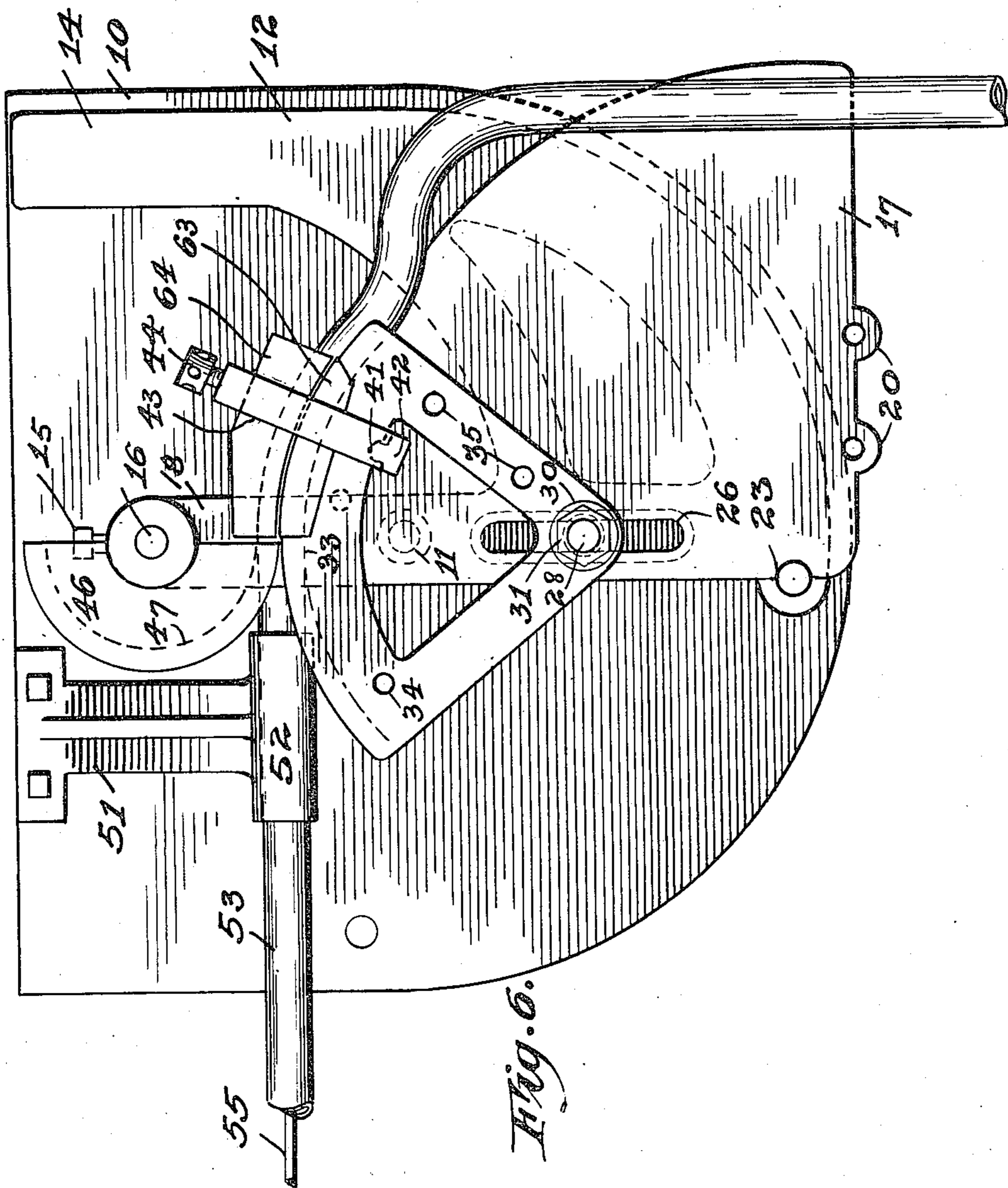
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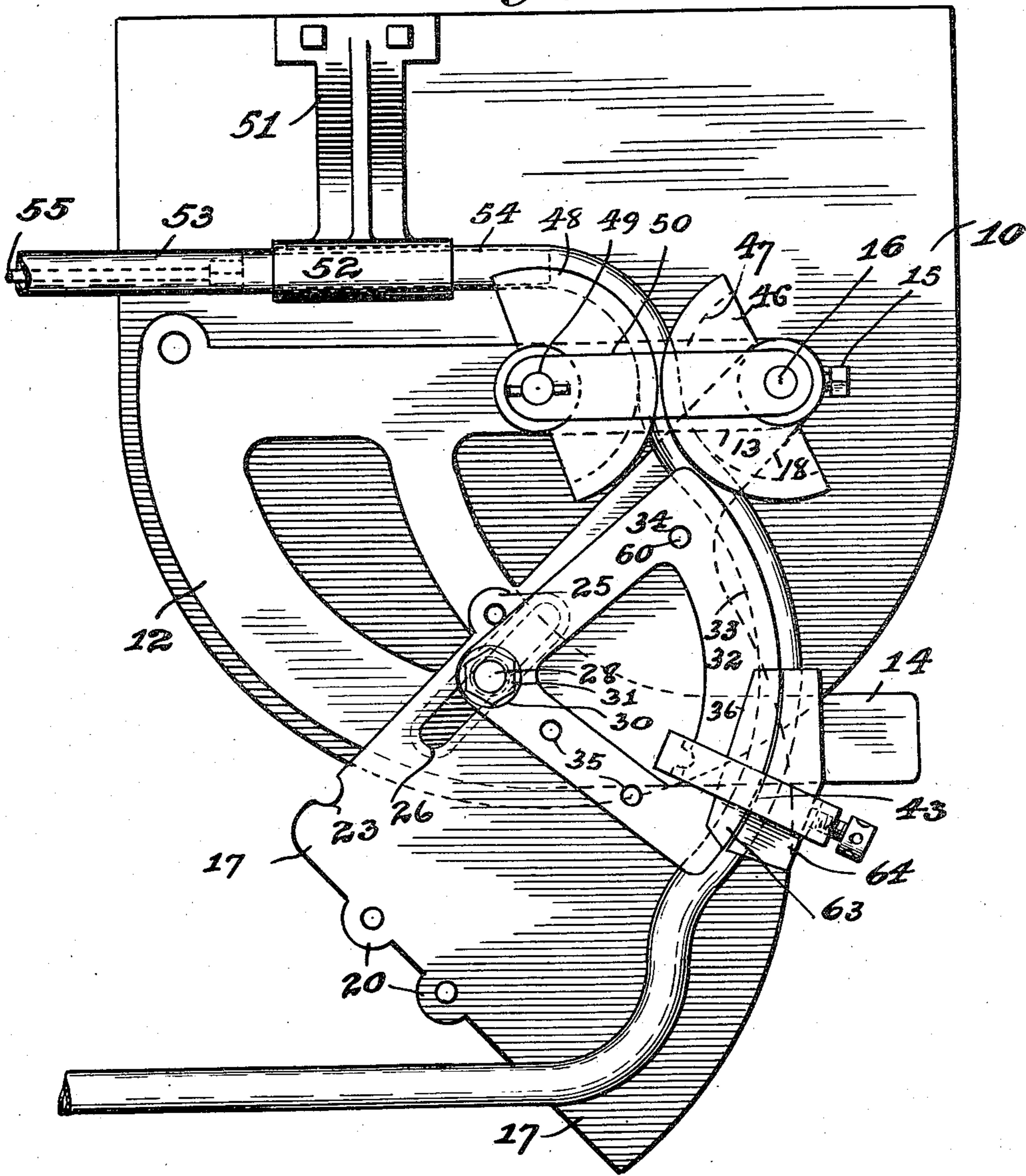
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Fig. 7.



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UNITED STATES PATENT OFFICE.

JOHN C. WILSON, OF KENOSHA, WISCONSIN, ASSIGNOR TO THE SIMMONS MANUFACTURING COMPANY, OF KENOSHA, WISCONSIN, A CORPORATION OF WISCONSIN.

TUBE-BENDING MACHINE.

983,664.

Specification of Letters Patent.

Patented Feb. 7, 1911.

Application filed January 29, 1909. Serial No. 475,016.

To all whom it may concern:

Be it known that I, JOHN C. WILSON, a citizen of the United States, residing at Kenosha, in the county of Kenosha and State of Wisconsin, have invented certain new and useful Improvements in Tube-Bending Machines, of which the following is a specification.

This invention concerns machines for bending tubes or pipes such as are used in metallic furniture, for example, bedsteads. At present it is fashionable to provide the tubes forming the main parts of the head and foot of a bedstead with one or more humps or curves, and it is to meet the need for machines which will bend tubes for such purposes that I have devised the bending machine described hereinafter which incorporates this invention.

Succinctly stated, my improved device in its most desirable embodiment has a plurality of rotary forms about which different portions of the tube are successively bent to provide the camel-back features referred to above.

In the accompanying drawings, which illustrate such an embodiment of my invention, I have shown a machine with its parts in different positions clearly indicating the various steps in the bending operations. Throughout the various views of these drawings like reference characters refer to the same parts.

In the drawings—Figure 1 is a top plan view of the improved mechanism showing a portion of the tube or pipe in the position which it occupies preliminary to the first bending operation; Fig. 2 illustrates the positions of the parts after the first bend has been made in the pipe or tube, certain parts being broken away to more clearly show the internal construction; Fig. 3 indicates the arrangement of elements after the second or reverse bend has been placed in the tube; Fig. 4 illustrates the location of and the manner of attaching the third form to the mechanism preparatory to giving the pipe its final bend of the first series; Fig. 5 shows the location of the parts after the third or last bend has been made in the tube; Fig. 6 illustrates the arrangement of parts and the position of the tube or pipe just before the first bend of the second series is made; Fig. 7 is a similar view after all the bends have been made; Fig. 8 is a vertical cross-section

on line 8—8 of Fig. 2; and Fig. 9 is a side elevation of the machine as viewed in the direction indicated by the arrow in Fig. 4.

Referring to the various views, it will be noticed that the machine includes a suitably-supported horizontal plate 10 which I will hereinafter refer to as a table to distinguish this plate from other parts of the mechanism. Pivoted on this table 10 on a hollow pin 11, and adapted to rest on the top face of the table, I provide a flat frame support 12 having two substantially-parallel projections 13 and 14.

Upstanding from the leg or extension 13 and secured in an aperture of the same by a set-screw 15, I provide a pivot-pin or post 16, clearly shown in Fig. 8, and on this pivot pin or stud I pivot or fulcrum a quadrant-plate 17 having an extension 18 apertured at 19 to receive the pin 16. As is clearly shown, this quadrant plate rests upon the top face of the frame-support 12. On one edge this quadrant plate 17 is equipped with a pair of apertured ears 20 with which a detachable handle 21 is adapted to cooperate, this handle having a pair of studs 22 adapted to fit in the holes of the apertured ears 20 when it is desired to apply the handle to this plate. On another edge this quadrant is recessed at 23 to partially receive and accommodate an upstanding locking pin 24 passing through an aperture 12^a in the support 12 into a recess or socket 10^a of the table 10 (Fig. 9). This quadrant plate is also supplied with another apertured ear 25, the object of which will be indicated hereinafter. The plate 17 has in addition an undercut slot 26 intended to accommodate the head 27 of a bolt 28, the shank of which is supplied with a sleeve 29, a washer 30 adapted to bear on the top of the sleeve, and a plurality of nuts 31. It will, therefore, be apparent that by tightening these nuts the bolt may be adjustably secured in any desired position in the elongated slot 26. On this sleeve 29 I pivot or fulcrum a quadrant form or sector 32 grooved at 33 on its curved edge concentric to the axis of the sleeve to accommodate approximately one-half of a cylindrical tube or pipe, as is clearly shown in Fig. 8. This pivoted form or sector has a hole 34 extended there-through, and on the opposite portion is supplied with a pair of apertures 35 to which the handle 21 may be detachably applied.

The curved edge or face of this pivoted form 32 is supplied with a comparatively large notch or recess 36 adapted to receive a block 37 grooved on its outer edge at 38 to form a tangential extension or prolongation of a portion of the groove 33, whereby, as will be apparent, it is capable of accommodating a portion of the tube or pipe to be acted upon. This pivoted form has a central opening 39, the outer curved edge 40 of which is notched at 41 to receive a tongue 42 on a clamp 43 equipped with a screw 44, the inner end of which is intended to bear against a pressure-block 45 grooved on its inner face to receive the outer portion of the tube or pipe. As will be apparent, the cooperating recess and tongue 41 and 42 prevent the clamp from slipping out of place. Above the quadrant-plate 17 I pivot on the cylindrical stud or post 16 a smaller substantially-semi-circular sector or segment form 46 grooved on its curved face at 47 to receive a portion of the tube to be bent.

In addition to the parts mentioned, this bending machine is supplied with a detachable semi-cylindrical form 48 similar to the curved form 46, a pivot-pin 49 adapted to be temporarily placed in the hollow pivot pin 11, and a link 50 apertured at its opposite ends to receive portions of the pins 16 and 49, the location of these parts when in operative position being shown, for example, in Fig. 4.

Upstanding from the table 10 is a bracket 51 having at its end a sleeve 52 intended to accommodate the tube or pipe 53 to be bent and an arbor 54 within the same mounted on the end of a rod 55 supported at its opposite end by any suitable standard or bracket 56, this rod being desirably equipped with an adjustable stop 57 which is fastened to the rod in adjusted position in the usual manner by a set-screw 58.

The operation of this mechanism takes place in substantially the following manner: The various parts of the mechanism being in the positions indicated in Fig. 1, a length of pipe 53 to be bent is slid over the arbor 54, through the supporting sleeve 52, and over the rod 55 until its end strikes the stop 57. The blocks 37 and 45 are then applied to opposite portions of the tube and clamped fixedly to the tube by applying the clamp 43 and turning its gripping screw 44, so that there is no possibility of the tube sliding relatively to the clamping blocks and the rotatable form 32. The frame support 12 is prevented from rotating in a clock-wise direction on its pivot pin or stud 11 because the locking-pin 24 passes through the support with the aperture 10^a in the table beneath the same. The quadrant plate 17, which is pivoted to the plate 16, is prevented from rotating in a like direction by also striking against the pin 24, as is clearly illustrated.

The handle 21, which may be of any suitable length to obtain the necessary leverage, is applied to the quadrant form 32 by permitting its prongs or pins 22 to enter the correspondingly spaced apertures 35, whereupon this form 32 is swung around approximately 45°, or any other extent desirable, to the position indicated in Fig. 2, the rotary form 46 also ordinarily turning on its pivot-pin 16, due to the friction between the tube and this second form. It will be apparent that the combined actions of the arbor 54 and rotary form 46 prevent the tube from becoming displaced or improperly bent, and that during the turning movement of the form 32 a part of the tube or pipe is compelled to assume the curvature of its convex face. At the completion of this partial rotation of the sector or form 32, its round hole 34 is brought into register with a hole 59 of the same size in the plate 17, whereupon a pin 60 is placed in the alined holes, thereby locking the form 32 to the plate. In order to obtain the next or reverse bend in the pipe, the handle 21 is detached or removed from the form 32 and is applied to the ears 20 of the quadrant-plate 17, and after such attachment this quadrant-plate, the form 32 locked thereto, and the pipe clamped to the form are swung in a counter-clockwise direction about the pin 16, the tube during this turning being bent around the smaller segmental form 46 which is free to rotate during such bending operation, the relation of the parts after the completion of this second bend in the pipe or tube being clearly indicated in Fig. 3. A long pivot or fulcrum pin 49 is used to pivot the third form or sector 48 to the machine, this pin being placed in the hollow pin or sleeve 11. As is clearly indicated in Fig. 4, the link 50 receiving in the holes at its opposite ends the top portions of pins 16 and 49 acts to prevent them from being displaced. After the parts have assumed the relation indicated in Fig. 3, that is, after the second bend has been made, the quadrant-plate 17 is locked to the frame support 12 by passing a locking-pin 61 through the hole of the apertured ear 25 and another hole 62 properly positioned in the support 12. The pin 24 is then removed. The detachable handle is allowed to remain attached to the plate 17 and this plate, together with the form 32, the pipe clamped thereto, the second form 46, and the link 50 are swung around in a clockwise direction about the axle or pin 49, the form 48 turning at the same time, and about which form the third bend in the pipe is made, until the parts assume the relation indicated in Fig. 5. This completes one-half of the bending of the pipe at the head or foot of a bedstead, the other series of bends being accomplished by applying such a partially-bent tube to the machine with its elements in their

original position, as shown in Fig. 6, but it is necessary in order to accommodate such a bent tube that the clamp blocks 37 and 45 be replaced by other blocks 63 and 64 recessed on their adjacent faces to accommodate the tube. It will be noted that the groove in the clamp-block 63 forms a curved extension of and has the same curvature as the groove 33 of the quadrant form 32, the block 64 being correspondingly shaped but applied to the bent part of the tube instead of to a straight part as shown in Fig. 1. The same clamp 43 however may be employed in both instances. In order to complete the bending of the tube the same series of operations is repeated as described above, the tube being bent in succession about the three forms 32, 46 and 48, the final disposition of the parts and the ultimate shape of the tube being clearly shown in Fig. 7.

It will be readily understood that by removing the clamp and certain of the pivot pins and forms the finished pipe or tube can without difficulty be removed from the machine. It should be noted furthermore that whereas I have herein described and set forth one preferred embodiment of the invention, the invention is susceptible of a variety of embodiments and is not, therefore, limited to the precise structural details herein described.

I claim:

1. In a bending machine, the combination of a plurality of rotary forms, means to bend the piece to be operated upon successively about said forms, and means to maintain the same relation between each form and the part of the piece bent about said form during subsequent bendings as they had at the completion of the bending about said form.

2. In a bending machine, the combination of a pivoted plate, means to lock said plate against turning on its pivot, a form pivoted on said plate, a second form pivoted concentrically with said plate, means to fasten the piece to be bent to said first form, means to lock said first form from turning on its pivot during the turning of said piece about said second form, whereby said piece may be first bent during the turning of said first form with said plate locked against rotation and bent again about the second form during the turning of the first form and plate

about the axis of said second form with said first form locked against rotation on said plate.

3. In a bending machine, the combination of a plurality of rotary non-concentric sector forms against the curved faces of which the piece to be bent is adapted to bear, means to secure said piece to one of said forms, and means whereby said sector forms may be turned about their individual axes to provide the piece with suitable curves.

4. In a bending machine, the combination of a pivoted support, a lock for said support, a plate fulcrumed on said support, a lock for said plate, a form pivoted on said plate, means to lock said form to said plate, a second form pivoted on said support concentrically with said plate, a third form detachably pivoted on said support concentrically with its pivot, means to secure the piece to be operated upon to said first form, and means to turn said forms about their individual centers to provide said piece with suitable curves.

5. In a bending machine, the combination with a plurality of forms, of means to bend a piece successively about said forms, and means for locking two or more of said forms together during certain of said operations.

6. In a bending machine, the combination with a plurality of forms, of means for bending the piece to be operated on successively about said forms, and means for moving a plurality of said forms synchronously during certain of said operations.

7. In a bending machine, the combination with a pivot support, a plate fulcrumed thereon, a plurality of forms pivoted on said plate, means for causing said forms to maintain definite relations relative to each other during certain of the operations, and means for turning said forms.

8. In a bending machine, the combination with a plurality of rotary non-concentric forms, of means to secure a piece to one of said forms, means for moving said forms about their individual axes, and means to maintain a definite relation between these forms during certain of the forming operations.

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