

No. 628,829.

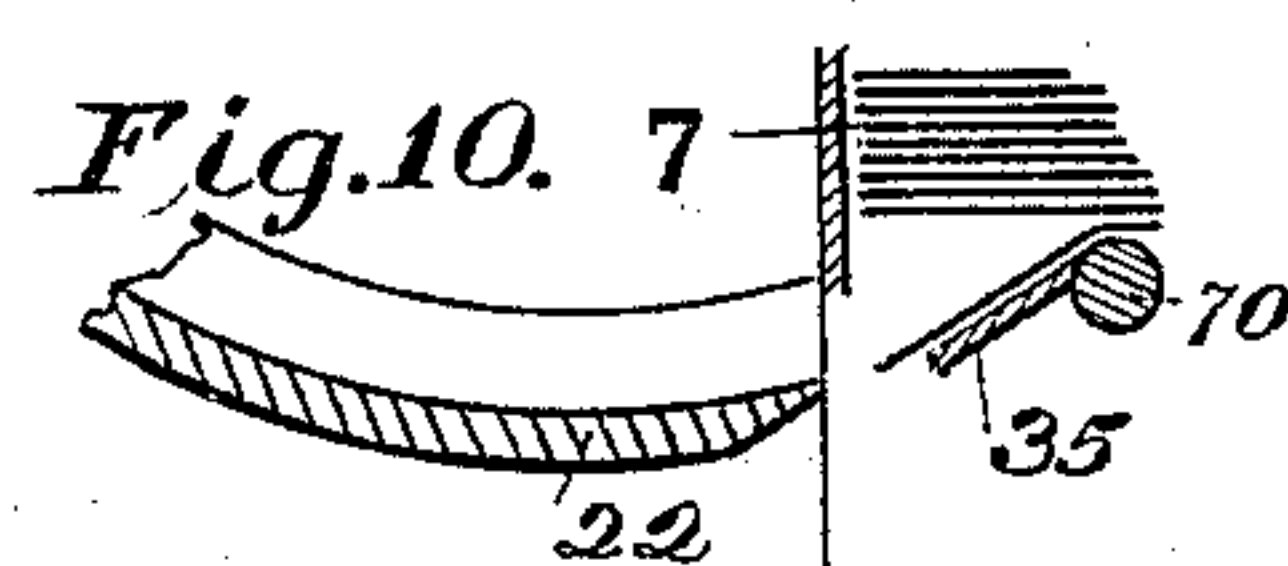
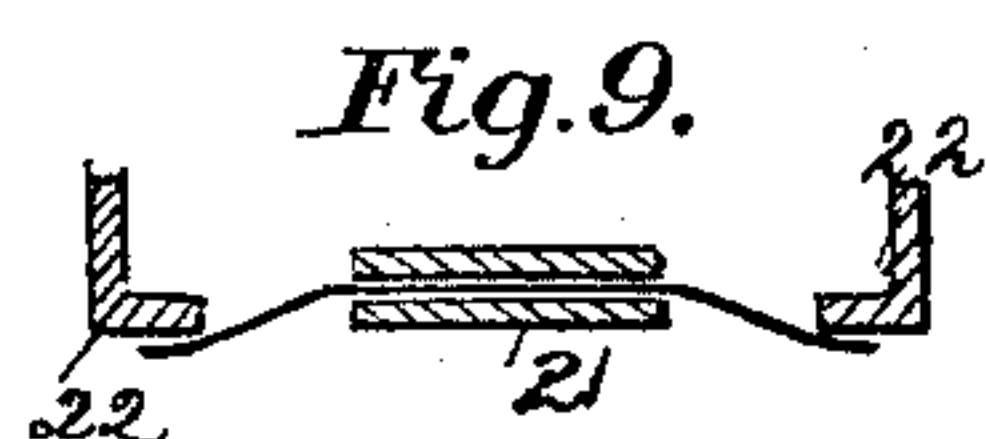
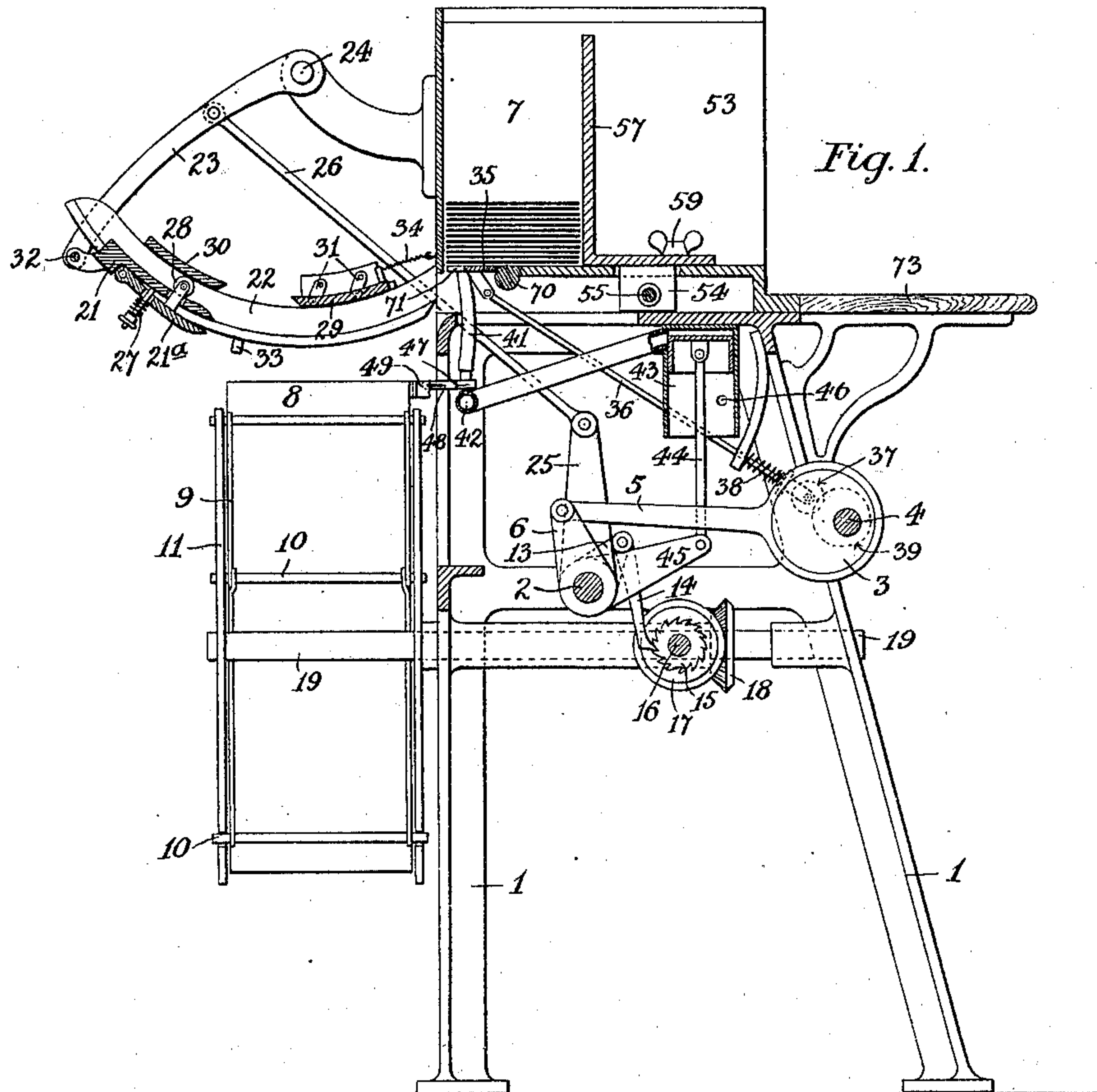
Patented July 11, 1899.

J. B. MERCER.
SIGNATURE GATHERER.

(Application filed Aug. 14, 1897.)

(No Model.)

5 Sheets—Sheet 1.



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Fig. 2.

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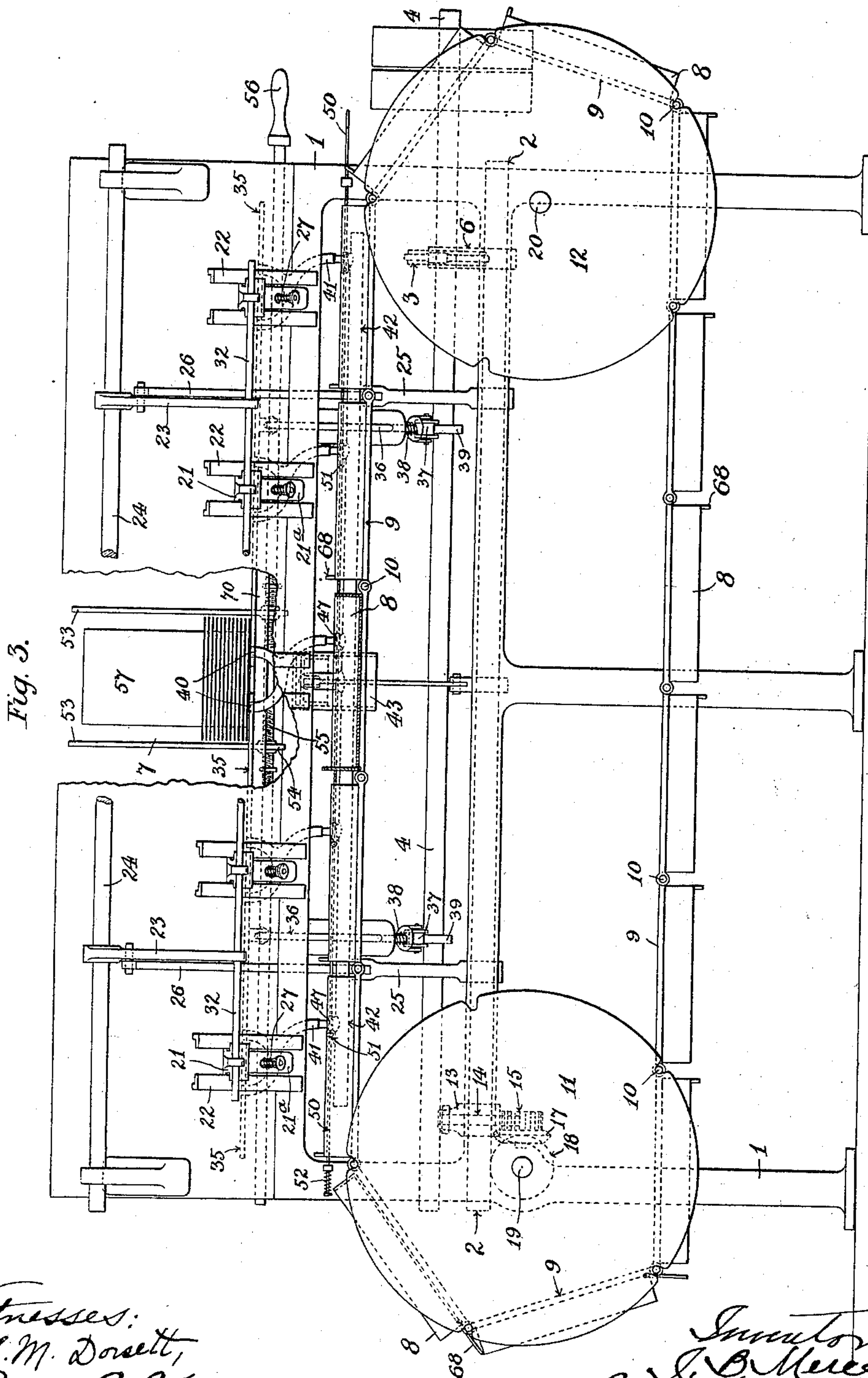
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SIGNATURE GATHERER.

(Application filed Aug. 14, 1897.)

(No Model.)

5 Sheets—Sheet 2.



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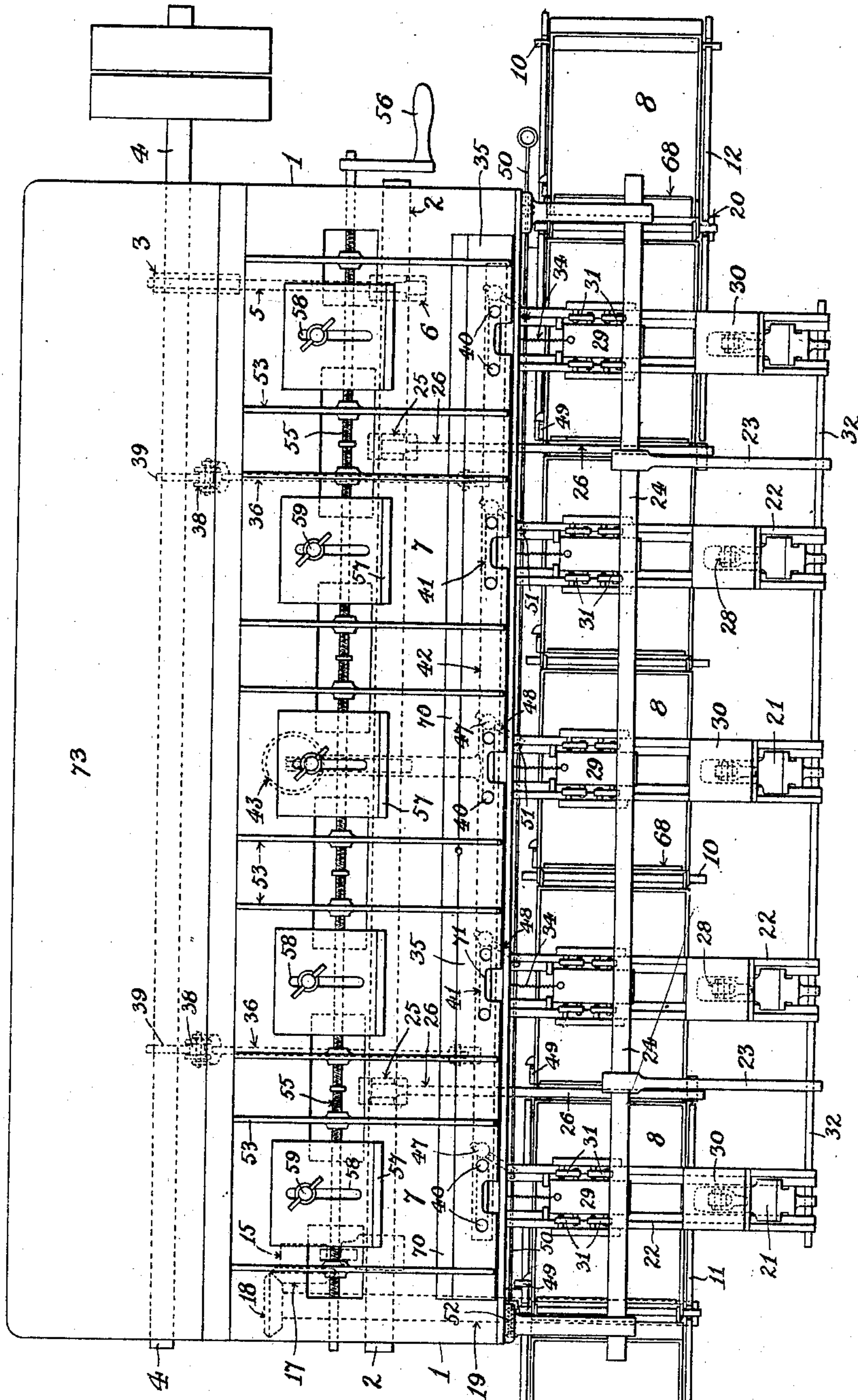
J. B. MERCER.
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(Application filed Aug. 14, 1897.)

(No Model.)

5 Sheets—Sheet 3.

Fig. 4.



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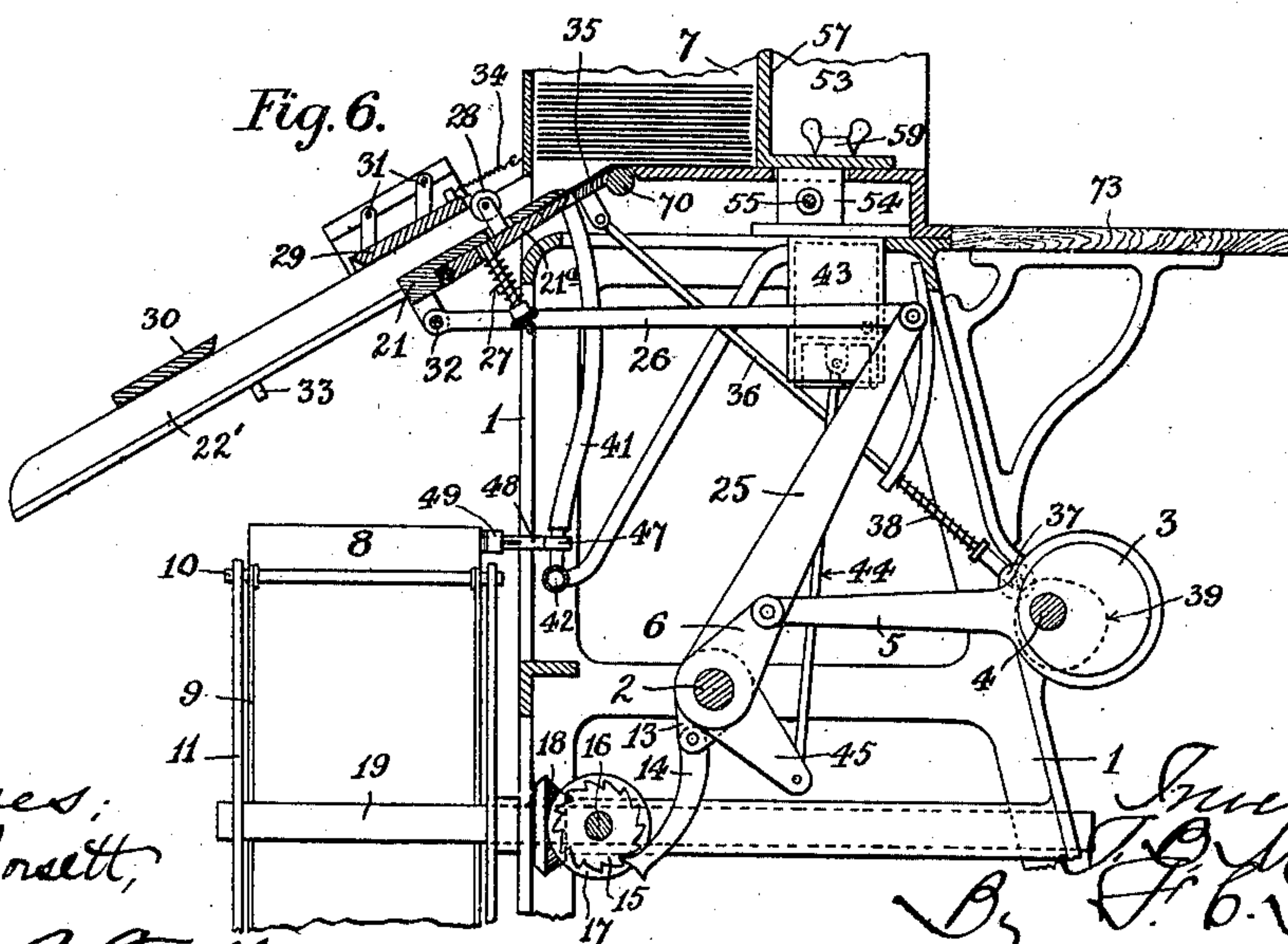
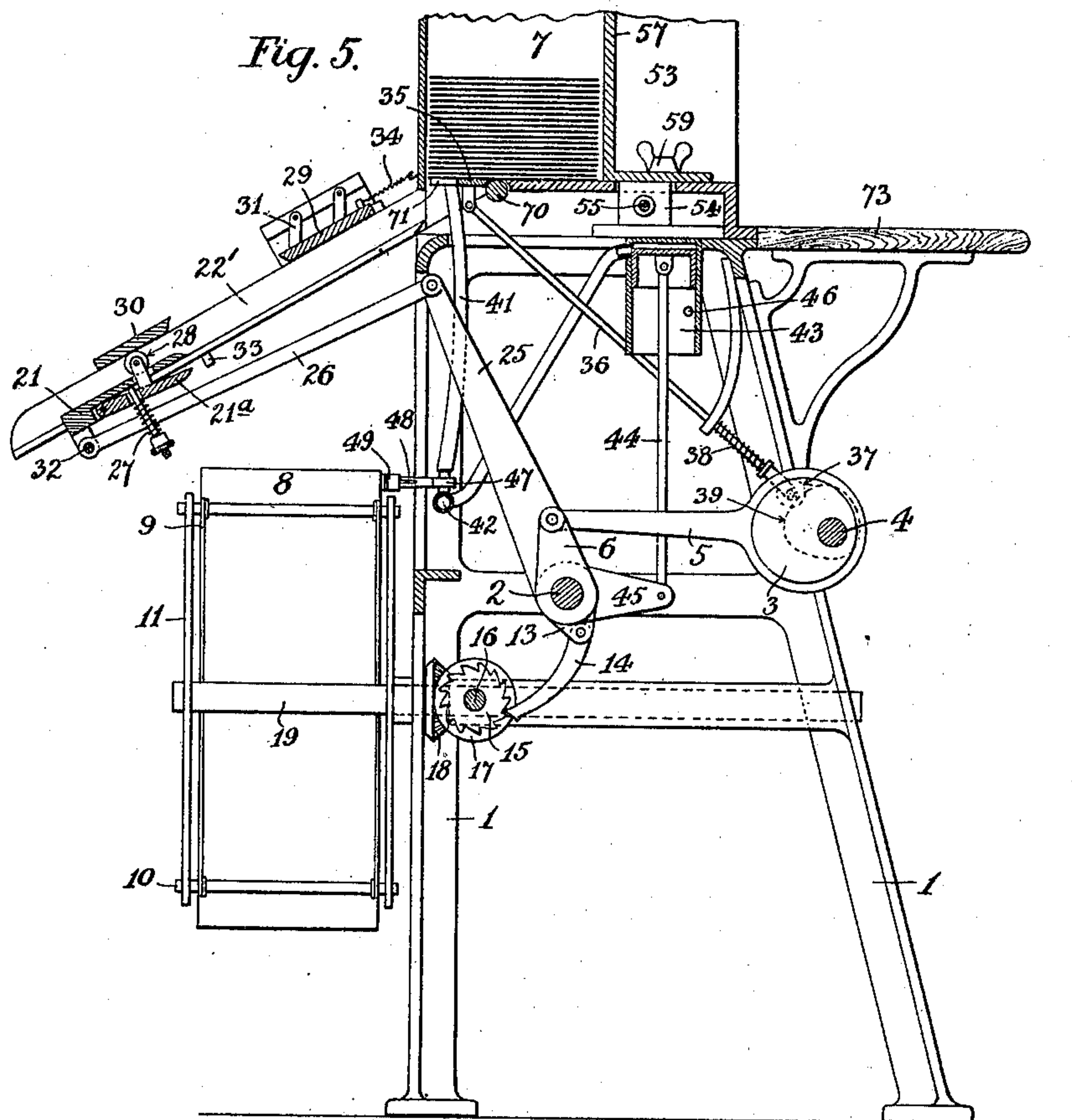
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5 Sheets—Sheet 4.



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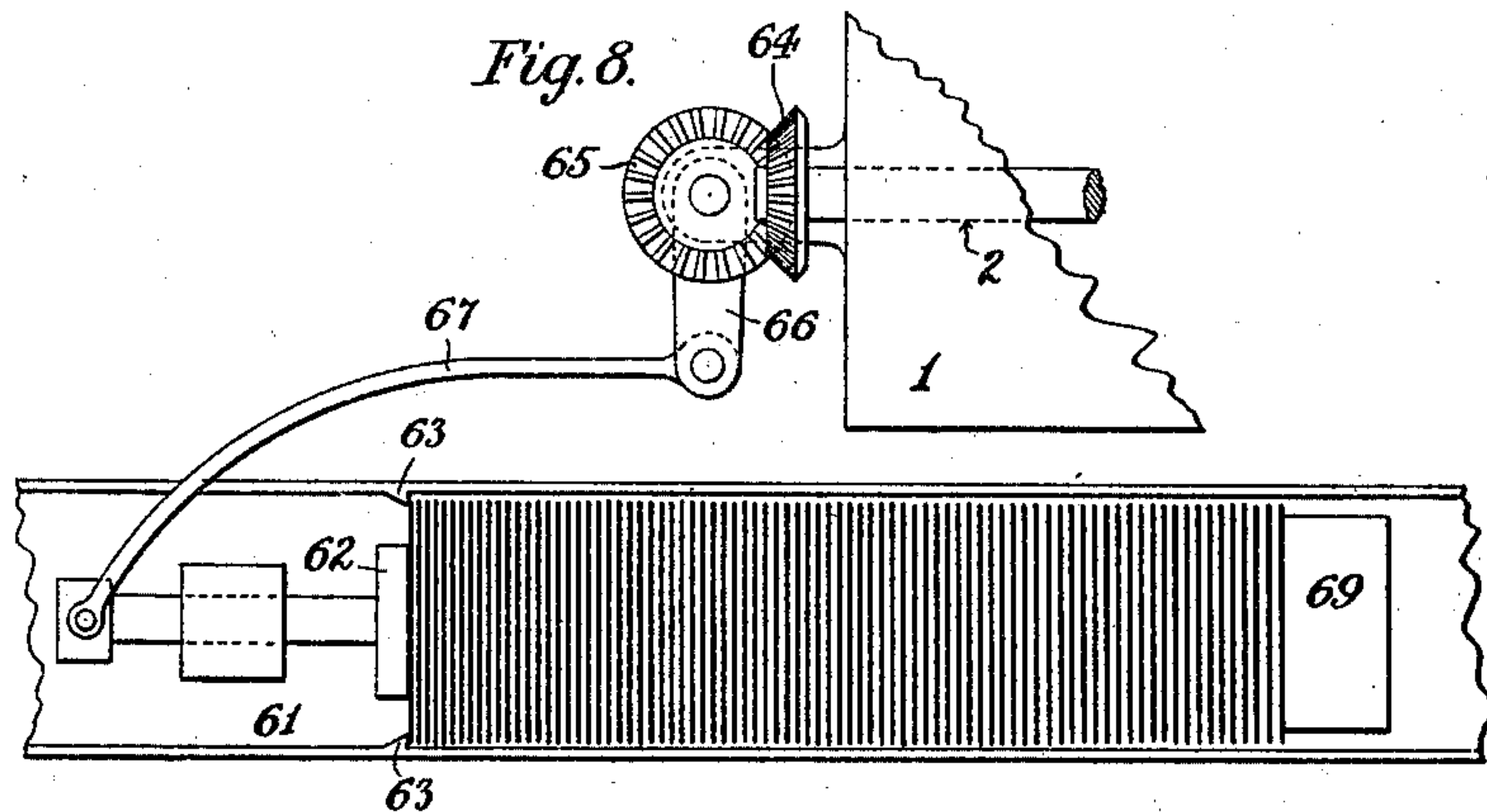
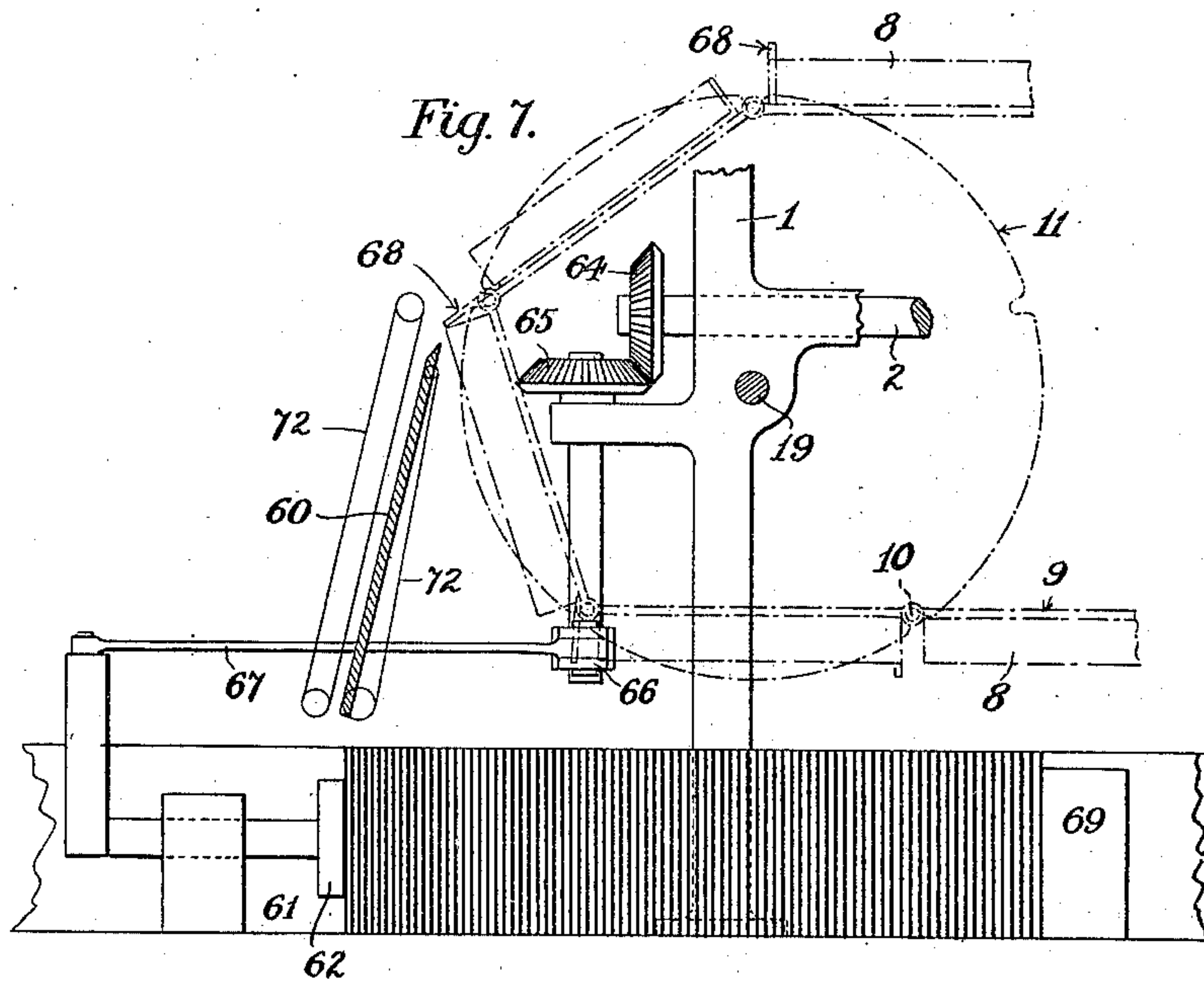
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(Application filed Aug. 14, 1897.)

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5 Sheets—Sheet 5.



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UNITED STATES PATENT OFFICE.

JOHN BERNARD MERCER, OF LONDON, ENGLAND.

SIGNATURE-GATHERER.

SPECIFICATION forming part of Letters Patent No. 628,829, dated July 11, 1899.

Application filed August 14, 1897. Serial No. 648,273. (No model.)

To all whom it may concern:

Be it known that I, JOHN BERNARD MERCER, a subject of the Queen of Great Britain, residing at London, in the county of Middlesex, England, have invented an Improved Apparatus for Gathering Sheets or Signatures of Books or other Publications, of which the following is a specification.

The present invention relates to an improved apparatus for gathering the different sheets or signatures which are to constitute a complete book or other publication, so as to insure that only a single sheet or signature shall be taken from each pile and shall then be delivered in the proper order to suitable boxes or receptacles, whereby the complete set of sheets or signatures is gathered in each box or receptacle, and the work of subsequently collating each of such sets is consequently rendered unnecessary.

The invention is principally applicable to the gathering of sheets or signatures which have been previously folded; but it might, if desired, be also applied to the gathering of unfolded sheets or signatures.

In the accompanying drawings, Figure 1 is a cross-sectional view of one arrangement, the parts being in the position they occupy after a sheet or signature has been gathered and delivered to the collecting-box. Fig. 2 is a similar view showing the parts in the position they occupy when the grippers are taking a sheet from the pile for delivery. Fig. 3 is a front elevation showing this arrangement, and Fig. 4 a plan view of same. Figs. 5 and 6 are similar views to Figs. 1 and 2 and show a slightly-modified arrangement for carrying the invention into effect. Fig. 7 is a front view, and Fig. 8 a plan view, of an arrangement which may be employed for collecting the sets of sheets or signatures as they are delivered from the machine, which, although not forming any part of my invention, may be so employed. Fig. 9 represents a cross-section through the guideways, showing a signature engaged by the grippers passing under the guideways. Fig. 10 represents a cross-section of a fragment of one of the stationary receptacles, its flap, and the guideway, the latter being in curved form and beveled at the end adjacent to the hinged flap to insure the passage of the signatures thereunder.

Referring to the arrangement shown in Figs. 1 to 4, inclusive, 1 is the frame of the machine, such frame carrying the main shaft 2, to which is imparted a rocking or reciprocating movement by means of an eccentric 3, carried by the power-shaft 4, and arms or levers 5 and 6, connecting the eccentric with such shaft 2.

On the bed of the machine a series of boxes 7 are arranged, and in these boxes the piles of sheets (whether previously folded or not) are placed. From these boxes the sheets are taken one at a time by the means hereinafter described and delivered into traveling boxes 8, which are so operated that as soon as a sheet has been delivered to them from one of the boxes 7 they are moved forward to the position to receive a sheet from the next box 7, and so on to the end of the machine, where the complete set of sheets is either taken by hand or delivered to the collecting apparatus hereinafter described.

The traveling boxes or receptacles 8 have the necessary intermittent step-by-step motion imparted to them in any suitable manner, the means shown in the drawings consisting in mounting each of same on a frame 9, forming part of an endless chain, the cross-bars 10 of which are elongated sufficiently to engage in notches formed in disks or drums 11 and 12, mounted at either end of the machine. Two only of these disks or drums are shown; but it will be understood that if necessary, owing to the length of the machine, one or more intermediate disks or drums may be mounted between those shown, so as to take up the weight of the chain and boxes with the contents of the latter. Drum 11 at the left-hand end of the machine (see Figs. 3 and 4) is arranged to be alternately rotated and allowed to remain stationary (while the sheets are being delivered to the traveling boxes 8) in any suitable manner. The method of effecting this (shown in Figs. 1 to 4) consists in mounting on the main shaft 2 an arm 13, carrying a pawl 14, which is always held in contact with the teeth of a ratchet 15 by means of a spring, so that when the shaft 2 moves in one direction the pawl by engaging a fresh tooth of the ratchet will rotate same, while when the shaft 2 moves in the other direction (while the sheet is being delivered to the traveling boxes 8) the pawl will slip idly

over the teeth of the ratchet without actuating it. The ratchet-wheel 15 is mounted on a shaft 16, suitably journaled in the frame, and keyed to such shaft is a bevel-wheel 17, gearing with another bevel-wheel 18, mounted on the shaft 19 of drum 11, so that it will be seen that on the ratchet-wheel 15 being rotated by the pawl 14 the drum 11 will be caused to rotate just sufficiently to move each of the traveling boxes 8 one step forward. Drum 12 may be allowed to simply rotate on its shaft 20 under the impulse communicated to drum 11, or it may be separately driven in a similar manner. The said form of delivering apparatus which I prefer to employ for taking a sheet from the pile placed in the stationary boxes 7 and delivering it to the traveling boxes 8 is as follows: Referring to Figs. 1 to 4, inclusive, it will be seen that the machine here shown is arranged for collecting the sheets from five boxes 7 and that a pair of grippers 21 is arranged to work in connection with each. Such grippers are caused to move alternately backward and forward in a curved guideway 22, being operated by means of a rod 32, carried by levers 23, mounted on a rod or bar 24, journaled in suitable brackets attached to the frame 1. The levers 23 receive their motion from the main shaft 2, which carries arms 25, to which connecting-rods 26 are pivoted, the other ends of such rods 26 being pivoted to suitable points in the length of the levers 23 to give the required movement.

Each pair of grippers consists of an upper jaw, having no other movement than that imparted by the levers 23, and a lower jaw 21^a, pivoted to the upper jaw, as shown, and acted upon by a spring 27, which tends to keep it normally closed. The lower jaw 21^a carries a roller 28, the bearing for which may extend through the upper jaw, such roller 28 being so arranged as to be acted on by the cam-surfaces 29 and 30, under which it passes, and thus open the grippers.

The cam-surface 29 is placed so that in the movement of the grippers toward the pile of sheets from which the lower one is to be taken such grippers will be opened shortly before they reach the edge of the sheet, and on the completion of such movement will immediately close under the action of spring 27 and grasp such sheet between them. The return movement of the grippers will then commence, and in order to prevent the cam-surface 29 from again opening them such cam-surface is mounted on pivoted levers 31, which allow it to turn back so as to permit the roller to pass without being depressed to open the grippers. The further movement of the grippers 21, which are still holding the sheet taken from the box 7, then continues, the grippers remaining shut until the roller 28 comes in contact with the cam-surface 30, which depresses the roller and thus opens the grippers, and at this time pegs 33, attached to the under side of the guide 22, come in

contact with the edge of the sheet, and by preventing its further movement cause it to leave the grippers and fall into the traveling box 8, which is situated immediately beneath.

The cam-surface 29 is acted on by a spring 34, which returns it to its normal position after the grippers have passed in their backward movement with the sheet, suitable stops being provided at the proper point to arrest such return movement of the cam-surface 29.

It will be seen that the rod 32 passes through a lug on each of the pairs of grippers 21 and so drives the whole of them through the levers 23, connected to the main shaft 2, as hereinbefore described.

The mechanism for actuating the grippers is so arranged in relation to that for actuating the traveling boxes that the movement of the latter will take place while the grippers are moving toward the piles of sheets from which the next ones are to be taken and that the traveling boxes shall remain stationary while each of the pairs of grippers is bringing back a sheet and dropping it into the traveling box situated beneath.

The means I prefer to employ for insuring that only one sheet or signature shall be seized by the grippers 21 and taken from the pile in box 7 is as follows: I construct the forward portion of the bottom of the boxes 7 with a hinged flap 35, adapted to be lowered to the position shown in Fig. 2 by means of a rod 36, hinged to such flap and carrying at its other end a roller 37, acted on by a spring 38, which causes it to always bear on a cam 39, mounted on the power-shaft 4. Such flap 35, which may, as shown, extend right across the machine to serve for all the boxes 7, has holes 40 bored in it, (preferably two for each box 7,) which are connected by means of flexible pipes 41 with a pipe 42, communicating with an air-pump 43, which may be of any suitable construction. The piston of this air-pump is connected by rod 44 with an arm 45 on the main shaft 2, so that the pump is operated each time the shaft is actuated, and the suction produced, acting on the sheet resting on the flap 35, (which latter at this time is in the position shown in Fig. 1,) will, when the flap is lowered, as shown in Fig. 2, draw such sheet down and insure that such one sheet only will be grasped by the grippers 21 when their forward movement is completed and carried thereby under the guideways, as shown in Fig. 9. A roller 70 is preferably provided at the hinge of the flap 35 to facilitate the passage of the sheet held by the grippers, and the flap has recesses 71, into which the grippers enter to grasp the sheet.

The suction-apertures 40 are preferably surrounded by a piece of thin sheet-rubber, or other suitable material, in order to insure complete contact with the sheet when the air-pump begins to operate, and thus insure a vacuum being formed.

An opening 46 is provided in the wall of the air-pump 43, so that on the descent of the piston of such pump the vacuum will be destroyed and the sheet be released when seized by the grippers, which will then carry same to the position for delivery to the traveling boxes 8.

In order that the traveling boxes or receptacles may each receive the right sheet or signature when the machine is first started and the subsequent sheets or signatures which make up the book or other publication being dealt with in succession, the branches from the pipe 42, to which the flexible pipes 41, are connected, are provided with cocks 47, by which the connection with the pump can be opened or cutoff, as desired. The opening of the cocks 47 may be automatically effected on starting the machine by providing the cocks with a lever or arm 48, so situated that a hinged part 49 on the traveling boxes 8 may, if same is opened, come in contact with the end of such levers or arms 48 and so open the cocks as the box having such hinged part 49 opened travels across the machine. If it is not desired to use all the boxes 7, the hinged part 49 may be allowed to remain open only so long as is necessary to turn the cocks 47 of the boxes required to be used. A rod 50 may be provided, passing through slots in the levers or arms 48 and having projections 51, which by pulling such rod 50 may be brought against each of the levers or arms 48 and so close all the cocks 47 simultaneously. The rod 50 may be returned to its normal position, leaving the cocks 47 free to be opened again, by means of a suitable spring 52.

To enable the machine to be employed for use in gathering sheets or signatures of various sizes, I find it preferable to make the sides and back of the boxes 7, in which the piles of sheets are placed as they come from the folding-machine or elsewhere, adjustable, and for this purpose all the sides 53 may have lugs 54 projecting through slots in the bottom of the boxes, through which lugs a screw 55 passes, which is alternately right and left handed. Such screw 55 may have a handle 56 outside the frame of the machine, by turning which it will be seen that all the sides 53 of the boxes will be moved toward or away from each other, according to the direction in which the handle is turned. The backs 57 of the boxes 7 are also made adjustable, a slot 58 being provided through which a thumb-screw 59 passes, so that the back can be moved backward or forward, as desired, and secured in the position to which it has been moved.

A table 73 is preferably provided at the back of the machine, on which the piles of sheets to be put into the boxes 7 may be placed until such boxes are ready to receive a further supply.

The arrangement shown in Figs. 5 and 6 corresponds in general lines with that already described; but, as will be seen, in this case, in-

stead of the curved guideway 22, previously described, a sloping or inclined guideway 22 is employed, along which the grippers 21 are caused to slide by means of a rod 26, by which they are connected to an arm 25 on the main shaft 2. The arrangements for causing the opening and closing of the grippers at the proper times and for operating the flap and pneumatic apparatus for causing a single sheet to be taken at a time by the grippers are all substantially the same as those previously described.

It will be seen that as the traveling boxes 8 move across the machine from right to left (see Figs. 3 and 4) they will each receive a sheet from each of the boxes 7. It will of course be understood that there may be more than five boxes 7 on the one machine or suitable arrangements may be provided for coupling two or more of such machines each having any desired number of boxes 7, so that any required number of sheets or signatures forming a set may be collected in each of the traveling boxes by the time that same shall have completed its travel across such machine.

In some cases the sets of sheets may be taken from the traveling boxes as they arrive at the end of the machine by hand, such traveling boxes having their forward end open, if desired, for facilitating this; but the arrangement shown in Figs. 7 and 8, if used, will avoid the necessity for this. As the traveling boxes turn over to go around the drum 11, the set of sheets may be arranged to simply slide off through the open end, which is preferably provided with a hinged flap or end 68, so as to avoid the chance of them catching on the back of the preceding box 8. From the box and flap they may pass along down the slide or guide 60 to the receiving-box 61, in which a rammer or pusher 62 is arranged to push them forward until they pass notches or projections 63 on the sides of the receiving-box 61, these notches or projections preventing them returning when the rammer is withdrawn to allow another set to be delivered.

The rammer may, as shown, receive its to-and-fro motion from the main shaft 2 through bevel-wheels 64 and 65, the latter being mounted on a shaft carrying an arm 66, connected by a rod 67 to an extension on the end of the rammer-spindle. The rammer is timed to operate to press a set of sheets forward immediately after same have been delivered, and then to return to its backward position to allow the next set of sheets to descend into the receiving-box 61. A block of wood 69 may be placed at the back of the sets of sheets in such box 61 to prevent them falling over.

The set of sheets from each box might, if desired, be delivered to tapes 72, (see Fig. 7,) which would conduct such sets in succession to the receiving-box 61.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a sheet-gathering apparatus, the combination of a series of traveling receptacles,

a series of stationary receptacles adapted to contain the sheets to be delivered, a pneumatic mechanism having pipes leading to said stationary receptacles, cocks disposed on
5 said pipes, and adjustable means on said traveling receptacles adapted to open said cocks.

2. In a sheet-gathering apparatus, the combination of a series of traveling receptacles, a series of stationary receptacles adapted to
10 contain the sheets to be delivered, pneumatic mechanism having pipes leading to said stationary receptacles for drawing down sheets therefrom, cocks disposed on said pipes and provided with arms, hinged arms disposed on
15 said traveling receptacles adapted to come in contact when in open position with said cock-arms and open the cocks, thereby bringing into operation the pneumatic mechanism with which said cocks are connected for drawing
20 down sheets from the respective receptacles, said hinged arms being adapted to be closed and thus permit the traveling receptacles to ride by the stationary receptacles without receiving a sheet therefrom.

25 3. In a sheet-gathering apparatus, the combination of a series of traveling receptacles,

a series of stationary receptacles adapted to contain the sheets to be delivered, pneumatic mechanism having pipes leading to said stationary receptacles, cocks disposed on said
30 pipes, adjustable means on said traveling receptacles adapted to open said cocks, and means connected with the stationary receptacles for operating all of said cocks simultaneously.

4. In a sheet-gathering apparatus, the combination of a series of traveling receptacles, a series of stationary receptacles adapted to contain the sheets to be delivered, pneumatic mechanism having pipes leading to said stationary receptacles, cocks disposed on said
40 pipes, adjustable means on said traveling receptacles adapted to open said cocks, and a slide connected with the stationary receptacles and engaging all of said cocks whereby
45 they may be all opened or closed simultaneously.

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