

No. 748,198.

PATENTED DEC. 29, 1903.

N. M. MACDOWELL & J. T. SPERLING.

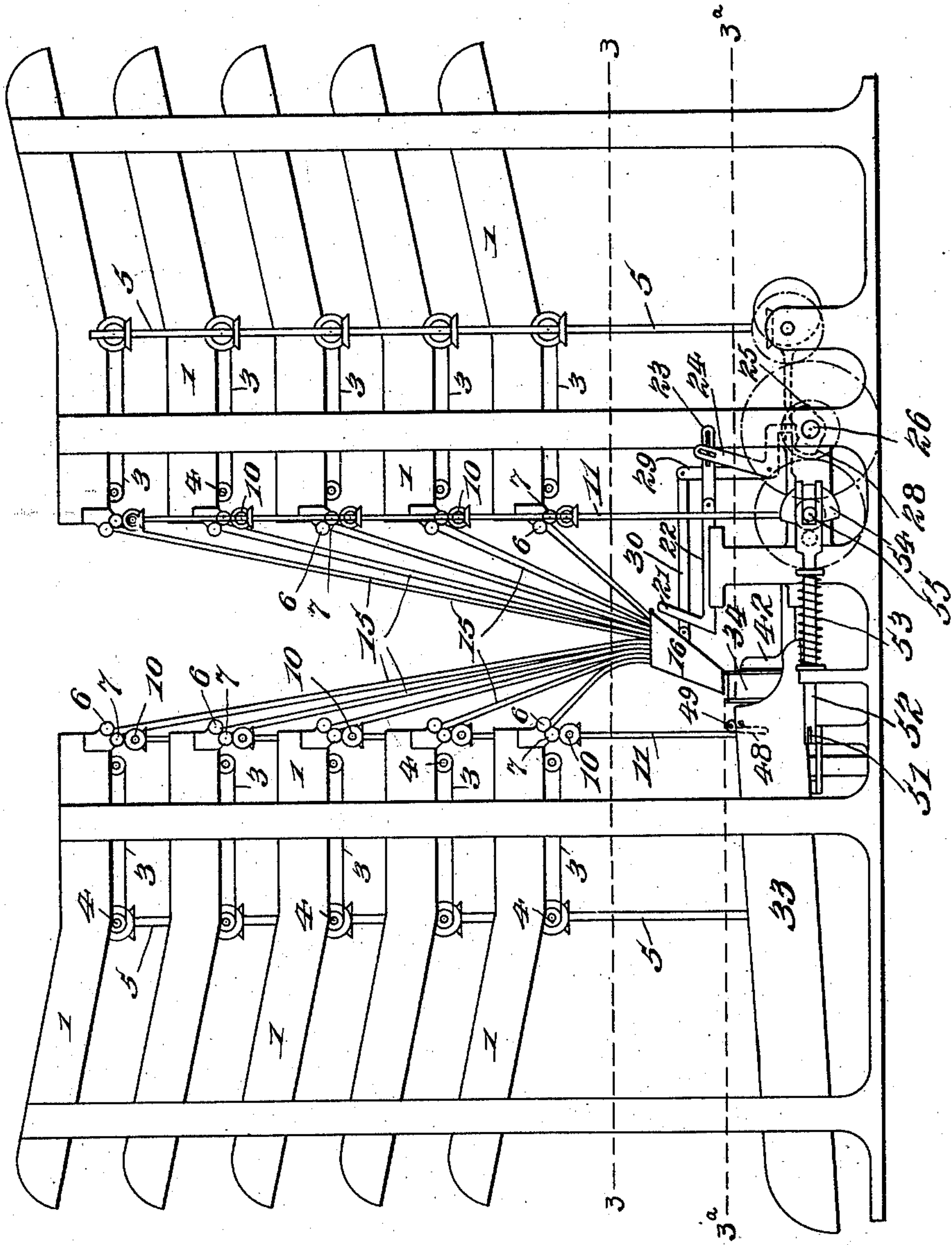
SIGNATURE GATHERER.

APPLICATION FILED MAR. 16, 1903.

NO MODEL.

3 SHEETS—SHEET 1.

Fig. 1



Witnesses.

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3 SHEETS—SHEET 2.

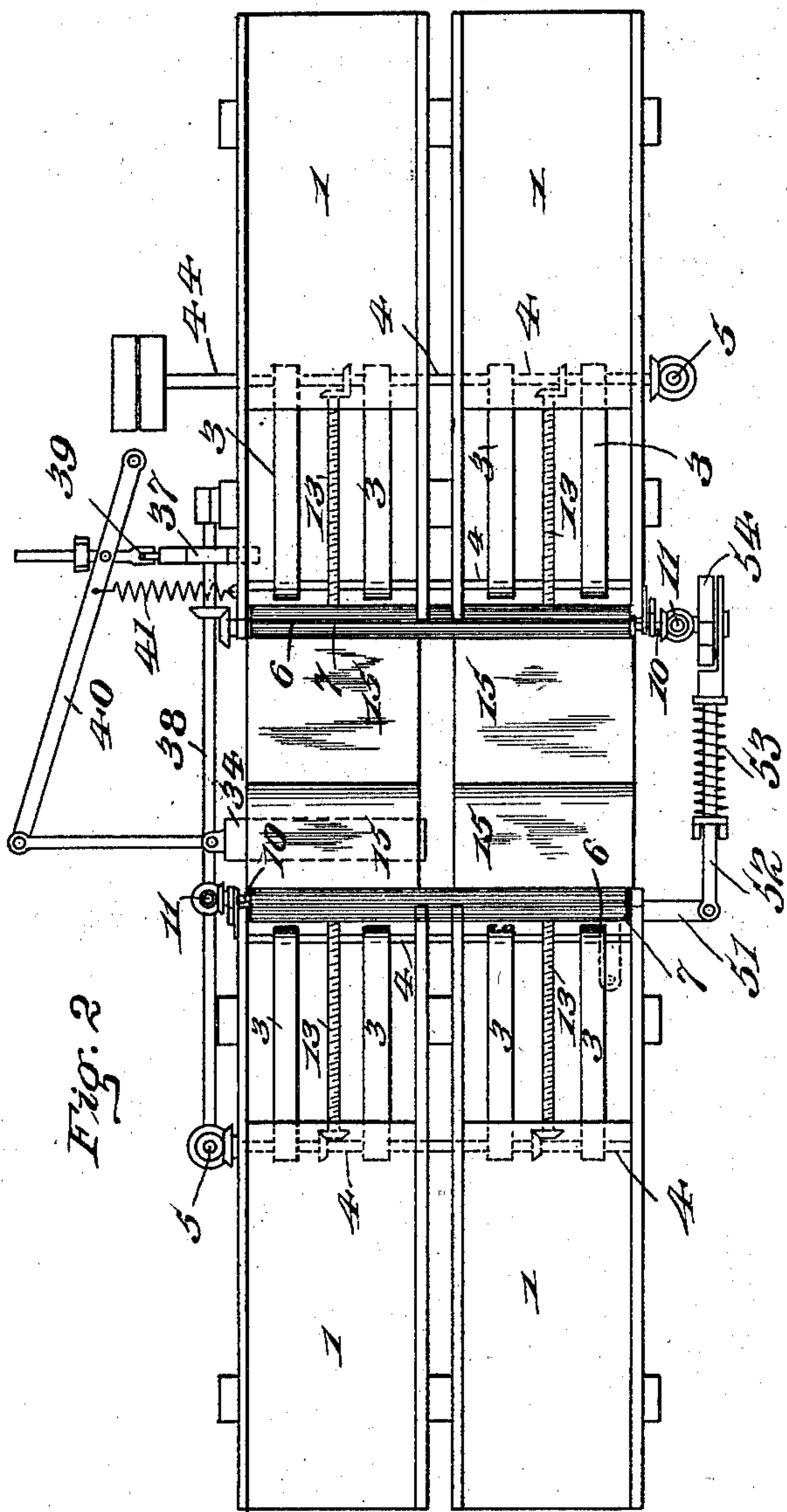


Fig. 2

Fig. 8

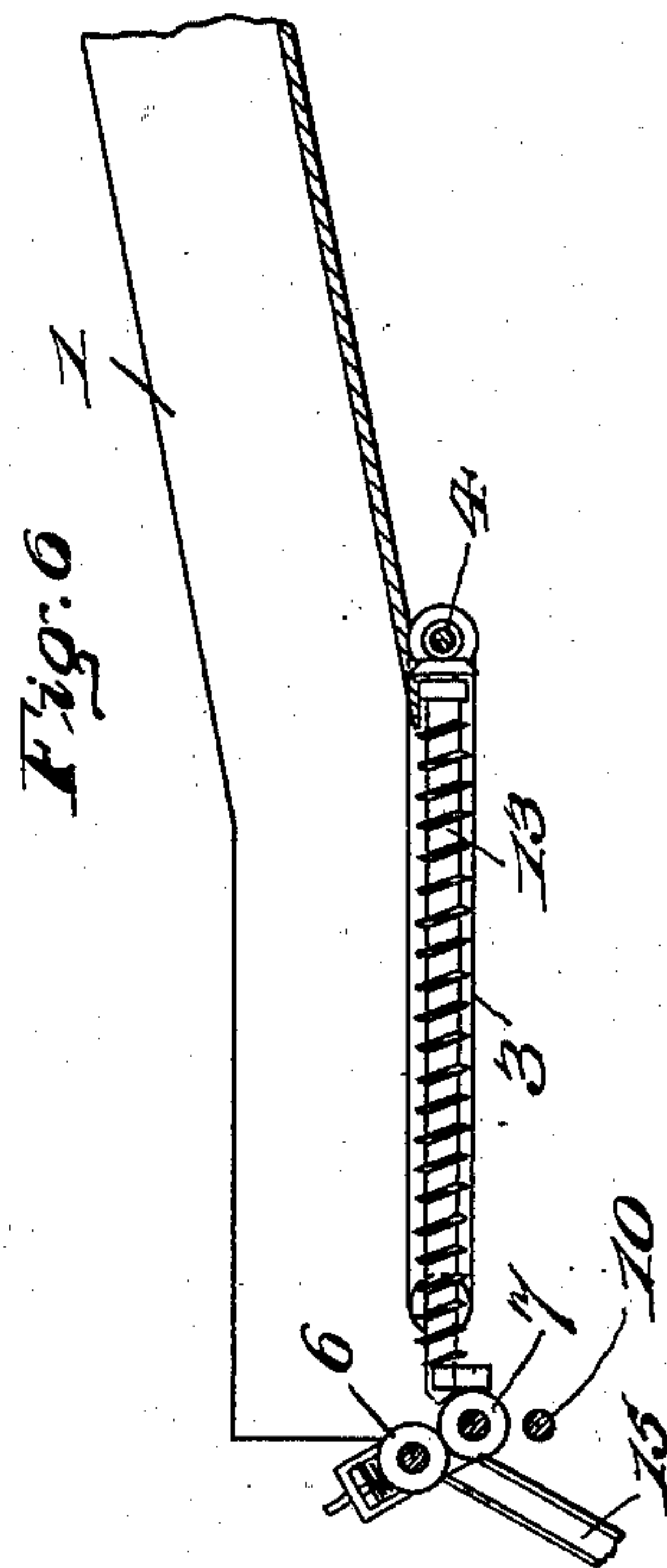


Fig. 6

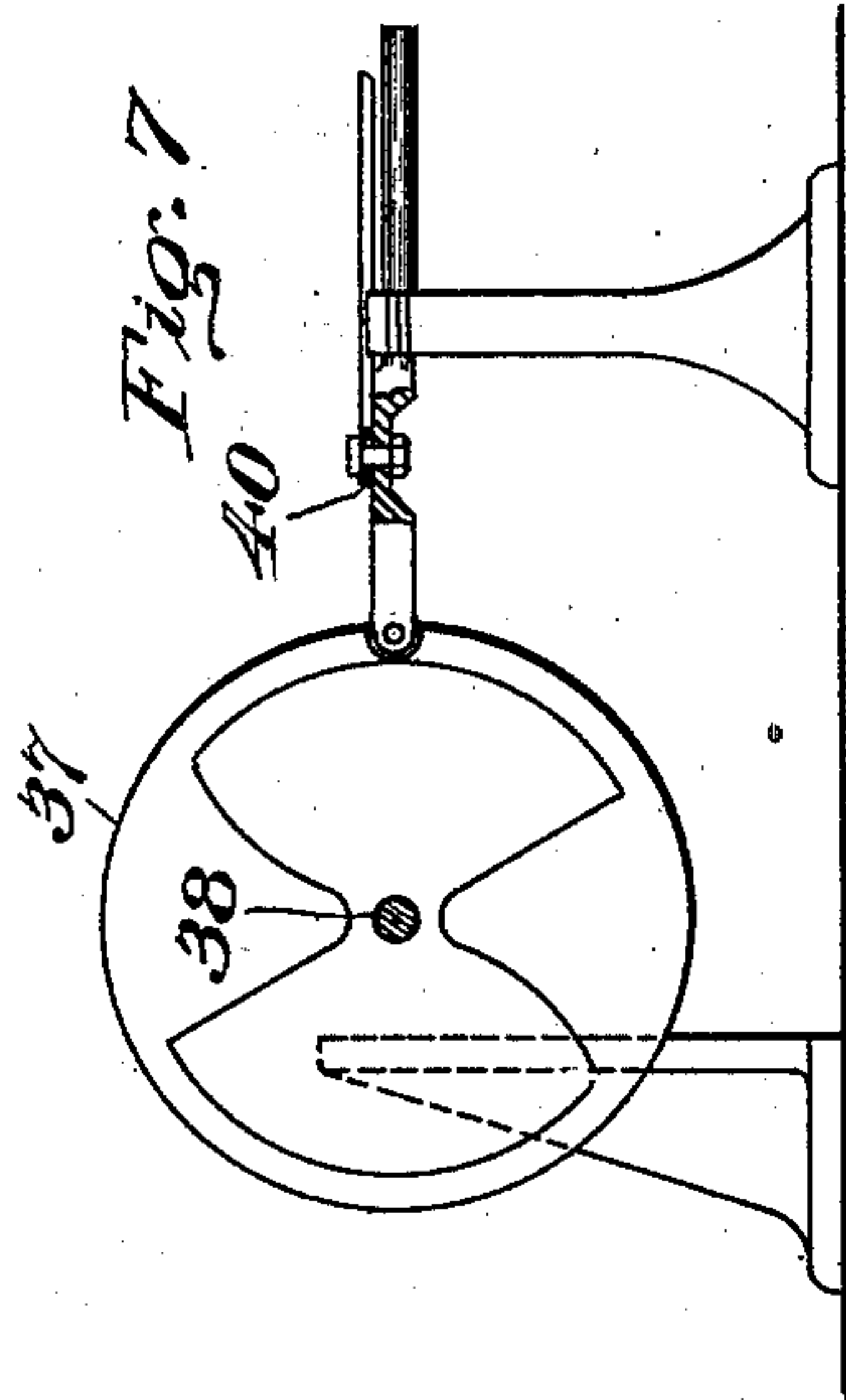


Fig. 7

Witnesses.

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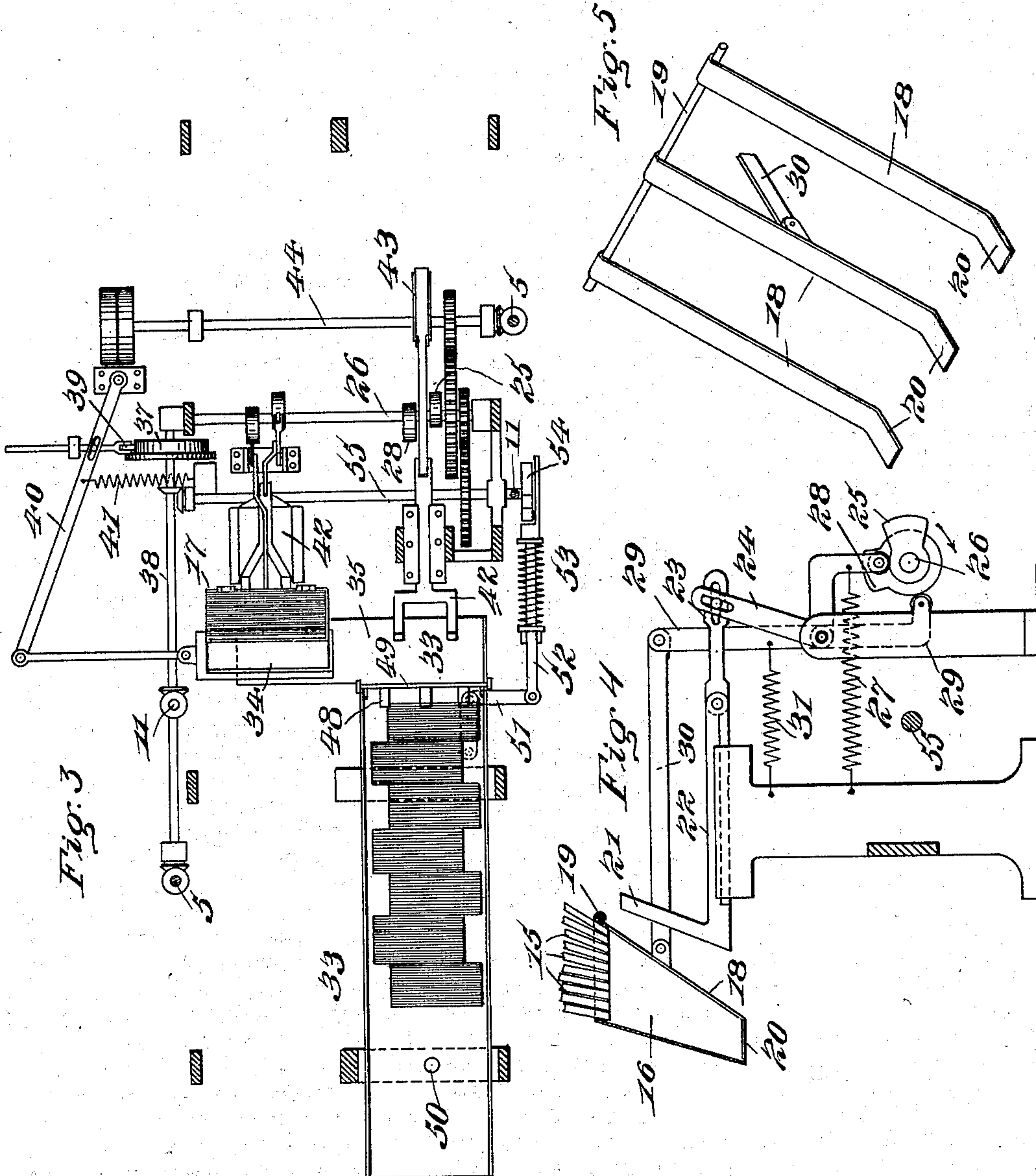
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NO MODEL.

3 SHEETS—SHEET 3.



Witnesses.

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# UNITED STATES PATENT OFFICE.

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## SIGNATURE-GATHERER.

SPECIFICATION forming part of Letters Patent No. 748,198, dated December 29, 1903.

Application filed March 16, 1903. Serial No. 148,024. (No model.)

*To all whom it may concern:*

Be it known that we, NATHAN M. MACDOWELL, a resident of Montgomery, in the county of Montgomery and State of Alabama, and JACOB T. SPERLING, a resident of Elizabeth, in the county of Union and State of New Jersey, have invented a new and useful Improvement in Signature-Gatherers; and we do hereby declare the following to be a full, clear, and exact description thereof.

Our invention relates to a machine for assembling or collecting signatures or parts of books, pamphlets, magazines, and the like.

In binding books, magazines, and the like it is customary to place the folded parts, or "signatures," as they are called, in piles and gather one signature from each pile to make up the volume. This work is slow and expensive. Machines have heretofore been proposed for doing this work; but difficulty has arisen in separating one signature from a pile of signatures and delivering the same at exactly the proper time and in the proper position with reference to the other signatures and without disturbing the signatures which remain in the pile.

Our invention has for its object a machine for doing this work wherein the signatures are accurately separated from their respective piles and delivered at exactly the proper time in proper position with reference to the other signatures. Our machine is also designed for collecting the signatures in succession for a series of volumes and so delivering the collected signatures of the various volumes that they can be readily separated one from the other.

In the accompanying drawings, Figure 1 is a side view of our machine. Fig. 2 is a plan view of the same. Fig. 3 is a horizontal section, that at the upper portion being taken on the line 3 3, Fig. 1, and that at the lower portion being taken on the line 3<sup>a</sup> 3<sup>a</sup>, Fig. 1. Fig. 4 is a vertical sectional view of a portion of the machine, showing the collecting-box and delivery mechanism. Fig. 5 is a perspective view of the gate for the collecting-box. Fig. 6 is a vertical sectional view, on an enlarged scale, through one of the receiving-magazines. Fig. 7 is a detail view of the

mechanism for operating the transfer-box, and Fig. 8 is a cross-section through one of the chutes.

In our machine the signatures or parts of the book are placed in suitable receiving-magazines 1, a sufficient number of such magazines being provided to accommodate all of the signatures of the proposed volume. The particular machine shown in the drawings is designed for collecting or assembling a book composed of twenty (20) parts or signatures. The twenty receiving-magazines shown are placed in groups of five, one upon the other, two such groups being reversely placed, as shown in Fig. 1, and facing each other, so to speak, while the other ten are placed at the side of the ten shown. Any desired number of these magazines, however, can be used by merely increasing the height of the machine or increasing the number of series placed side by side. Each receiving-magazine is an open-ended box or trough comprising a bottom and two sides. The bottom slopes downwardly for most of the length of the magazine, and the signatures are placed in these magazines on edge with their folded part down and resting on the bottom of the magazine. In order to feed the signatures forward in the magazine, we provide a pair of belts 3, which are positively driven from a shaft 4 and which have their upper reaches resting on the bottom of the magazine or trough 1. These belts serve to carry the signatures forward. If desired, a suitable follower may be placed behind the signatures in the magazine, as is the common practice in machines of this kind. The belt-shafts 4 are driven by suitable bevel-gearing from a vertical shaft 5, two such shafts 5 being shown, one on either side of the machine, that on the right-hand side being shown in front of the magazines, while that on the left hand is shown behind the magazines. Any other suitable gearing, however, for driving the belts might be employed.

At the forward or delivery ends of each magazine are a pair of delivery-rollers 6 and 7. One of these rollers—as, for instance, 7—is mounted in stationary bearings, while the other one is mounted in yielding and adjust-



able bearings in order that the distance between said rollers may be varied for delivering signatures of various thicknesses. The yielding movement of the roller 6 is secured  
 5 by having the bearings thereof spring-pressed, and the adjustment is secured by ordinary adjusting-screws for the spring-pressed bearings. The delivery-rollers for each magazine are driven from a gear on a transverse  
 10 shaft 10, and the various transverse shafts are driven from a vertical shaft 11, to which they are geared by bevel-gears or other suitable connections. Two such vertical shafts are used, one on either side of the machine,  
 15 as shown in Fig. 1.

In order to separate the signatures and deliver them one by one to the delivery-rollers, we mount in the bottom of each of the magazines 1, preferably at the middle thereof, a  
 20 separating-screw 13. This screw is provided with grooves or spaces between the threads, so that the folded signatures will drop down into said grooves, one signature in each groove, and by the rotation of the screw will  
 25 be fed forward and delivered one at a time to the delivery-rollers. This screw may be driven by any suitable mechanism, preferably by bevel-gears, from the belt-shaft 4. If desired, the screw-shaft may be extended  
 30 to the rear and provided with a hand-wheel for adjusting said screw and also for use in the initial charging of the magazine.

From each pair of delivery-rollers a chute or spout 15 leads downwardly, the chutes or  
 35 spouts from the front series of magazines leading to a collecting-box 16, while those from the rear series of magazines lead to a similar collecting-box 17. The chutes 15 may be formed of any suitable material, preferably of sheet metal, having an opening on  
 40 their front sides, so that the interior is accessible, and the chutes of each series extend downwardly a slight distance into the collecting-boxes. The various pairs of delivery-rollers are driven at such speeds and  
 45 are so timed with reference to each other that the signatures will be delivered to the collecting-boxes 16 and 17 at the proper time and in the proper order, the delivery-rollers  
 50 giving said signatures a suitable impetus, so that they will fall down the chutes very rapidly. The collecting-boxes 16 and 17 are formed of any desirable material and have solid or closed front and side walls and are  
 55 provided with a skeleton gate 18, which forms the back wall. The sides of these collecting-boxes preferably are formed of glass, so that the interior thereof can be viewed. The back or gate 18 of these delivery-boxes is shown in  
 60 Fig. 5 and comprises a series of bars mounted on the pivot-shaft 19 and provided at their lower ends with the intumed feet 20, which form the bottom of the collecting-boxes.

The signatures are deposited in the collecting-box when the gate 18 is closed, and they  
 65 fall down upon the feet 20 of said gate. When it is desired to deliver the collecting-box, the

signatures are pressed against the front wall of the box and the gate is then retracted, after which the compressing device is released,  
 70 thus allowing the signatures to drop out of the box. Various forms of mechanism for this purpose may be employed. We have provided for each of the delivery-boxes a pair of  
 75 fingers 21, secured to a slide 22, and which fingers are adapted to pass between the bars of the gate and press the signatures against the front wall of the box. The slides 22 may be actuated in any suitable way. We have  
 80 shown them connected by means of a slotted link 23 to the slotted arm of a bell-crank lever 24, the other arm of which is provided with a roller bearing against a cam 25 on the counter-shaft 26. A suitable spring 27 is arranged to hold the roller and the bell-crank  
 85 lever 24 constantly against the cam. A similar cam 28 on the same shaft bears against a roller on the lever 29, which is connected by means of a link 30 to the gate 18 of the collecting-box. A spring 31 holds the roller of  
 90 this lever constantly against the cam. The cams 25 and 28 are so shaped and positioned on the shaft 26 that the slide 22 will first be projected forwardly to press the signatures against the front wall of the box, after which  
 95 the gate 18 will be withdrawn, and immediately thereafter the slide 22 will also be withdrawn, thus permitting the collected signatures to drop out of the collecting-box, after which the gate 18 is again moved to its closed  
 100 position. It will be understood that separate gates, compressing-slides, and operating-cams are provided for each of the collecting-boxes 16 and 17.

Underneath the collecting-box 16 is the delivery box, table, or trough 33. The signatures from the box 16 drop when its gate is  
 105 withdrawn down into this delivery-box, but those from the collecting-box 17 drop down into a transfer-box 34, placed underneath the same. This transfer-box has its top, bottom, and one end open and slides on a suitable  
 110 base 35 and is placed with its open end toward the side of the delivery-box 33. Suitable mechanism is provided to move this transfer-box sidewise at the proper time to deposit the signatures therein in delivery-box 33. We have shown for this purpose a  
 115 cam 37, mounted on a shaft 38, against which cam bears a roller 39 on a lever 40, connected by means of a suitable link to the transfer-box. A spring 41 is provided for normally holding the roller 39 against the cam 38.  
 120

As soon as one batch of signatures has been dropped from the collecting-box 16 into the  
 125 delivery-box 33 it is moved forward in said delivery-box, so that they will not interfere with the transfer-box 34. A suitable reciprocating plunger or pusher 42 is provided for this purpose, this plunger being operated  
 130 from an eccentric 43 on the main drive-shaft 44. As soon as the transfer-box 34 has deposited its collection of signatures in the delivery-box 33 the plunger 42 is again project-



ed to push the same forward out of the way of the next batch coming from the collecting-box 16. It will thus be seen that the plunger 42 must make two reciprocations for each reciprocation of the transfer-box 34. The gearing between the drive-shaft 44 and the cam-shafts 26 and 38 is so arranged as to secure the proper relative number of movements of the plunger 42 and transfer-box 34 and gates 18.

In order to keep the signatures in the delivery-box from falling back after being shoved forward by the plunger 42, we provide suitable fingers or stops 48, secured to a transverse shaft 49, so positioned that when the plunger 42 shoves the signatures forward the fingers will swing and ride over the tops of the latter and will then fall down behind the same, but being prevented from passing backward beyond a vertical position by a suitable stop.

In order that the signatures composing the various volumes which are deposited in the delivery-box 33 may be readily separated from each other, we propose to place them therein in staggered relation, as shown in Fig. 3. To secure this object, we give the box 33 a slight sidewise movement after each volume is deposited therein. This can conveniently be secured by mounting the box 33 on a pivot, as at 50, and giving the forward end thereof a to-and-fro sidewise movement—as, for instance, by connecting thereto one arm of a bell-crank lever 51, the opposite end of which has connected thereto a rod 52, which is surrounded by a spring 53, tending normally to hold the box in one of its positions. A cam 54 on the counter-shaft 55 bears against a roller on the rod 52 and is so shaped as to move the box sidewise in opposition to the force of the spring 53. This cam serves to move the box to one of its positions and to hold it in that position the required time, and the spring 53 moves it to the opposite position.

Any suitable framing for supporting the various parts of the mechanism so far described may be employed, that shown in the drawings being intended to be illustrative merely. Likewise the shafts and connecting-gearing for driving the various parts may also be variously arranged, that shown in the drawings being also largely illustrative. We have shown the main driving-shaft at 44, and this is provided with the eccentric 43 for operating the plunger 42. It is also provided with a bevel-gear for operating the vertical shaft 5 on that side of the machine. It is connected to the cam-shaft 26 by suitable spur-gears which drive the latter at just half the speed of the drive-shaft, so that the gate 18 and compressing-fingers 21 of the collecting-boxes will be operated once for every two reciprocations of the plunger 42. This counter-shaft 26 in turn is connected by suitable gears to the cam-shaft 55, so that the latter is driven at only one-half the rate of the shaft 26 and only

one-fourth the rate of the driving-shaft 44, so that by this means a sidewise movement of the delivery-box 33 occurs only once for each two reciprocations of the plunger 42, and the complete reciprocation of said delivery-box occurs only once for each four reciprocations of the plunger 42. The cam 37 for operating the transfer-box is operated by suitable gearing from the shaft 55; but said cam is, as shown in Fig. 7, double, so that it will give two reciprocations to the transfer-box for each full reciprocation of the delivery-box. The vertical shafts 5 and 11 on the opposite side of the machine are driven from the cam-shaft 38; but, if desired, they may be driven by any other suitable gearing.

The signatures will be placed in the magazines 1 and will stand up on edge therein, being fed forward by the belts 3 to the delivery-rolls 6 and 7 and being separated by means of the screws 13, so that a single signature only will be delivered to the delivery-rolls. The latter rotate quite rapidly and give the signatures an impetus down the chutes 15 to the collecting-boxes 16 and 17. As soon as a signature from each of the magazines has been deposited in the collecting-boxes the gates 18 of the latter are withdrawn, thus allowing the signatures to fall down, those from the collecting-box 16 directly into the delivery-box 33 and those from the collecting-box 17 into the transfer-box 34. The reciprocating plunger 42 now comes forward and pushes the signatures coming from the collecting-box 16 forward and then withdraws. The transfer-box 34 is then moved over to deposit its collection of signatures in the delivery-box 33, when the plunger 42 again moves forward to push these along in the delivery-box. As soon as this takes place the delivery-box 33 is moved slightly toward one side, so that the signatures for the next volume will be placed in staggered relation to those just deposited. Meantime the gates 18 of the collecting-box 16 and 17 have been closed and a fresh supply of signatures deposited therein from the various magazines, and as soon as the delivery-box 33 and transfer-box 34 have been moved to proper position the gates 18 of the collecting-boxes are again opened, and the operation before described is repeated.

It will be understood, of course, that any number of magazines may be used by merely increasing the height of the machine, or, if desired, instead of using the two sets of tiers of delivery-boxes three sets might be used, one on either side of the set underneath which is the delivery-box 33. In that case two transfer-boxes 34 would be used, one on either side of said delivery-box, and said transfer-boxes will be made to move sidewise in succession, and the reciprocating plunger 42 would be given three instead of two actuations for each actuation of the transfer-boxes and delivery-box.

By means of the mechanism described the signatures are separated from their respec-



tive piles and delivered to the collecting-boxes, from whence they are deposited in the delivery-box, and in the delivery-box the collected signatures for the respective volumes are placed in staggered relation with reference to each other, so that said volumes can be readily separated. The mechanism described is positive in its action and insures the separation of the signatures one from the other and their delivery in the collecting-boxes at the proper time and in proper order.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a machine for gathering signatures, the combination with a series of magazines for receiving the signatures on edge, of a pair of delivery-rolls at the end of each magazine, a driven screw in the bottom of said magazine for separating said signatures and feeding them toward said rolls, and a collecting-box common to said magazines and to which said signatures are delivered by said rolls.

2. In a machine for gathering signatures, the combination with a series of magazines for receiving the signatures on edge, of a pair of delivery-rolls at the end of each magazine, driven belts for feeding the signatures toward said rolls, a driven screw in the bottom of said magazine for separating said signatures and regulating their feed toward the rolls, and a collecting-box common to said magazines and to which said signatures are delivered by said rolls.

3. In a machine for gathering signatures, the combination with a series of magazines, one above the other, mechanism for delivering the signatures from said magazines, a collecting-box on a lower level than said magazines, and chutes leading from said magazines to the collecting-box.

4. In a machine for gathering signatures, the combination with two series of magazines, each series comprising a number of magazines one over the other and the two series facing each other, mechanism for delivering the signatures from said magazines, a collecting-box, and a chute leading from each of said magazines to the collecting-box.

5. In a machine for gathering signatures, the combination with a stationary collecting-box, of delivery means thereunder, a gate for said collecting-box, mechanism for pressing the signatures against one wall of said collecting-box, and mechanism for retracting the gate and for thereafter releasing the compressing mechanism.

6. In a machine for gathering signatures, the combination with a stationary collecting-box, a hinged gate therefor, a reciprocating plunger for compressing the signatures against one wall of the collecting-box, and suitable cams for retracting said gate and thereafter retracting the plunger.

7. In a machine for gathering signatures, the combination with two series of magazines placed side by side, two collecting-boxes, one for receiving the signatures from each series

of magazines, a delivery-table underneath one of said collecting-boxes, transfer mechanism for delivering the signatures from the other collecting-box to said delivery-table, and means for moving said delivery-table laterally.

8. In a machine for gathering signatures, the combination with two series of magazines placed side by side, a collecting-box for receiving the signatures from each series, delivery means underneath one of said collecting-boxes, a transfer-box underneath the other collecting-box, and mechanism for reciprocating said transfer-box to deposit the signatures therein on the delivery means.

9. In a machine for gathering signatures, the combination with a stationary collecting-box, of a delivery-box for receiving the signatures therefrom, mechanism for transferring the signatures from the collecting-box to the delivery-box, and mechanism for moving the assembled signatures forward in said delivery-box.

10. In a machine for gathering signatures, the combination with a stationary collecting-box, of a delivery-box for receiving the signatures therefrom, mechanism for transferring the signatures from the collecting-box to the delivery-box, means for moving the signatures forward in said delivery-box, and means for preventing said signatures from moving backward in said box.

11. In a machine for gathering signatures, the combination with two series of magazines placed side by side, a collecting-box for each of said series, a delivery-box underneath one of said series, a transfer-box for delivering the signatures from the other collecting-box to said delivery-box, a reciprocating plunger for moving the signatures forward in said delivery-box, and gearing for actuating said plunger twice for each actuation of the transfer-box.

12. In a machine for collecting signatures, the combination with a stationary collecting-box, of a delivery-box for receiving the signatures therefrom, mechanism for transferring the signatures from the collecting-box to the delivery-box, and mechanism for moving said delivery-box sidewise after each delivery of signatures thereto from the collecting-box.

13. In a machine for gathering signatures, the combination with a stationary collecting-box, of delivery means, and mechanism for delivering the signatures from the collecting-box to said delivery means and placing them thereon in staggered relation.

14. In a machine for gathering signatures, the combination with a stationary collecting-box, of a pivoted delivery-box, mechanism for transferring the signatures from the collecting-box to the delivery-box, mechanism for moving said delivery-box sidewise, and a reciprocating plunger for moving the signatures forward in said delivery-box.

15. In a machine for gathering signatures,



the combination with two series of magazines placed side by side, a collecting-box for each series, a delivery-box underneath one of the series, a transfer-box for delivering the signatures from the other collecting-box to the delivery-box, a reciprocating plunger for moving the signatures forward in said delivery-box, said plunger having two actuations for each actuation of the transfer-box, and mechanism for moving said delivery-box sidewise after each two reciprocations of said plunger.

In testimony whereof we, the said NATHAN M. MACDOWELL and JACOB T. SPERLING, have hereunto set our hands.

NATHAN M. MACDOWELL.  
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