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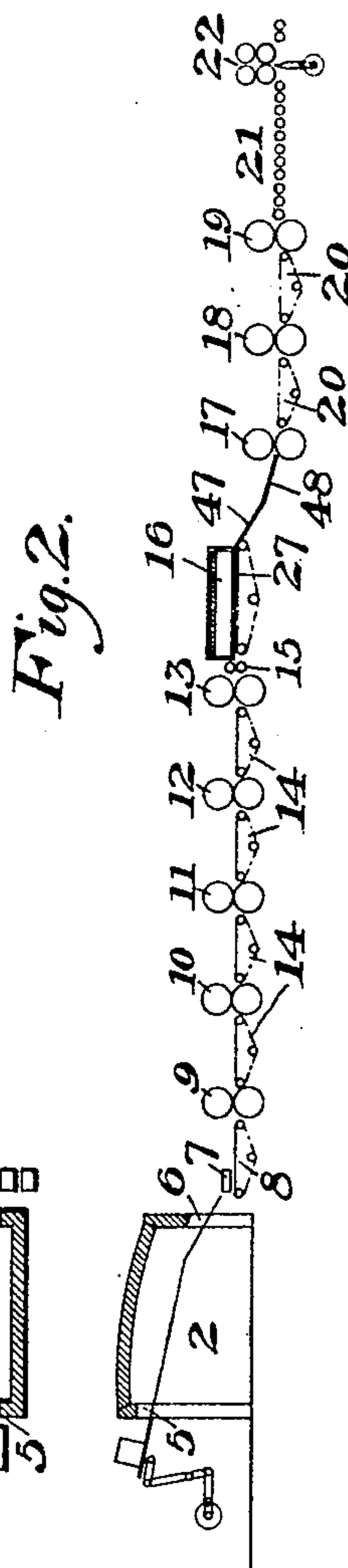
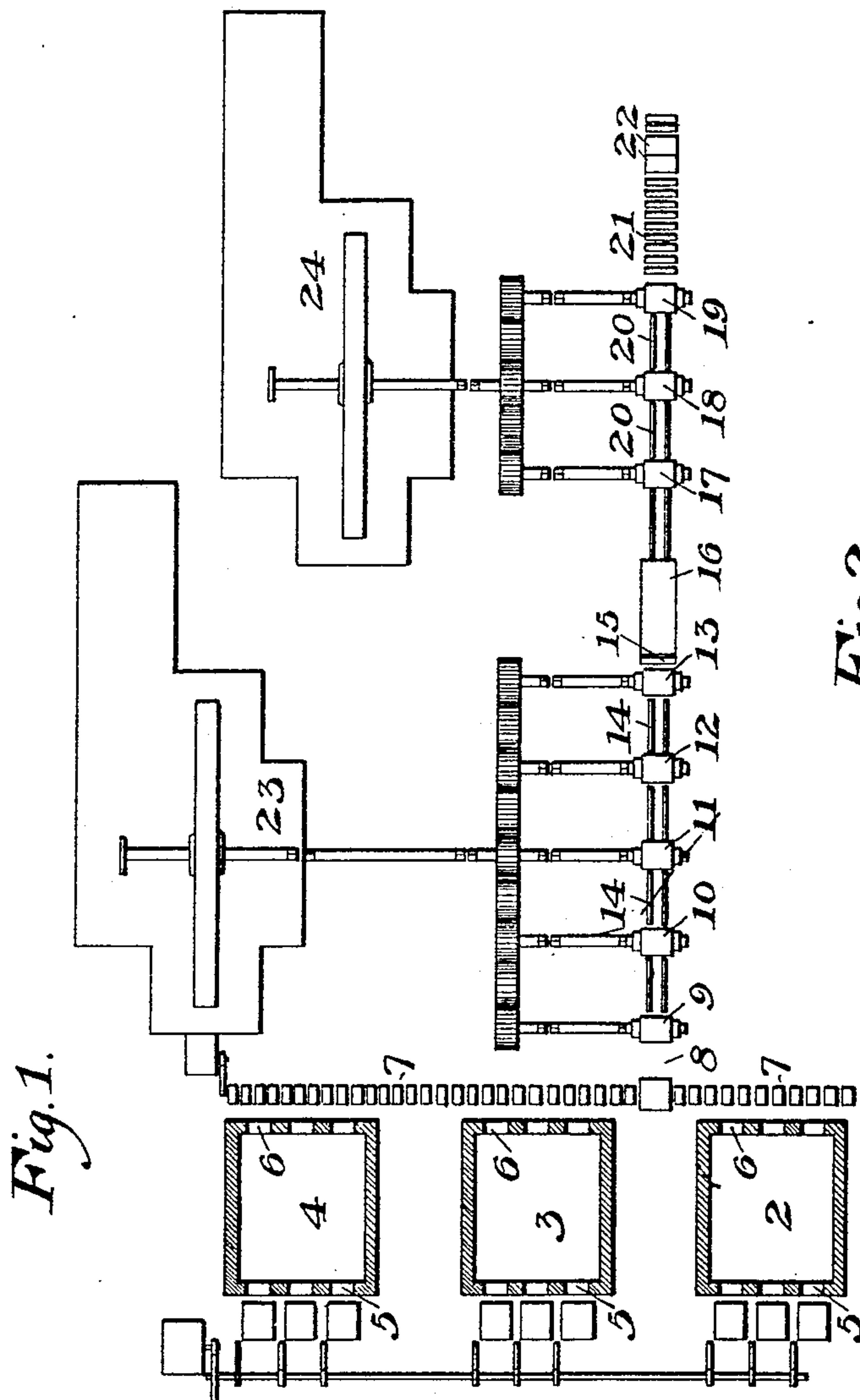
PATENTED OCT. 29, 1907.

C. W. BRAY.

APPARATUS FOR ROLLING BLACK PLATES AND SHEETS.

APPLICATION FILED JAN. 30, 1903.

5 SHEETS—SHEET 1.



WITNESSES

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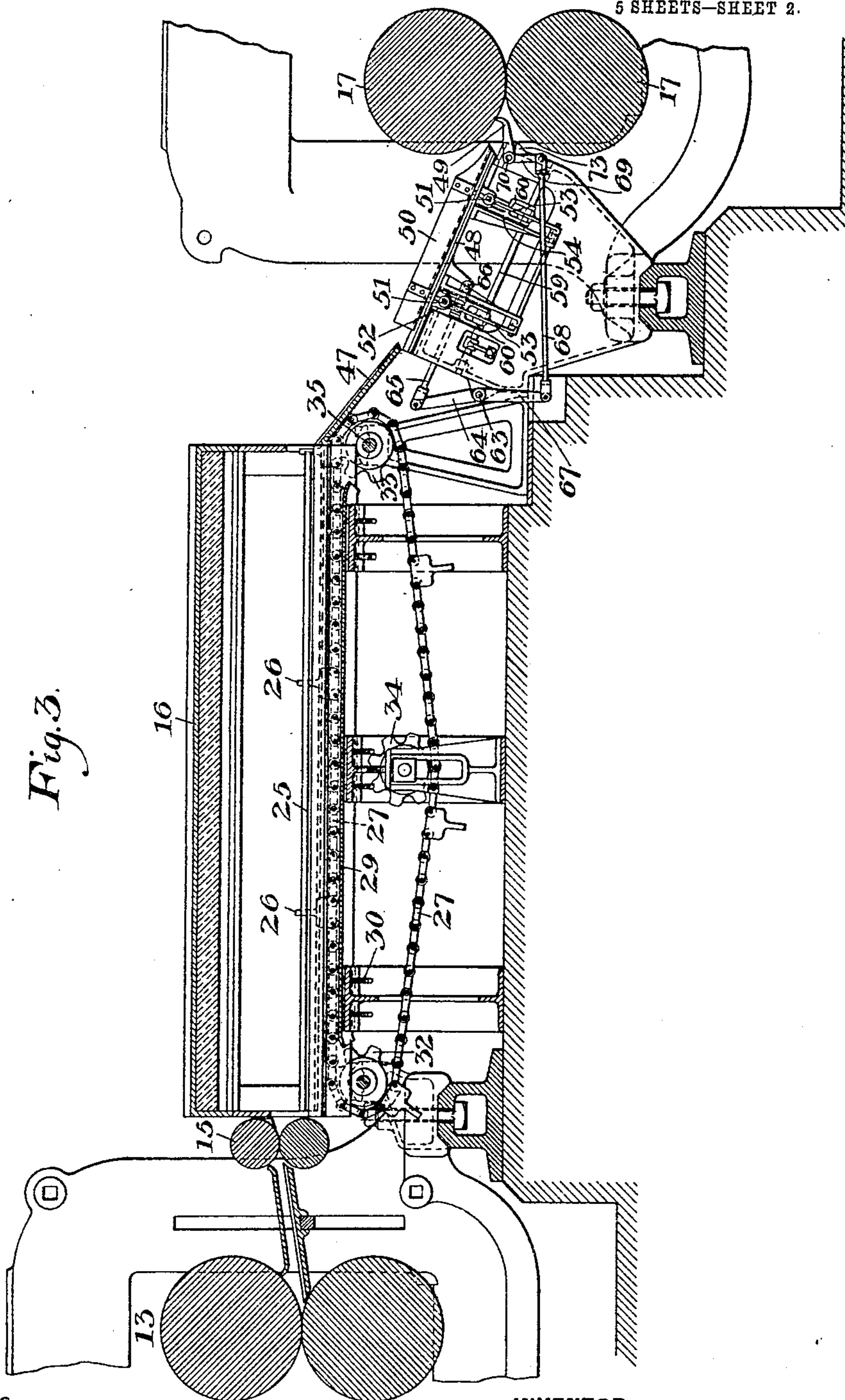


Fig. 3.

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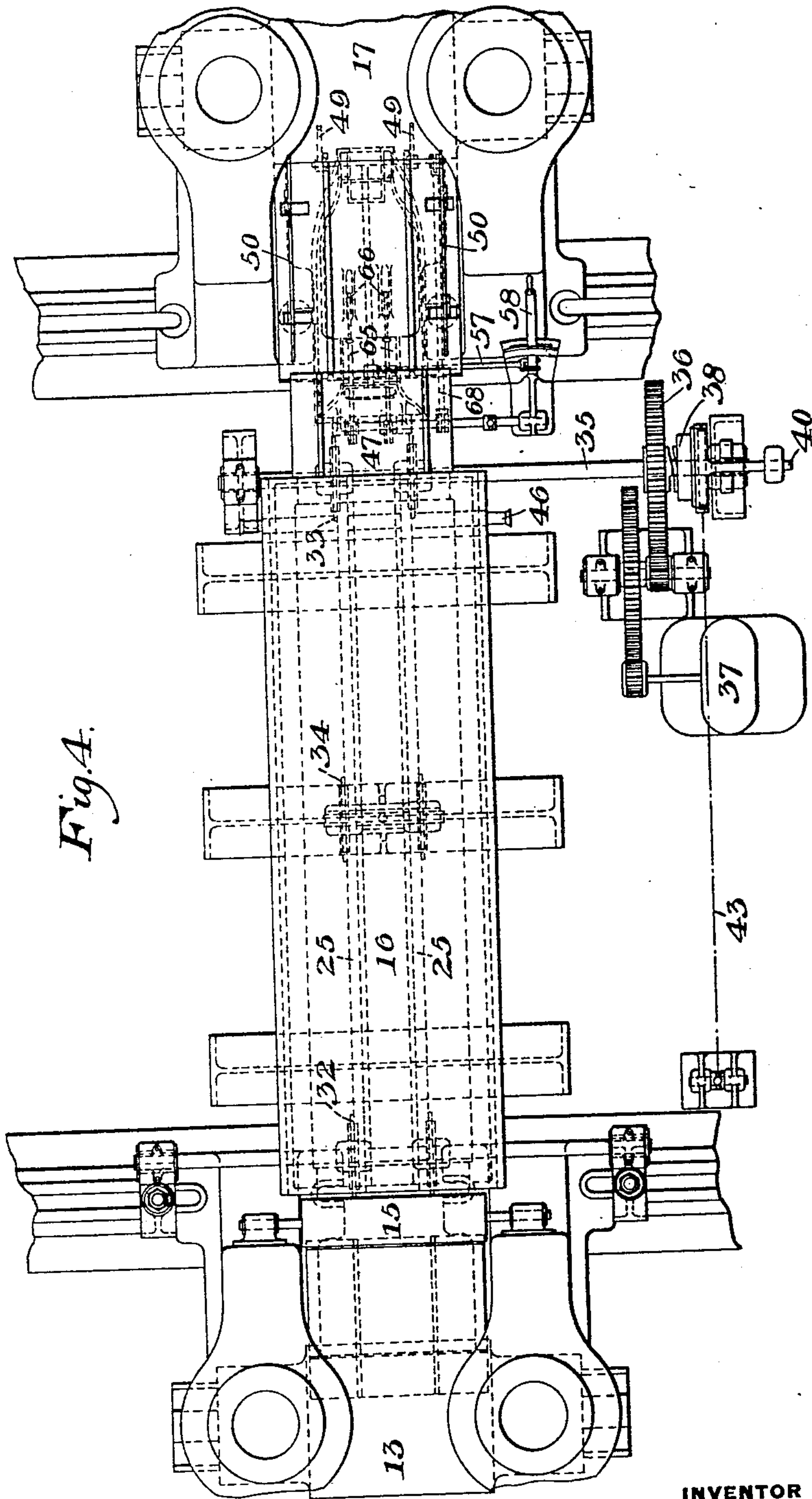
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5 SHEETS—SHEET 3.



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5 SHEETS—SHEET 4.

Fig. 6.

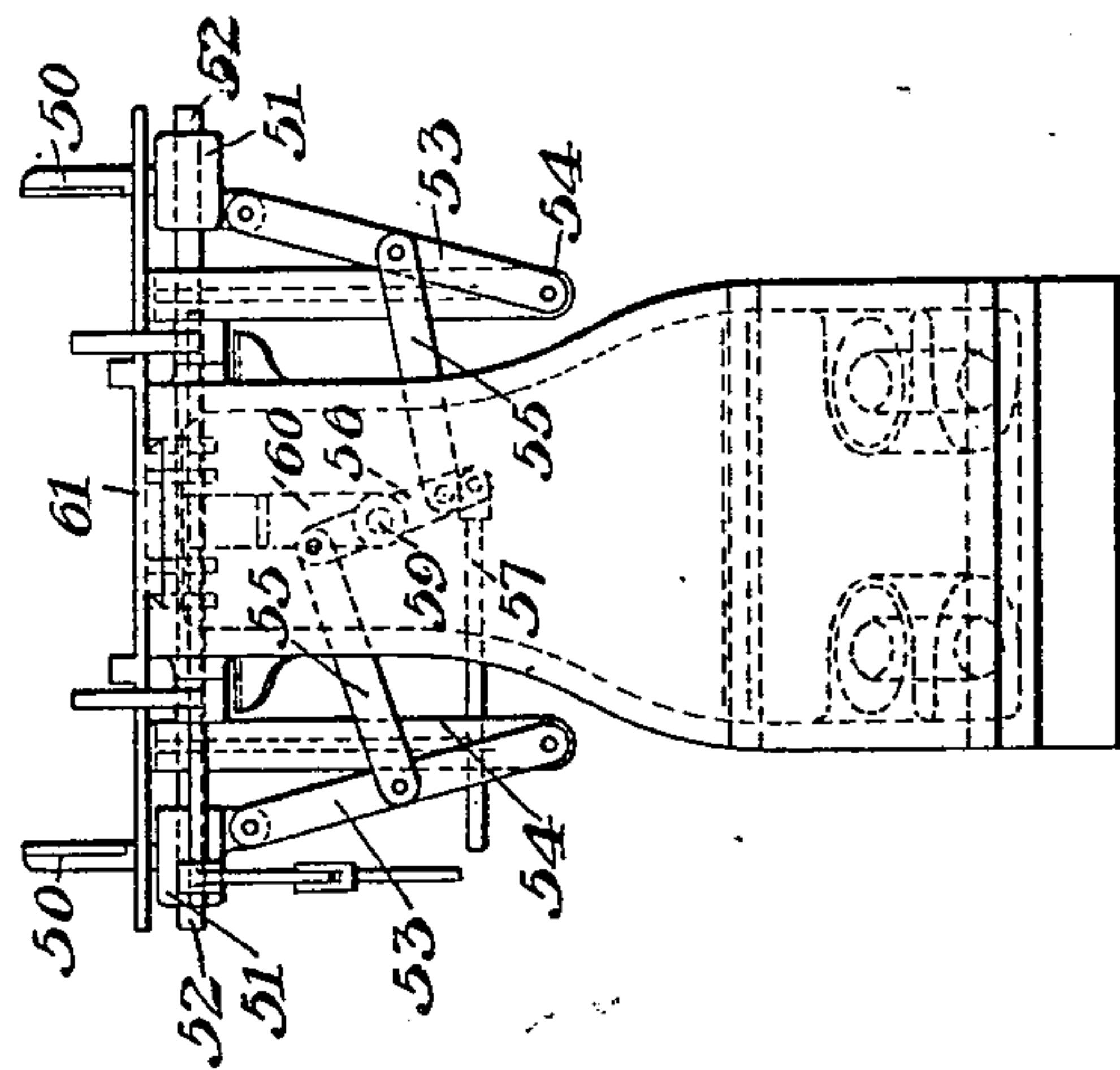
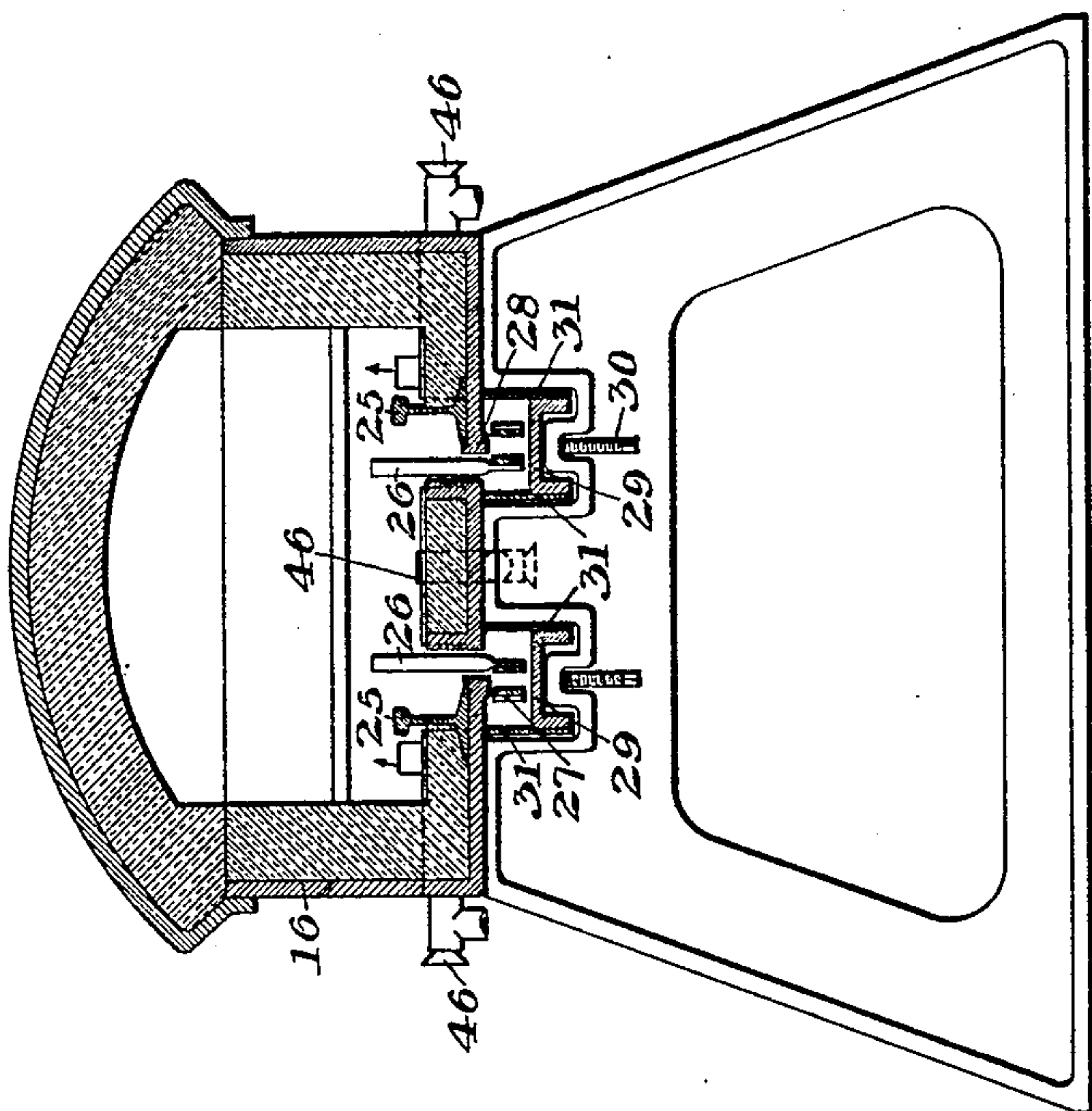


Fig. 5.



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5 SHEETS—SHEET 5.

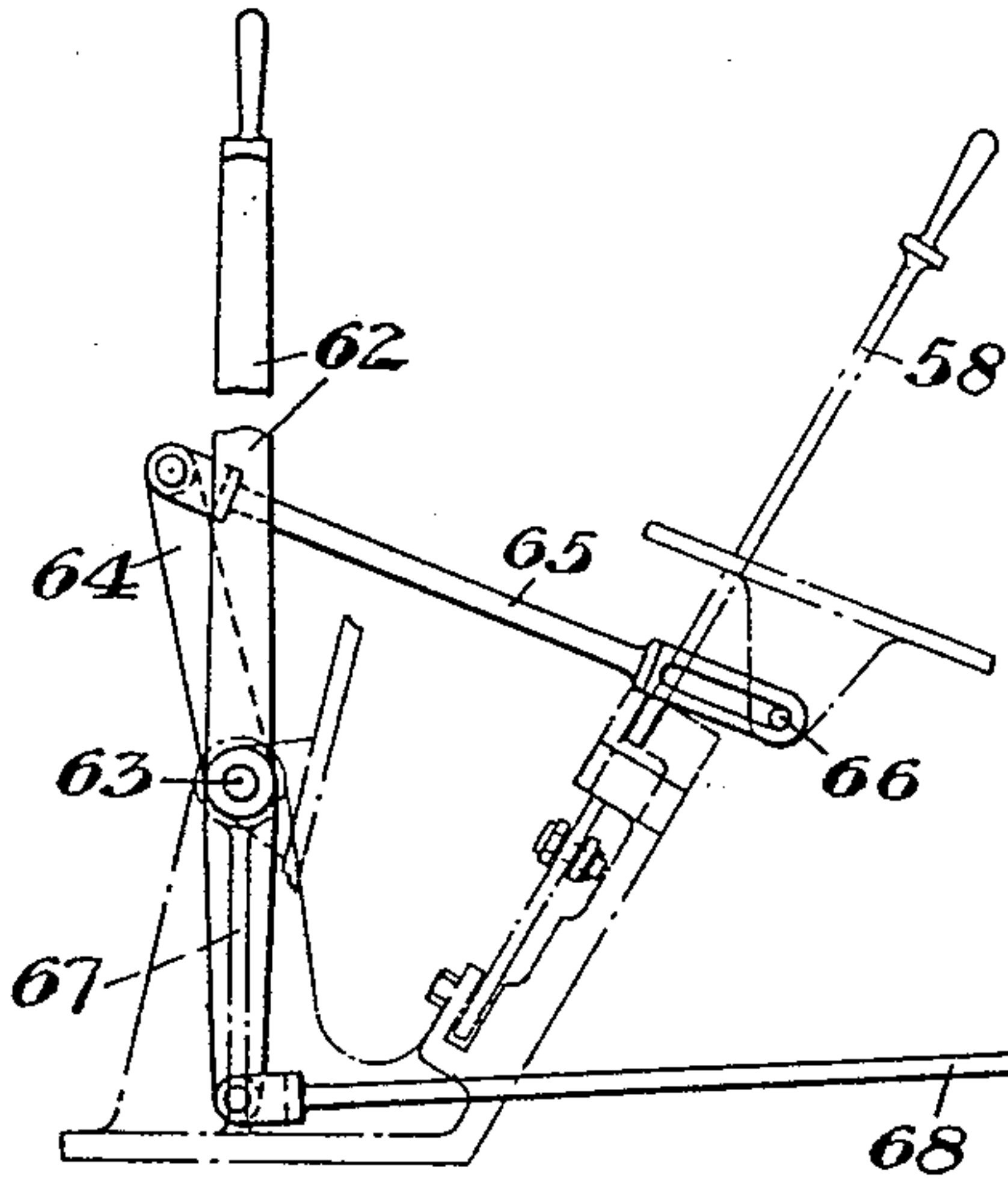


Fig. 9.

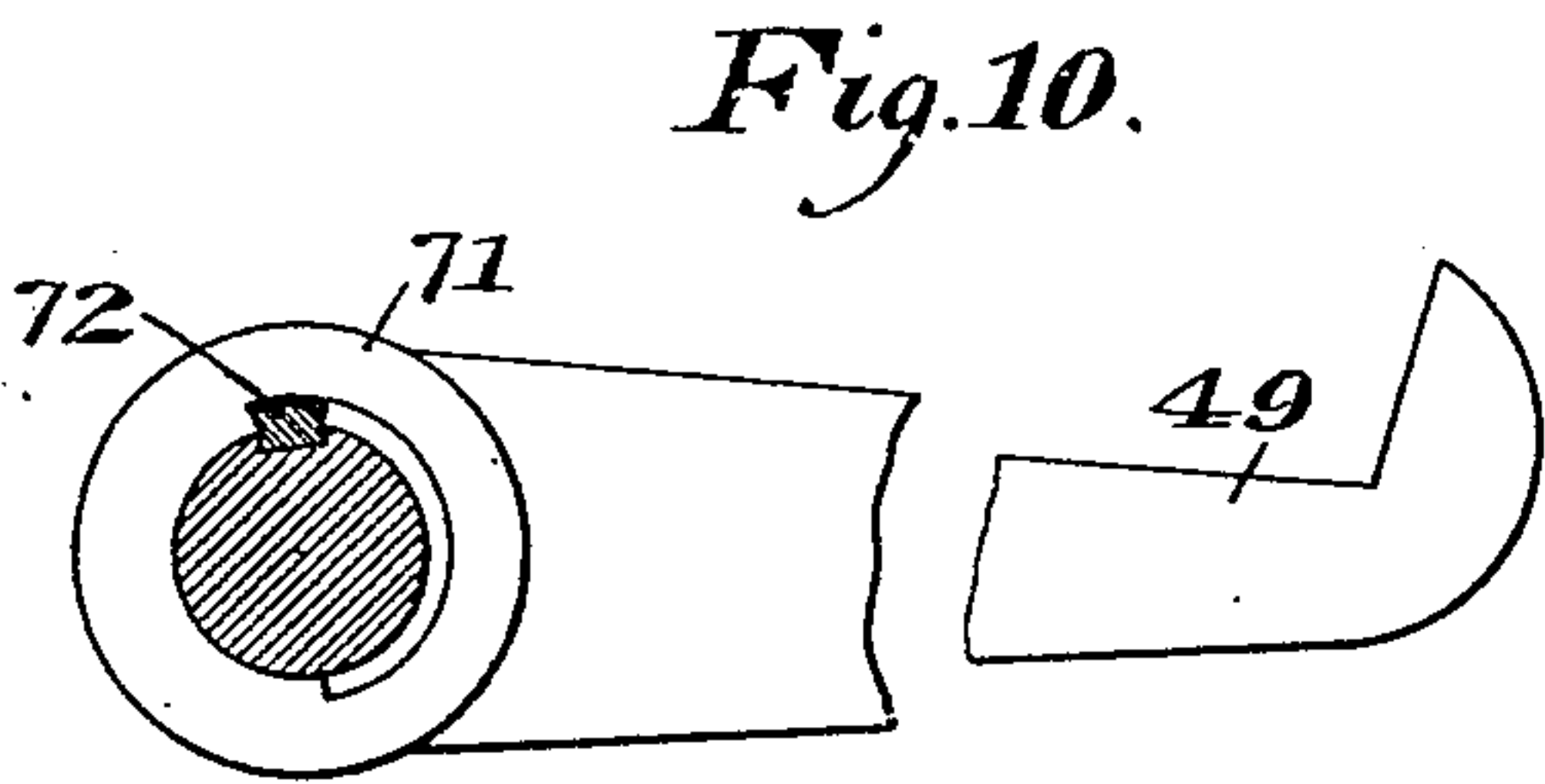


Fig. 10.

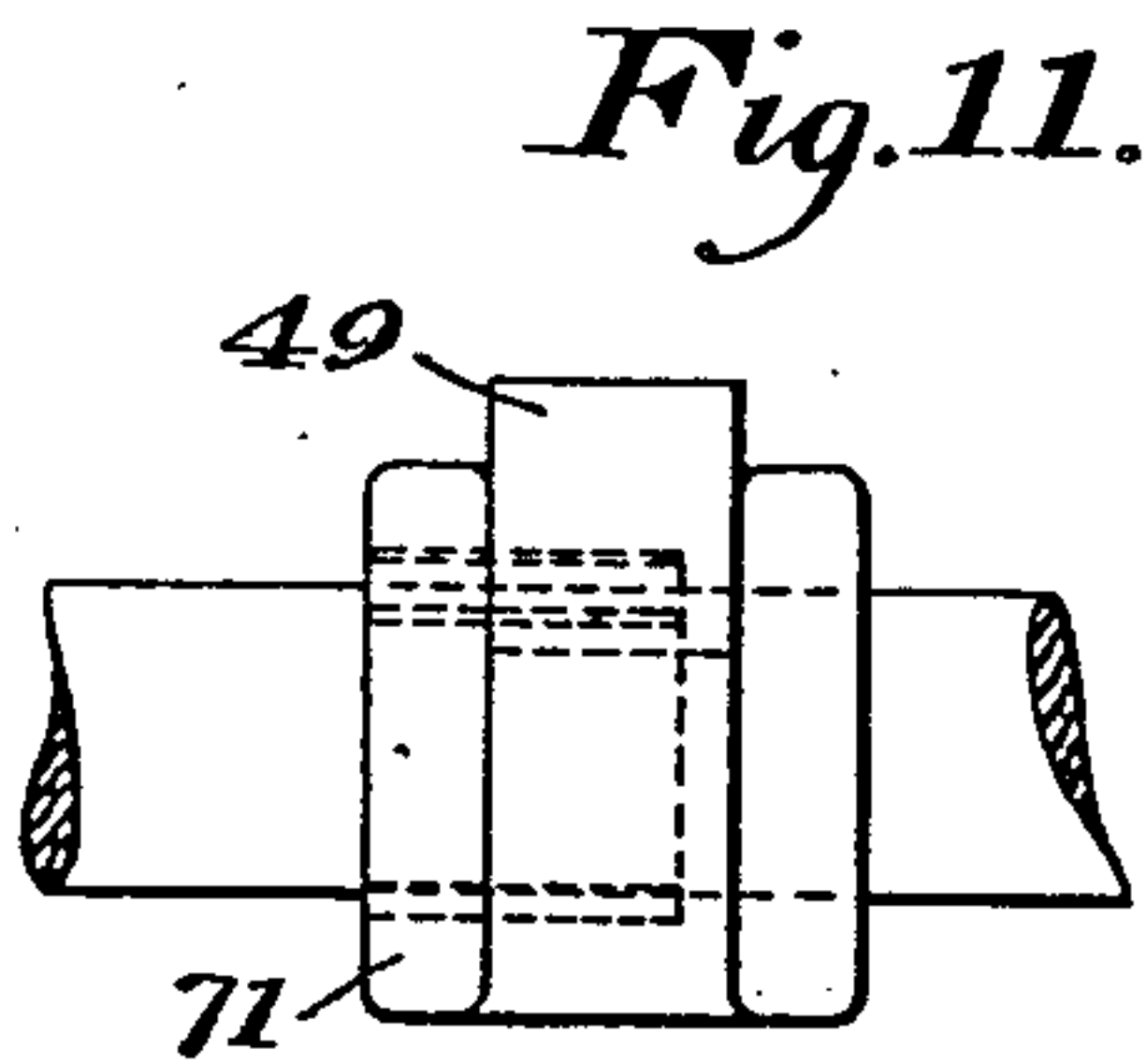
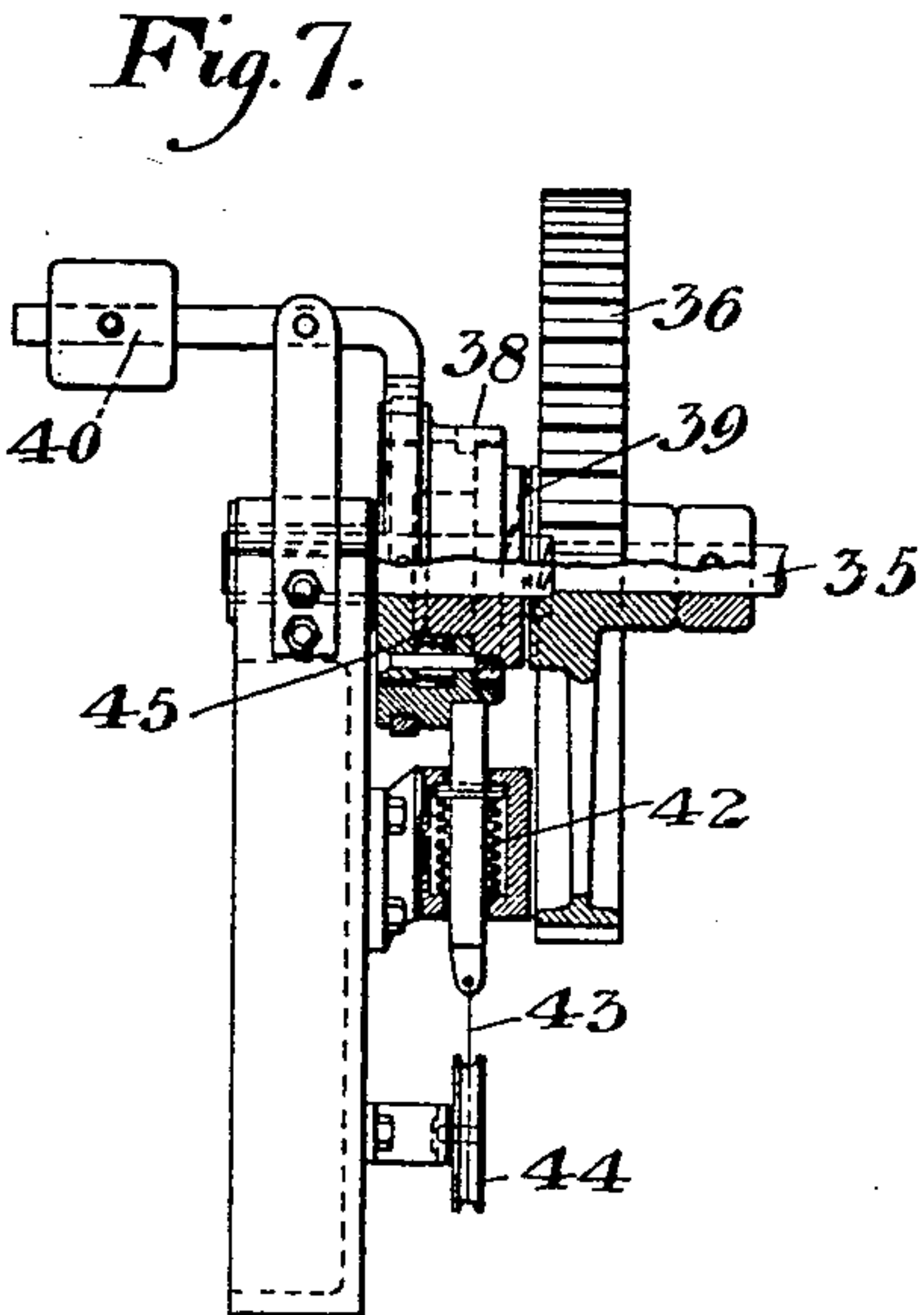
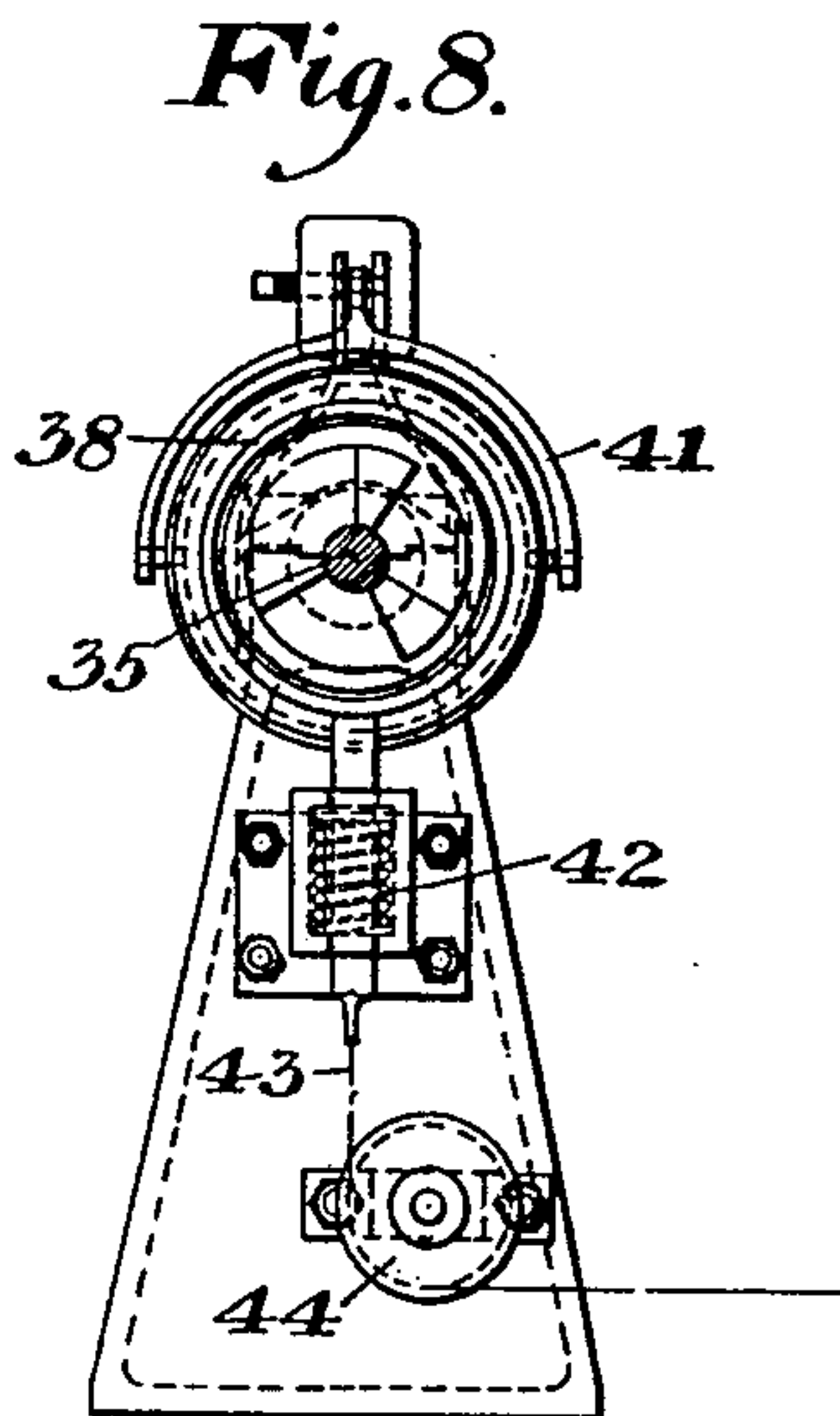


Fig. 11.



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UNITED STATES PATENT OFFICE.

CHARLES W. BRAY, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO AMERICAN TIN PLATE COMPANY, OF ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

APPARATUS FOR ROLLING BLACK PLATES AND SHEETS.

No. 869,291.

Specification of Letters Patent.

Patented Oct. 29, 1907.

Application filed January 30, 1903. Serial No. 141,134.

To all whom it may concern:

Be it known that I, CHARLES W. BRAY, of Pittsburg, in the county of Allegheny, State of Pennsylvania, United States of America, have invented a new and
5 useful Apparatus for Rolling Black Plates and Sheets, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a diagrammatic plan view, showing the
10 general arrangement of my apparatus. Fig. 2 is a similar side elevation, partly broken away. Fig. 3 is a side elevation on a larger scale, showing a portion of the apparatus including the heating furnace and the matching apparatus. Fig. 4 is a top plan view of Fig. 3. Fig. 5
15 is a cross-section of the furnace. Fig. 6 is an end elevation of the matching device. Figs. 7 and 8 are detail views of automatic stop mechanism, which I preferably employ for the furnace carriers; and Figs. 9, 10, and 11, are detail views showing parts of the matching device.

20 My invention relates to the rolling of black plates and sheets, and is designed to provide an improved apparatus for this purpose which may be cheaply operated and will produce a larger output; also to provide an improved matching apparatus, and further a furnace at
25 an intermediate point of the apparatus.

In the drawings, referring to Figs. 1 and 2, 2, 3 and 4 are heating furnaces into which the bars are fed through rear openings 5. The bars which are heated in the furnaces are taken out through the front opening 6 to feed
30 tables 7 which lead to a feeding apparatus 8 at the entrance to the continuous or tandem mill. In this mill I have shown five sets of rolls, 9, 10, 11, 12 and 13, arranged in tandem with suitable feeding devices 14 between them. The metal bars after passing through the
35 five successive passes of these rolls, pass between feed rollers 15 which are positively driven, and which feed the metal into a continuous heating furnace 16. The metal plates are reheated in this furnace, and are piled preferably as they enter the furnace. The packs are
40 thus heated in the furnace and as they issue therefrom are squared up and fed on in the same direction through further sets of tandem rolls of which I have shown three pairs 17, 18 and 19 with suitable conveyers between them. The packs thence pass over feed table 21 to a
45 doubler which is indicated at 22.

I have shown the mills 9 to 13 as driven from one engine 23 and the mills 17, 18 and 19 are driven from another engine 24. The number of sets of rolls and the manner of driving may be varied without departing
50 from my invention.

Referring now to the reheating furnace which is placed between two of the tandem sets of the mill; this furnace as shown in Figs. 3, 4 and 5, has an entrance

and exit opening at opposite ends, and is provided with two longitudinal supports 25, along which the bars or
55 packs are moved by push fingers 26. The fingers 26 are secured to endless chains 27, having rollers at the joints of the links, which rollers travel between guides 28 and 29. The fingers are secured to the links between their
60 rollers, so that the rollers bearing upon the lower and upper guides prevent tilting of the fingers when operating upon the packs. The lower guides may be adjusted vertically by set screws or adjusting devices 30; and to prevent air entering the longitudinal bottom
65 slots through which the fingers project, I provide side plates 31 which coact with the bottom guide to inclose each slot throughout the major part of its length, thus forming a shield which prevents air passing up in the furnace. The chains pass over end sprocket wheels 32
70 and 33, being engaged in its lower path by the adjustable idler 34, which serves to adjust the tension. The wheels 33 are upon the shaft 35, upon which is loosely mounted a toothed wheel 36 having slow motion gear-
75 ing connections with an electric motor 37; and the shaft carries a clutch device which coacts with a clutch member secured to the wheel 36.

The clutch member 38 on the shaft is movable thereon and is normally moved into engagement with the other member 39, forming part of the gear wheel, by weighted lever 40, the two members having coact-
80 ing crab-faces, and the lever being forked as shown at 41. The member 38 is held in retracted position by a spring pressed latch 42, which may be pulled back by a cord 43 extending over a lower pulley 44. When this latch is pulled back the weighted lever 40
85 will cause the two clutch members to engage, and the shaft will revolve for one revolution. It is stopped by the curved cam face 45 on the member 38 which engages the pin and gradually forces back the member 48 during this one revolution. The spring throws
90 the pin inwardly whenever the cord is released. The number of teeth on the sprocket wheels 35 are so proportioned that one revolution of the shaft will move the chains a distance equal to that between the push
95 pins upon them. Hence at each rotation one pack will be moved out of the furnace into the squaring up device or matcher, while two other packs will be moved forward into successively hotter portions of the furnace, thus leaving a space at the entrance end
100 for the introduction of additional plates to form another pack. The burners 46, or other source of heat, are located at or near the outlet end of the furnace.

The pack out of the furnace slides down over the inclined fore-plate 47 and upon an inclined table 48, down which the pile slides until the forward end of
105 the plates contact with stop fingers 49 at the entrance

of the pass to the rolls 17. This inclined table of the matcher is provided with squaring up side guides 50, mounted on arms provided beneath the table with collars 51 which slide upon a transverse shaft 52. The collars are simultaneously moved toward or from each other by means of levers 53 pivoted to supports 54 depending from the table, and connected by links 55 with a two-armed lever 56, to one arm of which is pivoted a connecting rod 57. This connecting rod is connected at its outer end to a hand lever 58 by which the guides may be simultaneously moved in to square up the plates sidewise, and also to grip the side edges of the pack and hold the plates in proper position as they are fed forward into the next pair of rolls. The shaft 59 has a splined connection with the lever 56 which is moved along it by depending forked supports 60 upon the table when the table is moved endwise. The table is provided with a central dovetailed guide connection 61 with its support, and is moved longitudinally by a hand lever 62 which operates a rock shaft 63 having a lever 64 with a pivoted link 65, which has a loose slotted connection 66 with a depending bracket on the table. The hand lever 62 is extended at 67 and is connected by pivoted links 68 with a lever 69, secured to a rock shaft 70 having loose connection with the stop finger 49. These stop fingers are provided with collars 71 which are cut out for a portion of their circumference to contain the key 72 on the shaft, so that the shaft may rotate a part of a revolution before it acts upon the fingers. The arrangement is such that when the parts are in their normal position, the operator moves in the squaring up side guides which may be held either by the operator or by a notched latch device. The operator then swings the lever 62 in the direction of the arrow (Fig. 7). The keys 72 then move in a clock-wise direction and allow the stops to drop or swing down; and this movement may be assisted by springs if desired. This movement is limited by a stop 73. The further movement of the lever 62 acts through link 65 which has thus far moved idly, to positively move the table, side guides, and packs, forwardly until the forward end of the pack enters the set of rolls 17. The operator then releases the side guides and the pack feeds forwardly into the pair of rolls with the plates in their correct relative positions.

In using the apparatus the heated bars are fed singly and successfully through the first set of rolls of the tandem mill and then after they have been reduced to a desirable thickness for piling, they are fed into the reheating furnace and either piled therein or after leaving it and before entering the next pass. I prefer to pile them as they are fed into the furnace, each plate passing through the feed rolls and thence dropping down upon the preceding plates which lie on the rails. When the pack is formed the operator throws in the clutch and causes the carriers to move the pack forward to the next station in the furnace. At the same time another pack is fed out of the furnace, drops into the matcher, is squared up both endwise and sidewise, and is then fed forward into the succeeding sets of rolls. After the pack of reheated plates is reduced, the packs pass on to the doubler, where

they may be doubled or not, according to the gages desired.

The advantages of my invention result from the use of the reheating furnace which is preferably in line with the sets of rolls of the tandem mill, and in which the bars or plates are reheated after passing through the first stands of rolls and before the pack is rolled. The arranging of the furnace and matching device in line with the rolls is of advantage, and the steps may be cheaply and rapidly carried out.

The matching may be done in the furnace, but I prefer to at least square up the pack after the heating operation and before further rolling. I have found in practice that after passing the bars through a continuous mill, it is of advantage, especially with lighter gages, to reheat before matching or piling as a better action of the finishing rolls is given owing to the higher temperature of the plates.

The arrangement of the parts may be varied in many ways. The matching may be carried out in the furnace, or the plates may be fed singly through the furnace and matched before entering the next pass. The rolls succeeding the furnace need not be arranged in tandem with the preceding rolls, though I prefer to so locate them.

The novel method of rolling plates and sheets described herein forms the subject matter of a divisional application, Serial No. 142,343, filed February 7, 1903.

I claim:

1. Apparatus for reducing metal bars into sheets in pile, comprising a tandem mill arranged to reduce the cut bars singly and successively, a furnace arranged to receive the plates in piles, means for carrying the piles through the furnace, and a set of rolls arranged to roll the reheated pile; substantially as described.
2. Apparatus for reducing metal bars into sheets in pile, comprising a tandem mill arranged to roll cut bars singly and successively, a heating furnace and metal piling device located between two of the sets of rolls of said mill, means for feeding the pile through the furnace, and a transfer device arranged to carry the heated piles to the succeeding pair of rolls; substantially as described.
3. Apparatus for reducing metal bars into sheets in pile, comprising a tandem mill arranged to reduce hot bars singly and successively, a heating furnace in line therewith, means for carrying piles of plates through the furnace, a squaring-up device into which the piles are discharged from the furnace, and mechanism for feeding the packs forwardly from the squaring-up device; substantially as described.
4. Apparatus for reducing metal bars into sheets in pile, comprising a heating furnace for the cut bars, a tandem mill through which the cut bars pass singly and successively from the heating furnace, another heating furnace arranged to receive rolled plates in pile, means for passing the piles through the second furnace, and rolls arranged to reduce said reheated piles; substantially as described.
5. Apparatus for reducing metal bars into sheets in pile, comprising a mill having sets of rolls arranged in tandem, a reheating furnace, and a matcher between two of the sets of rolls, means for feeding the packs through the heating furnace and into the matcher, and means for feeding the squared-up packs out of the matcher and into a successive pair of rolls; substantially as described.

In testimony whereof, I have hereunto set my hand.

C. W. BRAY.

Witnesses:

GEO. B. BLEMING,
H. M. CORWIN.