

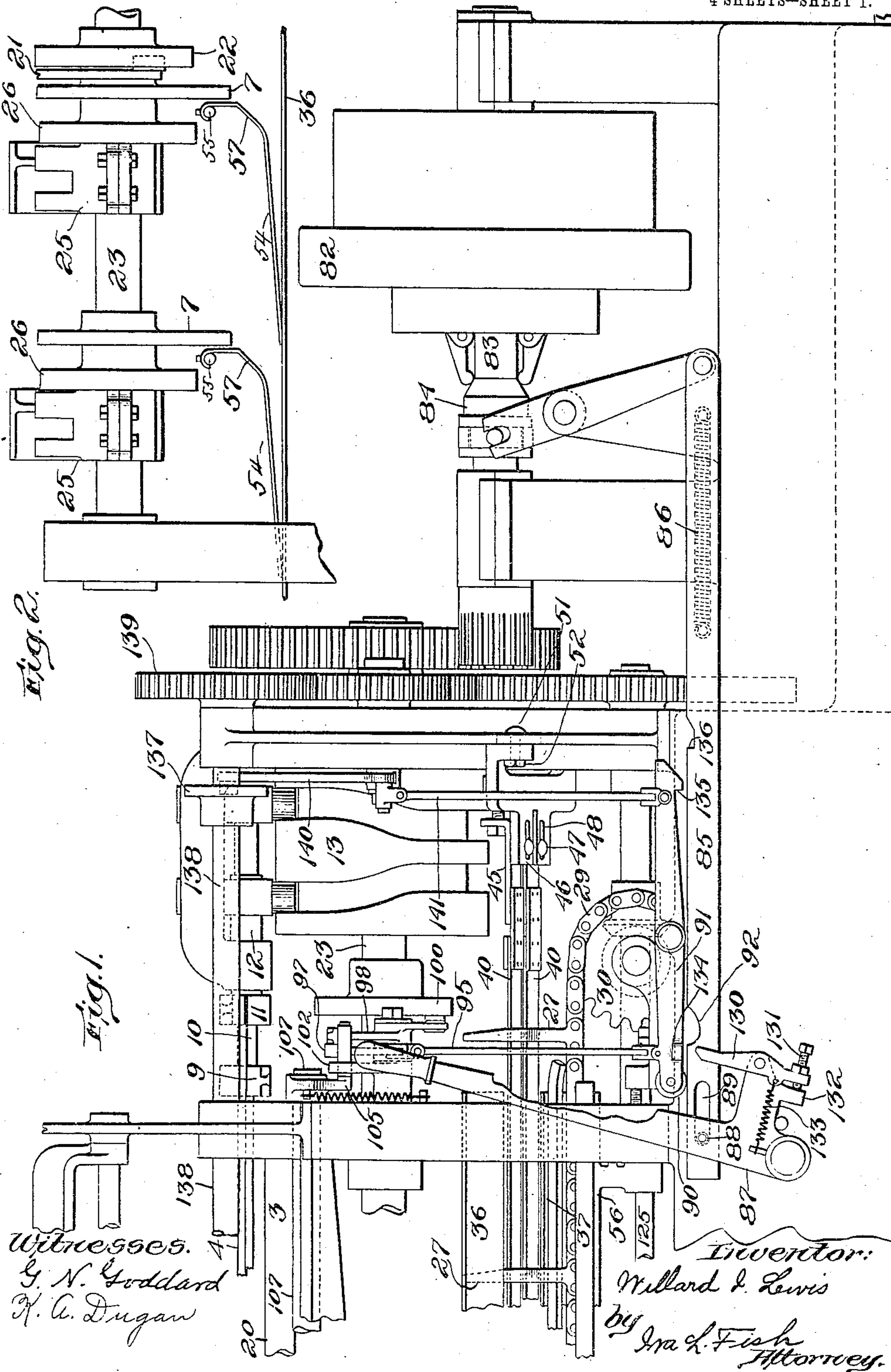
No. 868,195.

PATENTED OCT. 15, 1907.

W. I. LEWIS.
SIGNATURE GATHERING MACHINE.

APPLICATION FILED MAY 12, 1906.

4 SHEETS—SHEET 1.



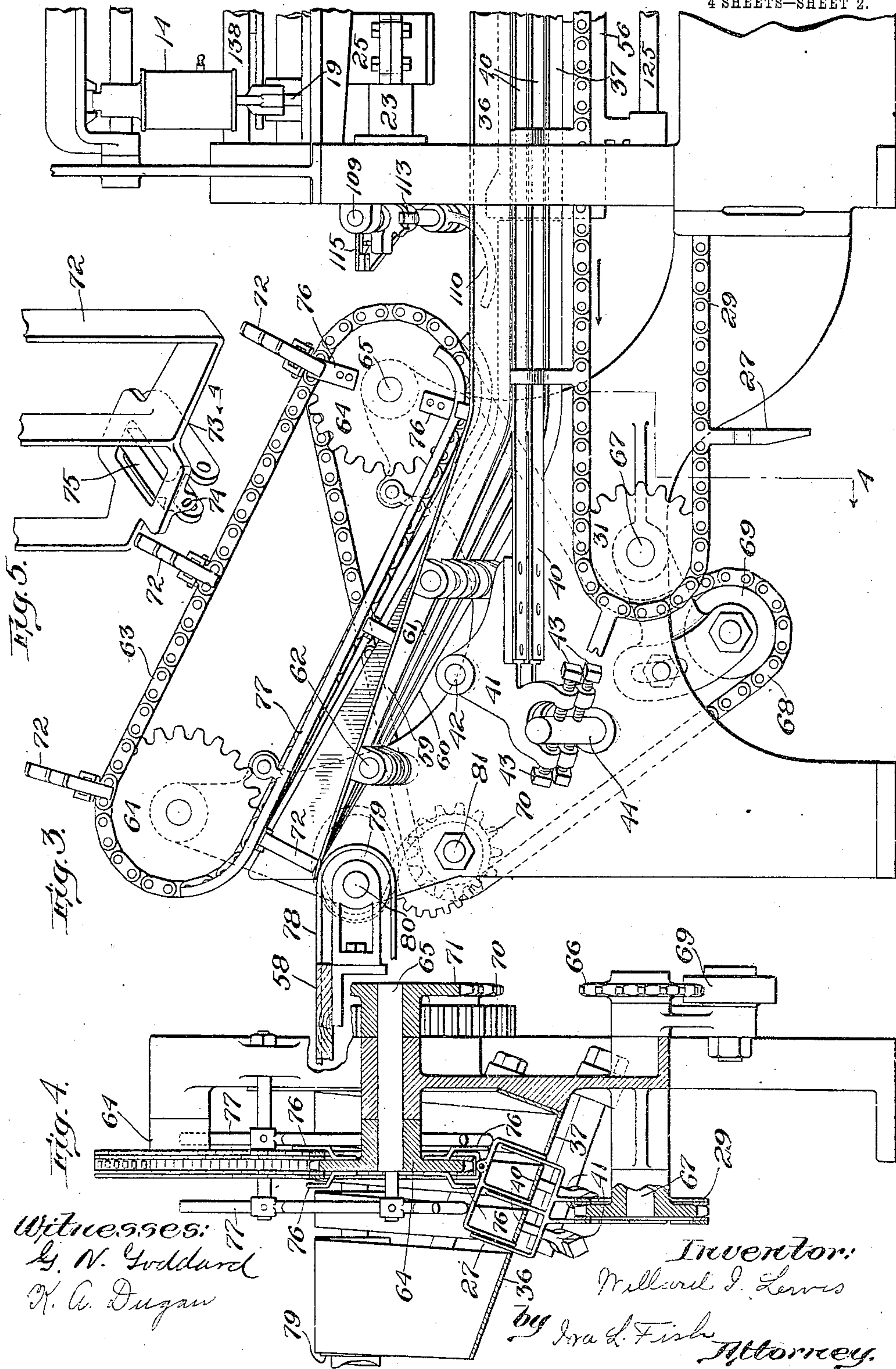
No. 868,195.

PATENTED OCT. 15, 1907.

W. I. LEWIS.
SIGNATURE GATHERING MACHINE.

APPLICATION FILED MAY 12, 1906.

4 SHEETS—SHEET 2.



Witnesses:
L. N. Goddard
K. A. Dugan

Inventor:
Willard I. Lewis
by Ira D. Fisher
Attorney.

No. 868,195.

PATENTED OCT. 15, 1907.

W. I. LEWIS.
SIGNATURE GATHERING MACHINE.

APPLICATION FILED MAY 12, 1906.

4 SHEETS—SHEET 3.

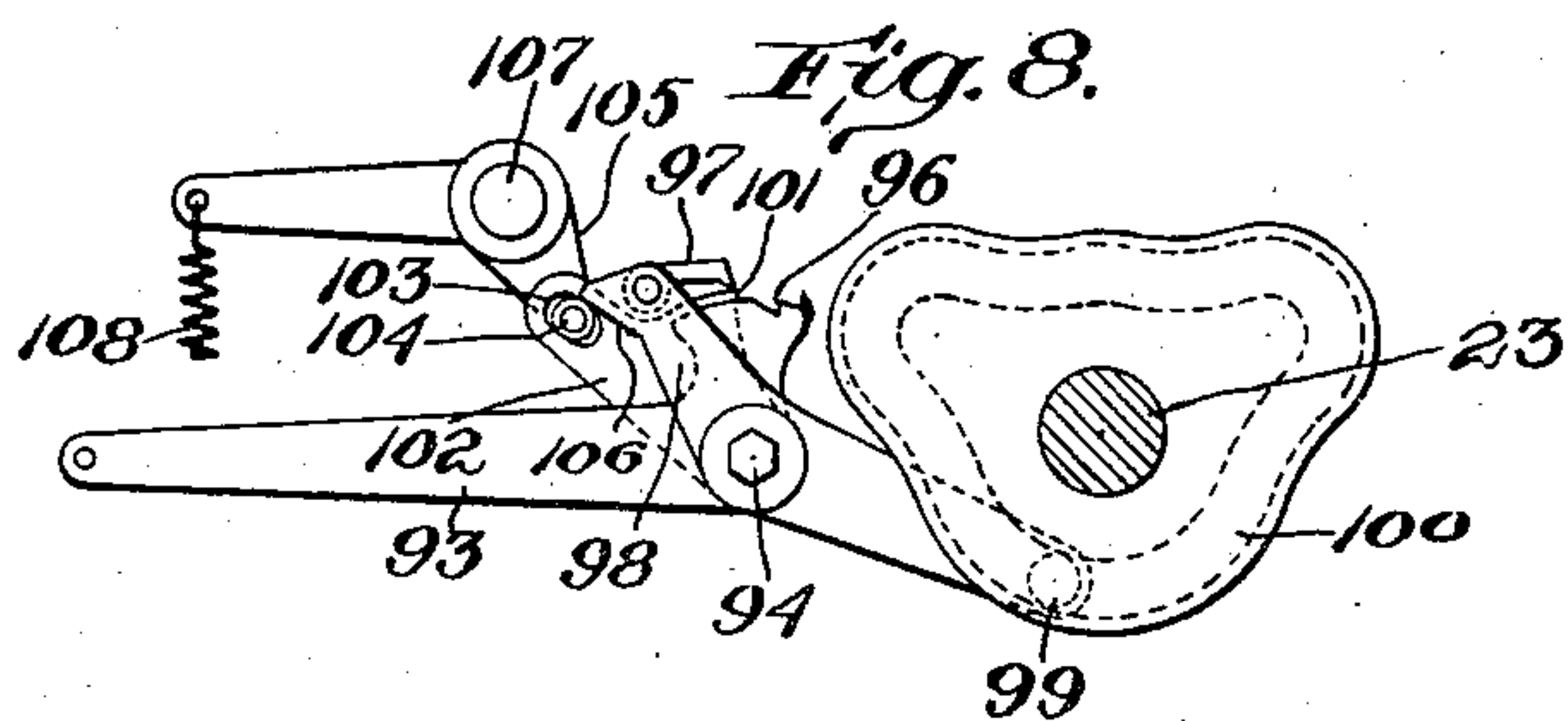
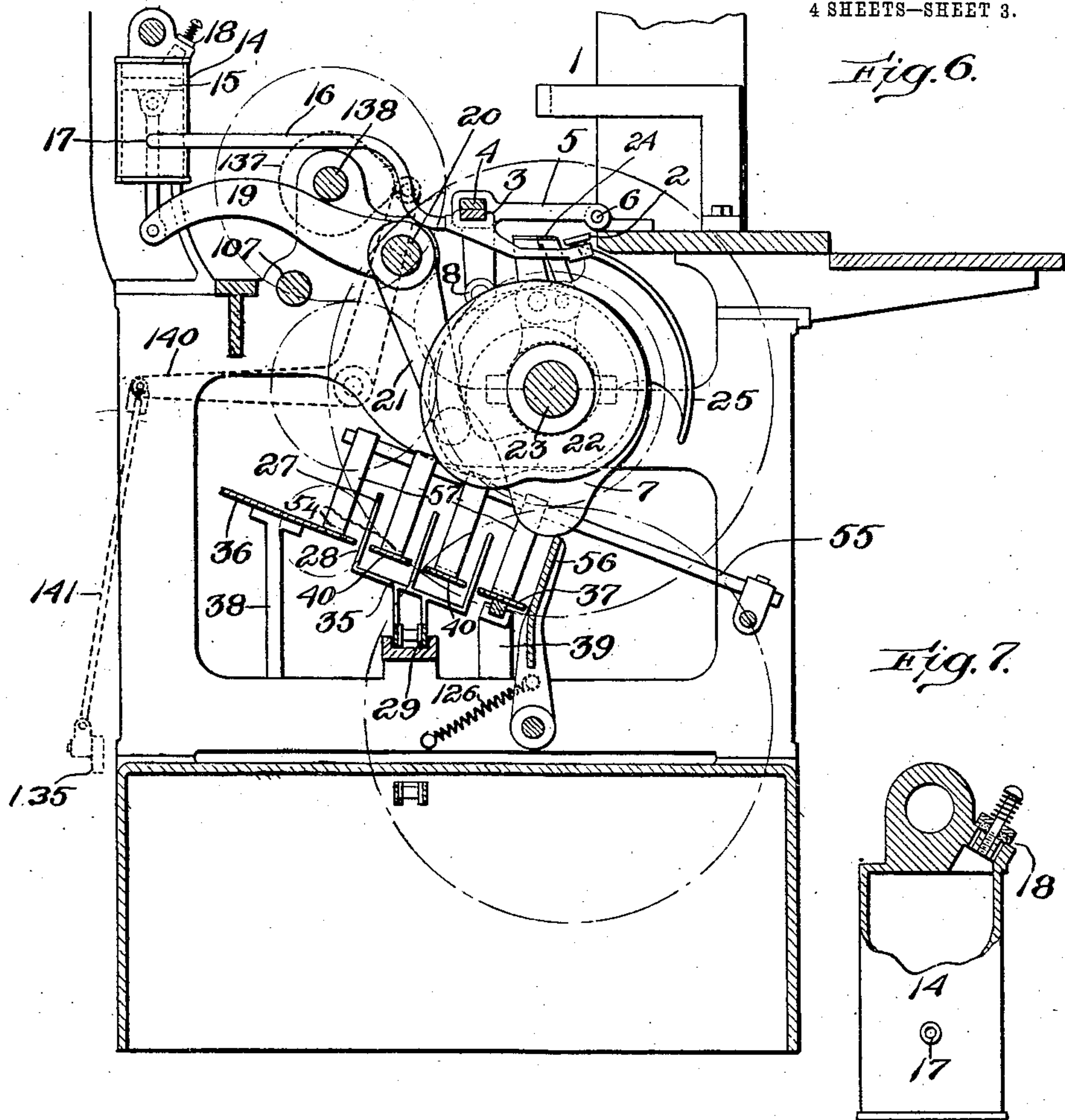
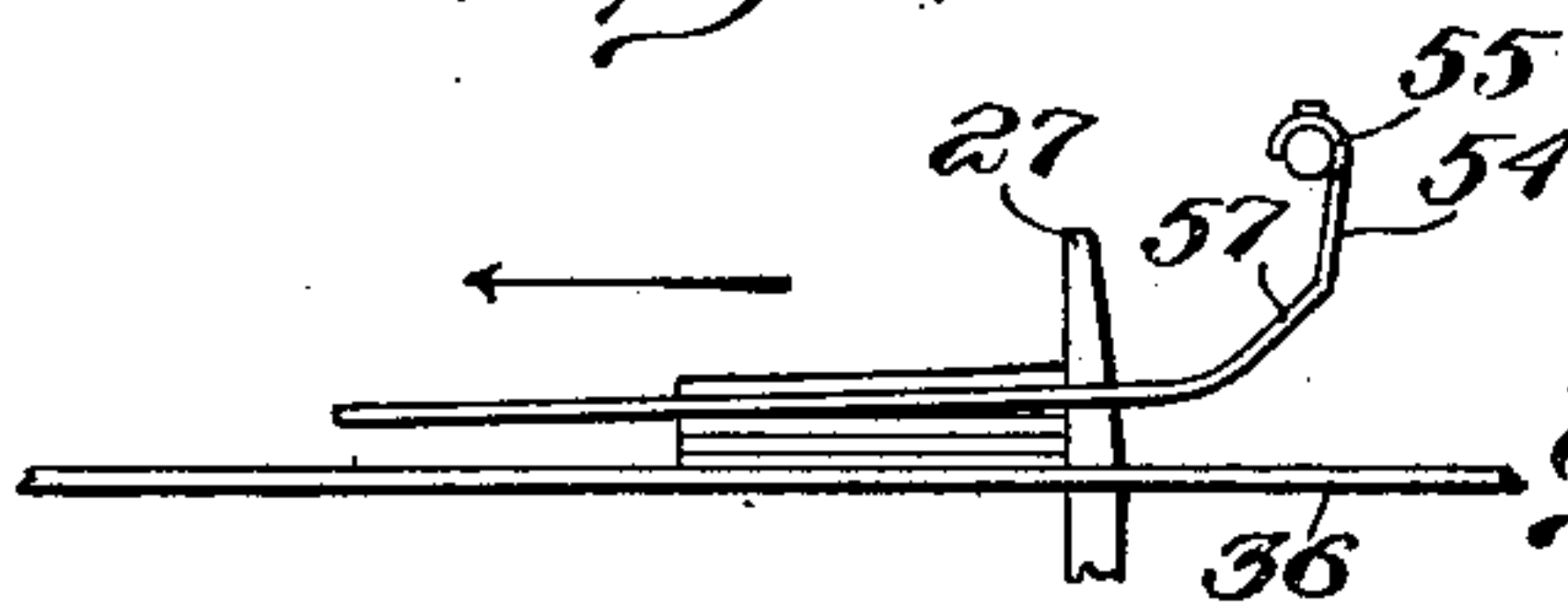


Fig. 9.



Witnesses:
G. N. Goddard
H. A. Dugan

Inventor:
Willard I. Lewis

by Ira L. Fish
Attorney.

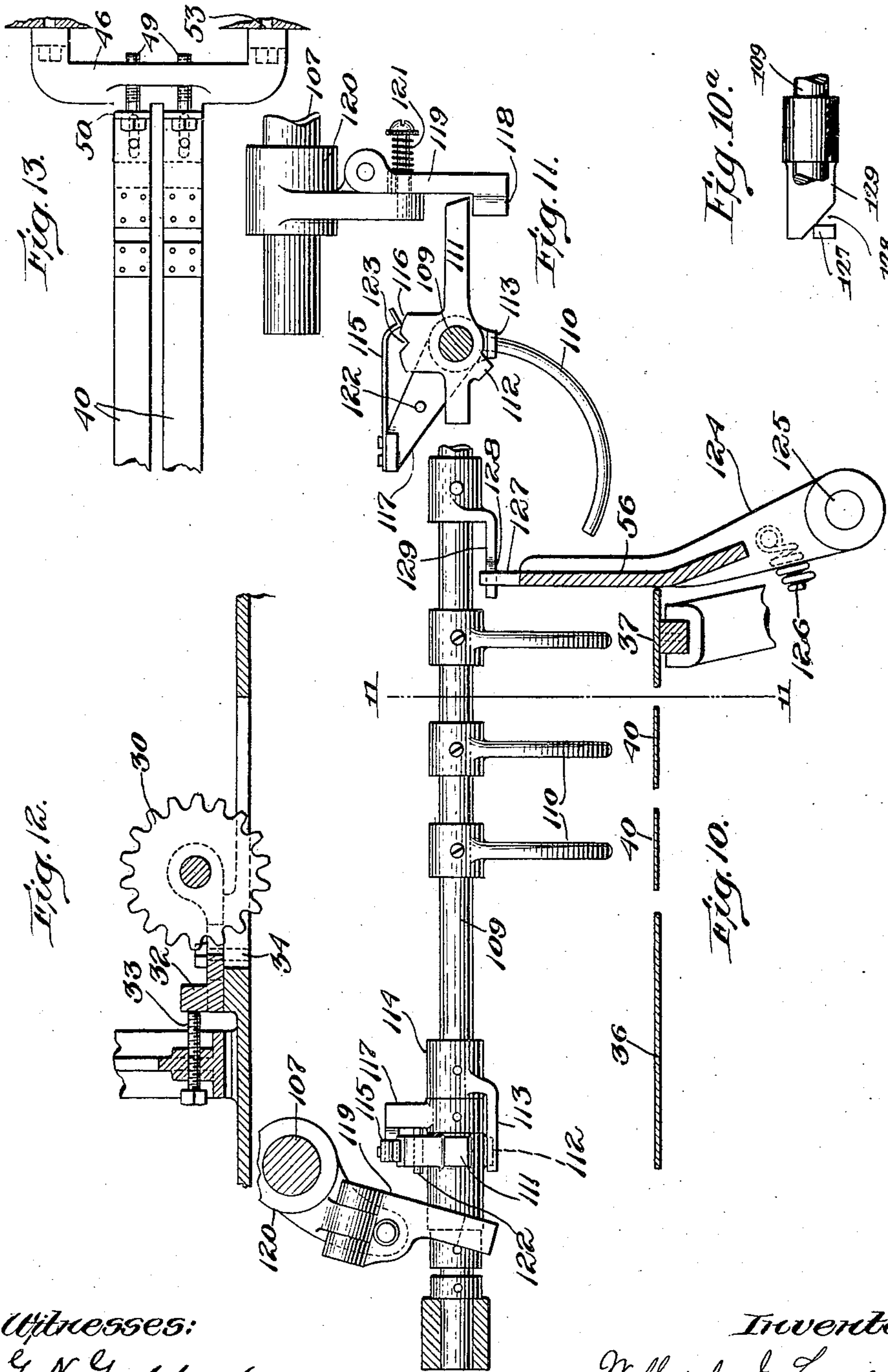
No. 868,195.

PATENTED OCT. 15, 1907.

W. I. LEWIS.
SIGNATURE GATHERING MACHINE.

APPLICATION FILED MAY 12, 1906.

4 SHEETS—SHEET 4.



Witnesses:
G. N. Goddard
R. A. Dugan

Inventor:
Willard I. Lewis
by Ira L. Fish
Attorney.

UNITED STATES PATENT OFFICE.

WILLARD I. LEWIS, OF WALPOLE, MASSACHUSETTS, ASSIGNOR TO HERBERT M. PLIMPTON,
OF NORWOOD, MASSACHUSETTS.

SIGNATURE-GATHERING MACHINE.

No. 868,195.

Specification of Letters Patent.

Patented Oct. 15, 1907.

Application filed May 12, 1906. Serial No. 316,437.

To all whom it may concern:

Be it known that I, WILLARD I. LEWIS, a citizen of the United States, and a resident of Walpole, county of Norfolk, Massachusetts, have invented certain new and useful Improvements in Signature-Gathering Machines, of which the following is a specification.

The invention relates to that class of machines known as signature gathering machines which are employed for gathering in proper succession several signatures composing a book or magazine and its object is to provide a machine of this character which shall be simple in construction and which will operate to efficiently and accurately collect the desired number of signatures and deliver them properly and accurately superimposed into convenient position for removal or subsequent manipulation.

The features and combinations by which these objects are accomplished will be understood from the following detailed description of a machine embodying them.

For the purpose of illustration the various features of the invention have been shown embodied in a machine having the general construction and mode of operation of the machine shown in and described in a patent to Pray, No. 767,081, dated August 9, 1904, although it will be understood that certain features and combinations comprised within the invention may be embodied in other forms of machines.

A machine embodying the various features of the invention in the forms in which I prefer to employ them is shown in the accompanying drawings, in which—

Figure 1 is a side elevation of the end of the machine at which the driving mechanism is located. Fig. 2 is a detail elevation showing the devices for "jogging" the signatures. Fig. 3 is a side elevation of the delivery end of the machine. Fig. 4 is a sectional view on line 4—4 of Fig. 3. Fig. 5 is a detail view showing the manner of connecting the feeding fingers to one of the delivery chains. Fig. 6 is a transverse sectional view. Fig. 7 is a detail of one of the suction pumps. Fig. 8 is a detail showing a part of the stopping mechanism. Fig. 9 is a detail showing the operation of the jogging devices. Fig. 10 and 10^a are enlarged details of certain devices for controlling the stopping mechanism. Fig. 11 is a view on line 11—11 looking toward the left in Fig. 10. Fig. 12 is a detail showing the means for tightening the conveyer-chain, and Fig. 13 is a detail showing the means for tensioning the strips forming a part of the collecting-table.

In the machine indicated in the drawings, the signatures are contained within a series of magazines, one of which is indicated at 1 in Fig. 6, these magazines being arranged in succession lengthwise of the

machine in the usual manner. The individual signatures are separated from the stacks of signatures in the magazine and are delivered upon a supporting table along which they are carried.

The devices for separating individual signatures from the stacks of signatures in the magazines comprise a series of suction pickers 2 mounted upon a bar 3, and a series of separator plates (not shown) carried upon a bar 4. (Figs. 1 and 6.) The carrying bars 3 and 4 for the pickers and separator-plates are mounted to reciprocate longitudinally in bearing arms 5 which are pivoted at 6 so that they may have a rocking movement about said pivot. The rocking movement is imparted to the arms 5 by a cam 7 which engages and supports a roll 8 on the arm 5. The bar 3 is connected by means of an arm 9 with a shaft 10, and the bar 4 is connected by an arm 11 with a sleeve 12 which surrounds the shaft 10. The sleeve and shaft are reciprocated by means of cam grooves formed on a cam 13 in the manner described in the patent referred to.

In separating the individual signatures from stacks of signatures in the magazines, the suction pickers 2 move toward the left in Fig. 1 into position beneath the corners of the lower signatures in the magazines, then rise into engagement with the signatures, then move downward to bend the corners of the signatures away from the signatures in the magazines, the separator-plates moving forward between the lower signatures and the stacks. The pickers are then released from the signatures and move toward the right, the separator-plates rising to support the stacks while the lower signatures are withdrawn. These movements are imparted to the pickers and separator-plates by the rocking of the supporting arms 5 and the reciprocation of the carrying bars 3 and 4, as is more fully explained in the patent referred to.

The suction-producing devices for the pickers 2 in the form shown consist of a suction pump for each picker comprising a cylinder 14 and a piston 15 (Fig. 6.) Each cylinder 14 communicates with the corresponding picker 2 through a flexible pipe 16 connected at one end with a port 17 in the cylinder, and at the other end with a passage formed in the picker-carrying arm and communicating with the signature-engaging end of the picker. The port 17 is arranged at a suitable distance from the inner end of the cylinder 14, and the cylinder is provided at its inner end with a spring-pressed valve 18 for the escape of the air as the piston 15 rises. The pistons for the various pumps are connected by arms 19 with a rock-shaft 20 which extends longitudinally of the machine and is rocked at proper intervals by means of one or more arms 21 secured to the shaft and operated by a cam or cams 22 which are secured to the main cam-shaft 23 of the machine.

Assuming that the piston 15 is at the upper end of the

cylinder 14, the downward movement of the piston will create a vacuum in the cylinder above the piston, and as the piston passes the port 17 the picker 2 will be brought into communication with the vacuum within the cylinder, thus creating a sudden suction at the signature engaging end of the picker. At this time the picker is in engagement with the surface of the lower signature and acts therefore to effectively grip the signature and bend it down away from the signature next above it.

During the upward movement of the piston 15, any air which is within the cylinder above the piston is discharged through the valve 18, which yields to allow the escape of the air and immediately closes after the air is expelled.

The lower signatures, the corners of which are bent down by the pickers 2, are withdrawn from beneath the stacks of signatures in the magazines by means of grippers 24 which are mounted upon heads 25 corresponding in number to the magazines and secured upon the main shaft 23 of the machine. These grippers correspond in construction and mode of operation to the grippers shown and described in the patent referred to, and are operated in proper time to seize and release the signatures by means of fixed cams 26 as described in said patent. At each rotation of the shaft 23 the grippers 24 seize a series of signatures, one from each magazine, and deliver these signatures as they are brought into position above a collecting table which extends from end to end of the machine.

The signatures delivered by the grippers are pushed along the collecting table by means of a series of fingers 27 which project up through slots 28 and travel longitudinally of the table.

In order that the signatures may be carried along the table without danger of getting out of alinement it is desirable to provide a plurality of fingers arranged in line transversely of the collecting table and engaging the signatures at different points. Heretofore in cases where a plurality of fingers thus arranged have been employed it has been customary to secure the fingers to a plurality of chains in order that the fingers might be at a considerable distance apart and at the same time to enable the use of a supporting section in the collecting table between the fingers. With this construction it was difficult if not impracticable to secure a uniform action of the fingers because of the unequal stretch and wear of the chains. This construction also involved a duplication and complication of parts as compared with the construction which I have devised and which forms a feature of the present invention.

In practicing the features of my invention relating to the construction of the collecting table and devices for feeding the signatures along the table, I employ a single chain or carrier for the feeding fingers and provide this chain at suitable intervals with signature-feeding devices consisting of a plurality of fingers arranged transversely of the collecting table and projecting up through slots or spaces extending longitudinally of the table. I also provide the table with supporting sections extending from end to end of the table and arranged between the fingers.

In the particular embodiment of the invention shown in the drawings (Figs. 1, 3, 6, 12 and 13) the carrier for the feeding devices or fingers consists of an endless chain 29 passing over sprocket wheels 30 and 31 mount-

ed at opposite ends of the machine. In order that the chain may be kept taut and adjusted to operate properly, the sprocket wheel 30 is mounted in an adjustable bearing block 32 which may be adjusted by an adjusting screw 33 and may be clamped in position by one or more bolts 34 (Fig. 12).

The feeding devices for carrying the signatures along the collecting table consist of a series of transverse bars 35 secured at proper intervals to the chain 29 and provided with the feeding fingers 27 which project up through the slots 28 in the collecting table. (Figs. 3 and 6.) In order that this form of feeding device may be employed and at the same time the signatures be supported between the fingers 27, I have provided a novel form of collecting table. This table comprises the outer and inner sections 36 and 37 which are supported at intervals throughout their length by standards 38 and 39. The space above and below the sections 40 of the table which lie between the fingers 27 must be unobstructed throughout the length of the table along which the signatures are fed, the space above the sections being free for the passage of the signatures and the space below the sections being free for the passage of the transverse bars 35. In order that these sections may be thus supported and the sections adjusted and maintained in proper relation to the other sections of the table, I have mounted and supported these sections in the manner shown in Figs. 1 and 3. As shown in these figures, the sections 40 of the collecting table consist of thin strips which extend from end to end of the machine and are secured at their opposite ends to devices by which their vertical position may be regulated and by which they may be maintained under sufficient tension to retain them in the proper plane; that is, substantially in the plane of the outer and inner sections 36 and 37 of the table. At the delivery end of the machine the strips 40 are secured to two levers 41 which are pivoted on a stud 42 and are provided with adjusting screws 43 arranged to engage the opposite sides of a fixed stud 44. By adjusting the screws 43 the vertical position of the delivery end of the strips 40 may be brought into the proper plane. At their opposite ends the strips 40 are secured to slides 45 which are mounted upon a supporting bracket 46 (Figs. 1 and 13). Each slide 45 is connected with the bracket 46 by a screw 47 which extends through a slot 48 in the supporting arm of the bracket, the screw and slot serving as a guide for retaining and guiding the corresponding slide. The slides 45 are also connected with the bracket 46 by bolts which pass through lugs 50 on the slides and are screwed into the bracket 46. By tightening these bolts the strips 48 may be drawn taut and put under the proper tension to maintain them in position. The bracket 46 is secured to the frame of the machine by bolts 51 and nuts 52, the bolts passing through slots 53 in the frame so that the bracket may be adjusted vertically to bring the strips 40 into the proper plane.

In order that the successive signatures delivered to the collecting table by the transfer devices may be positioned accurately against the fingers 27, I have provided devices onto which the signatures are delivered by the transfer devices and from which they are taken by the fingers 27 and deposited on the sig-

natures already collected by such fingers. The devices which I prefer to employ for this purpose are shown in Figs. 2, 6 and 9, and consist of a series of thin strips 54, of sheet metal which are loosely hung upon transverse bars 55, there being a bar and series of strips corresponding to each signature magazine. As the transfer grippers 24 release the signatures they fall upon the strips 54 and remain in position on these strips until engaged by the fingers 27 as indicated in Fig. 9, when they are carried forward, and as they pass beyond the ends of the strips, drop onto the top of the pile of signatures already collected and being carried forward by the fingers 27. The signatures which have been collected and are being carried forward by a set of fingers 27 pass under the strips 54, the strips swinging about the rod 55 to allow the passage of the signatures. The strips 54, therefore, not only act to insure the engagement of the signatures just delivered by the fingers 27, but also act to force the signatures previously delivered snugly against fingers 27. The backs or edges of the signatures are thus accurately "jogged" or brought into the same plane and squarely against the fingers 27. In the machine illustrated the signatures are so delivered to the collecting table that their backs are engaged by the fingers 27. In order that the signatures may be "jogged" or brought into the same plane at one end as well as at the back, and in order that they may be accurately maintained in position as they are moved along the collecting table, I prefer to arrange the table so that it is inclined transversely as indicated in Fig. 6, and to provide a guard-plate or fence 56 along the lower edge of the table against which the edges of the signatures rest. With the table thus arranged the strips 54 not only insure the positioning of the signatures with their backs against the fingers 27, but also insure the positioning of the end of the signatures against the guard-plate 56. When the signatures are delivered onto the strips 54 these strips will act as a support down which the signature will readily slide until its edge brings up against the guard-plate 56. In order to facilitate this lateral sliding of the signature I prefer to provide the strips 54 with an incline 57 at their rear ends, and to so arrange the strips that the signature will be delivered with the back resting upon this inclined portion. These devices which have just been described are especially valuable in connection with the gathering of signatures for magazine work where the covers of the magazines are secured by pasting to the backs of the collected signatures forming the magazine, and are of especial advantage in cases where the collected signatures are to be fed directly to wire-stitching mechanism by which the signatures are secured together.

In order that the collected signatures may be readily removed and handled after being collected in cases where the machine does not deliver directly to wire-stitching mechanism for securing the signatures together, I have provided a novel form of delivery mechanism for transferring the collected signatures onto a horizontal table from which they may be readily and conveniently removed. This delivery mechanism is shown in Figs. 3, 4, and 5.

In the construction shown the collected signatures are carried from the laterally-inclined collecting table

up a longitudinally inclined support, the supporting surface of which gradually changes from the lateral inclination of the collecting table to coincide with the lateral plane of a horizontal delivery table 58. The longitudinally-inclined support consists of extensions 59 and 60 of the outer and inner sections 36 and 37 of the collecting table and of intermediate sections 61 which are connected with and form extensions of the sections 40 of the collecting table. The sections of the longitudinally-inclined support are mounted upon inclined studs 62, and the upper ends of the sections of the support are in a horizontal plane coinciding substantially with the plane of the delivery table 58. The collected signatures are fed up the inclined support intermediate the collecting table to the delivery table by means of feeding devices carried by an endless chain 63. This chain passes over sprocket wheels 64, one of which is secured to a shaft 65. The shaft 65 is driven from the chain 29 through a sprocket-wheel 66 secured to the shaft 67 on which the sprocket-wheel 31 is secured. A chain 68 passes over the sprocket-wheel 66, an idler pulley 69, a sprocket-wheel 70, and a sprocket-wheel 71 which is secured to the shaft 65. The sprocket-wheels 66 and 71 are so proportioned that the chain 63 is driven at the same surface speed as the chain 29 which carries the collecting fingers 27. Each of the feeding devices for carrying the signatures up the inclined support consist of fingers 72 projecting from a transverse bar 73. The bars 73 are connected with the chain 63 at suitable intervals and are so connected with the chain that they may swing laterally of the chain. As shown in Fig. 5, the bars 73 are pivoted as at 74 to lugs 75 formed on certain of the links of the chain 63. In order that the fingers 72 may be at right-angles to the plane of the inclined support when the fingers come into action upon the signature the sprocket-wheel 64 is provided at diametrically opposite points with positioning plates 76 arranged to engage the underside of each bar 73 as it comes into position opposite the corresponding plates. The lengths of the positioning plates on opposite sides of the sprocket-wheel 64 are so proportioned that the bar 73 will be maintained in such position as it travels the circumference of the sprocket-wheel that the fingers 72 will be in proper alinement transverse of the collecting table to accurately engage the backs of the collected signatures and carry the signatures forward without disturbing their alinement. As the fingers 72 come into action against the backs of the collected signatures, they are traveling about the circumference of the sprocket-wheel 54 and therefore the signature-engaging portion of these fingers is traveling at a greater surface speed than the fingers 27, and they take the collected signatures from the fingers 27 and move them forward at an accelerated speed out of the path of the fingers 27 so that the fingers 27 may pass below the signatures without disarranging them. The fingers 27 are maintained in uniform relation with the surface of the longitudinally-inclined support up which the collected signatures are carried by controlling guide rails 77 arranged parallel to the surface of the support above which they extend and in position to engage the bar 73 and gradually shift it about its pivot. The fingers 72 thus carry the collected signatures up the twisted inclined support and maintain the signatures in proper alinement. These fingers deliver the collected signatures onto a series of

tapes 78 which extend longitudinally of the delivery table 58. The delivery tapes 78 pass over rollers 79 secured to a shaft 80 which is connected by gearing with the shaft 81 on which sprocket-wheel 70 is secured. In order that the signatures may be carried out of the path of the fingers 72 as they are delivered onto the tapes 78, the tapes are driven by elliptical gears which accelerate the speed of the tapes at the proper times.

In order that the machine may be stopped or thrown out of operation automatically in case the proper number of signatures are not collected, I have provided means for throwing the machine out of operation which is controlled by the thickness of the pile or bundle of signatures carried along the collecting table. In embodying this feature of the invention in the machine I have employed a stopping mechanism similar in certain respects to the stopping mechanism shown in the patent before referred to.

The various parts of the machine are driven from a pulley 82 which is connected with and disconnected from the driving shaft 83 by a clutch-operating sleeve 84. This clutch sleeve is operated to throw the machine into and out of operation by a bar 85 operated in a direction to stop the machine by a spring 86. The bar is shifted against the tension of the spring 86 to start the machine by a lever 87 provided with a pin 88 engaging the end of a slot 89 in the bar. When the bar is shifted to start the machine it is locked in position by means of a roll 90 carried by a pivoted arm 91 and arranged to engage a notch 92 in the bar.

The mechanism for automatically operating the locking arm 91 comprises a bell-crank lever 93 (Figs. 1 and 8) loosely mounted on a stud 94 and connected with the locking arm by a link 95. The short arm of the bell-crank lever 93 is provided with a notch 96 so arranged that it may be engaged by a reciprocating operating pawl 97. The pawl is pivoted upon the end of a pawl-carrying lever 98 which is loosely mounted on the stud 94 and is provided at its lower end with a roll 99 which fits within a cam groove in a cam 100. The cam 100 is secured to the main shaft 23 and is so shaped that the pawl-carrying arm is reciprocated twice during each rotation of this shaft. During the normal operation of the machine the pawl 97 is prevented from engaging the notch 96 as the pawl reciprocates by means of a guard 101 which underlies the pawl and reciprocates with it. The guard is formed on a guard-arm 102 which is loosely mounted on the stud 94. The guard arm is provided with a radial slot 103 which is engaged by a roller on a pin 104 projecting laterally from a rock-arm 105. The roll and pin 104 extend beyond the guard-arm 102, and the roll is engaged by a bearing surface 106 formed on the rear side of the pawl-carrying arm 98. The rock-arm 105 is secured to a rock-shaft 107 and is forced yieldingly toward the right in Fig. 8, or in a direction to keep the roll on the pin 104 against the pawl-carrying arm by means of a spring 108. So long as the rock-shaft 107 is free to rock, the guard-arm and guard carried thereby will reciprocate with the pawl-carrying lever and the pawl will be prevented from engaging the notch 96. If the movement of the rock-shaft 107 under the influence of the spring 108 is arrested however, the guard-arm and guard will not advance with the pawl-carrying lever and in such case the pawl will ride off the guard and will engage with

the notch 96 and will operate the bell-crank lever 93 to operate the locking-arm 91 and thus release the clutch-shifting bar 85.

In order to arrest the movement of the shaft 107 and thus render the throw-out mechanism active in case the proper number of signatures have not been collected, I provide the mechanism shown in Figs. 10 and 11 for controlling the throw-out mechanism by the signatures advanced over the collecting table. This controlling mechanism comprises a transverse shaft 109 arranged above and parallel to the collecting table and provided with a series of depending fingers 110. The fingers are adjustably secured upon the shaft 109 and may be adjusted so that they stand a definite distance above the collecting table. In case the proper number of signatures or a pile of signatures of the proper height is advanced along the collecting table, the signatures will pass under the fingers 110. In case however the pack is for any reason thicker than normal, then the signatures will engage the fingers 110 and lift them as the signatures pass under the fingers, thus rocking the shaft 109. This rocking of the shaft throws into operation devices which arrest the movement of the shaft 107 and thus render the throw-out mechanism active. These devices consist of an arm 111 loosely mounted on the shaft 109 and provided with a lug 112 which is engaged by an arm 113 projecting laterally from a collar 114 secured to the shaft. The arm 111 is frictionally held in position on the shaft with the lug 112 in engagement with the arm 113 by a spring 115 which engages a surface 116 on the arm 111. The spring 115 is mounted upon an arm 117 which is secured to the shaft 109. The arm 111 is so arranged that it is normally out of the path of a lug 118 which projects laterally from an arm 119 carried by the rock-shaft 107. When the shaft 109 is rocked by the engagement of the signatures with the fingers 110, however, the arm 111 is brought into the path of the lug 118, thus arresting the movement of the shaft 107 and rendering the throw-out mechanism active. In order that the lug 118 may pass idly by the arm 111 in one direction, the arm 119 is pivoted to a collar 120 secured to the shaft 107 and is held yieldingly in position by a spring 121. The lug is also beveled or inclined on its rear face as indicated in Fig. 11 so that it will ride against the end of the arm 111 and pass idly by said arm on the back stroke of the shaft 107 in case the arm 111 is in the path of the lug during this movement of the shaft 107. In case it is desired to throw this controlling mechanism out of action, the arm 111 may be swung about the shaft until the rear end of the arm strikes a stop-pin 122 on the arm 117, when the front end of the arm 111 will lie below and out of the path of the lug 118. In case it is desired to stop the machine at any time by the controlling devices, the operator may swing the arm 111 into position for the end of the spring 115 to engage a notch 123 in the surface 116, when the end of the arm 111 will be latched in the path of the lug 118 and will operate to render the throw-out mechanism active.

In order that the throw-out mechanism may be rendered active in case the signatures are not properly delivered along the collecting table and are crowded against the guard-plate 56, I have also provided means for controlling the throw-out mechanism from the guard plate 56. In embodying this feature of the invention

in the machine shown I have employed the same shaft 109 which is operated by the engagement of the signatures with the fingers 110, and have provided means whereby this shaft will be rocked to render the throw-out mechanism active in case the signatures tend to crowd against the guard-plate 56. For this purpose I mount the guard-plate 56 upon arms 124 which are secured to a rock-shaft 125 and hold the plate 56 yielding against the edge of the collecting table by springs 126.

The plate 56 is provided at the delivery end with a lug 127 arranged to engage an inclined cam surface 128 formed on an arm 129 which is secured to the shaft 109. In case the signatures bunch up or crowd against the guard-plate 56, the plate yields, and the lug 127 acting against the cam surface on the arm 129, rocks the shaft 109 to render the throw-out mechanism active.

In addition to the devices for automatically rendering the throw-out mechanism active, I have also provided means for manually tripping the locking-arm or lever 91 to release the clutch-shifting bar 85. (Fig. 1.) This means consists of a tripping arm 130 pivoted to the lever 87 and provided with an adjusting screw 131 which is held in engagement with a lug 132 on the lever by a spring 133. This tripping arm 130 is arranged to cooperate with a lug 134 on the locking-arm 91. When the lever 87 is swung toward the left in Fig. 1 to shift the bar 85 into position to be locked by the roll on the locking-arm 91 the tripping arm 130 passes to the left of the lug 134. If it is desired to manually trip the locking-arm 91, the lever 87 is swung to the right to bring the tripping arm 130 to the right of the lug 134, and it is then moved toward the left. As the lever is moved toward the right, the tripping-arm 130 will yield and pass beyond the lug 134, the pin 88 moving idly in the slot 89 in the bar 85. When the lever 87 is moved toward the left, the tripping-arm 130 will act against the lug 134, lifting the locking-arm 91 so that the bar 85 is released.

In a machine of this class it is desirable that whenever the machine is stopped, whether automatically or manually, that it should be stopped with the parts in a definite fixed position. The manual operation of the stopping mechanism may however be effected at any point in the operation of the machine, and it frequently happens that it is not desirable or feasible to so time the devices for automatically rendering the throw-out mechanism active that they will operate at the time when it is desired to stop the machine. In the machine described, for instance, it is desirable that whenever the machine is stopped it should be stopped at the moment when the pistons 15 of the vacuum or suction pumps are at or near the upper ends of their strokes in order that the production of an effective suction at the pickers may be insured when the machine starts up. In order to insure the stopping of the machine at a definite point in the cycle of operations, I have provided, in connection with the throw-out mechanism, a supplemental timing device for determining the point at which the driving mechanism shall be thrown out of operation and the machine stopped.

In the construction shown the timing mechanism for controlling the throwing out of the driving mechanism comprises a latch 135 which is arranged to engage a shoulder 136 on the clutch-shifting bar 85. When

the machine is running the latch 135 is a short distance to the right of the shoulder 136 in Fig. 1, so that when the bar 85 is released, either automatically or manually, it moves to the right a short distance and is then arrested by the latch 135. The latch 135 is operated to release the bar 85 so that the machine is stopped by a cam 137 secured to a shaft 138 which is driven through gearing 139 from the main cam shaft 23 of the machine Fig. 6. The cam 137 makes one revolution for each revolution of the main cam shaft, and therefore one revolution during each complete cycle of operations performed by the machine. The cam 137 is arranged to engage one arm of a bell-crank lever 140, the other end of which is connected by a lever 141 with the latch 135. At each revolution of the cam 137, therefore, the latch 135 is raised to carry it out of the path of the shoulder 136 or to disengage it from this shoulder in case the throw-out mechanism has been manually or automatically operated. Thus the stopping of the machine is accurately timed, and takes place at a definite point in the cycle of operations without regard to the time at which the automatic or manually controlled devices have been operated to render the throw-out mechanism active.

The timing feature may be employed in connection with forms of automatic-controlling devices other than those shown and described, as, for instance, in connection with the devices for rendering the throw-out mechanism active in case the transfer devices fail to transfer a signature to the collecting devices, or in case the transfer devices deliver a signature which is too thin or too thick to the collecting mechanism.

While I prefer to embody the various features of my invention in a machine constructed and arranged in the manner shown, it will be understood that the invention is not limited to the specific construction and arrangement of parts shown and described, and that the mechanisms embodying the various features of the invention may be modified and changed without departing from the invention.

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

1. A signature gathering machine having in combination, collecting devices for advancing the signatures, yieldingly mounted supports along the under surface of which the collected signatures are carried, and means for delivering signatures onto said supports and in the path of the collecting devices, substantially as described.

2. A signature gathering machine having in combination, collecting devices for advancing the signature, strips supported for vertical movement and extending in the line of movement of the signatures under which the collected signatures are carried, and means for delivering signatures onto said strips and in the path of the signature advancing devices, substantially as described.

3. A signature gathering machine having in combination, a collecting table, a series of traveling fingers projecting through the table, a series of transfer devices for delivering signatures in front of the fingers, and yielding supporting strips on which the signatures are delivered and by which they are supported in the path of the fingers, substantially as described.

4. A signature gathering machine having in combination, a collecting table, traveling fingers projecting through the table, a series of transfer devices for delivering signatures in front of the fingers, and yielding supporting strips registering with each transfer device upon which the signatures delivered by the transfer devices are supported in the path of the traveling fingers, substantially as described.

5. A signature gathering machine having in combination, a collecting table, traveling fingers projecting through said table, a series of transfer devices for delivering signatures in front of the fingers, and strips 54 supported for vertical movement upon which the signatures are delivered by the transfer devices and by which they are supported in the path of the fingers, substantially as described.
6. A signature gathering machine having in combination, a laterally inclined collecting table, a series of traveling fingers projecting through the table, a series of transfer devices for delivering signatures in front of the fingers, and yielding supports upon which the signatures are delivered by the transfer devices and which support the signatures in the path of the fingers, substantially as described.
7. A signature gathering machine having in combination, a laterally inclined collecting table, traveling fingers projecting through the table, a series of transfer devices for delivering signatures in front of the fingers, and strips 54 supported for vertical movement upon which the signatures are delivered by the transfer devices, substantially as described.
8. A signature gathering machine having in combination, a laterally inclined collecting table, a series of traveling fingers projecting through the table, a guard plate at the lower edge of the table, a series of transfer devices for delivering signatures in front of the fingers, and supporting strips 54 provided with inclined surfaces 57 upon which strips signatures are delivered by the transfer devices and by which they are supported in the path of the fingers, substantially as described.
9. A signature gathering machine having in combination, a collecting table, a series of traveling fingers projecting through the table, a series of transfer devices for delivering signatures in front of the fingers, transverse bars 55, and strips 54 loosely hung on the bars and resting upon the table in position to receive the signatures from the transfer devices, substantially as described.
10. A signature gathering machine having in combination, a laterally inclined collecting table, devices for advancing signatures thereon, a horizontal delivery table, a longitudinally inclined support between the collecting and delivery tables the surface of which gradually changes from the plane of the delivery table, and devices for carrying the collected signatures up the support, substantially as described.
11. A signature gathering machine having in combination, a laterally inclined collecting table, a horizontal delivery table, a support leading from the collecting table to the delivery table the surface of which gradually changes from the plane of the collecting table to the plane of the delivery table, and devices for advancing the collected signatures over said support, substantially as described.
12. A signature gathering machine having in combination, a laterally inclined collecting table, a horizontal delivery table, a support leading from the collecting table to the delivery table the surface of which gradually changes from the plane of the collecting table to the plane of the delivery table, a series of traveling fingers projecting through the collecting table, a series of transfer devices for delivering signatures in front of the fingers, a carrier arranged above the support, feeding fingers pivotally mounted on the carrier, and means for maintaining the fingers in uniform relation to the surface of the support as they feed the collected signatures over said support, substantially as described.
13. A signature gathering machine having in combination, a laterally inclined collecting table, a horizontal delivery table, a support leading from the collecting table to the delivery table the surface of which gradually changes from the plane of the collecting table to the plane of the delivery table, a carrier 29 provided with fingers 27 extending through the slots in the collecting table, a carrier 63 arranged to travel above the support, fingers 72 pivotally supported upon the carrier 63, and devices for controlling the position of the fingers, substantially as described.
14. A signature gathering machine having in combination, a laterally inclined collecting table, a horizontal delivery table, a support leading from the collecting table to the delivery table the surface of which gradually changes from the plane of the collecting table to the plane of the delivery table, a chain 63 arranged above the support, wheels 64 over which the chain passes arranged above opposite ends of the support, feeding fingers 72 connected with the carrier 63, and feeding fingers 27 mounted to travel along the collecting table and to deliver the collected signatures to the fingers 72, substantially as described.
15. A signature gathering machine having in combination, a laterally inclined collecting table, a horizontal delivery table, a support leading from the collecting table to the delivery table the surface of which gradually changes from the plane of the collecting table to the plane of the delivery table, a carrier chain 63 mounted to travel above the support, fingers 72 pivotally mounted upon the carrier, a wheel 64 over which the chain passes, controlling plates 76 carried by said wheel, and controlling guides 62 arranged over the support, substantially as described.
16. A signature gathering machine having in combination, a mechanism for throwing the machine out of operation and means for controlling the same from the collected signatures, substantially as described.
17. A signature gathering machine having in combination, a mechanism for throwing the machine out of operation and means for rendering the same active when the thickness of the collected pile of signatures exceeds a predetermined amount, substantially as described.
18. A signature gathering machine having in combination, a mechanism for throwing the machine out of operation and devices operated by the pile of collected signatures for rendering the throw out mechanism active, substantially as described.
19. A signature gathering machine having in combination, a mechanism for throwing the machine out of operation, a reciprocating part the arrest of which renders the throw out mechanism active, and a device operated by the collected signatures for arresting said part, substantially as described.
20. A signature gathering machine having in combination, a mechanism for throwing the machine out of operation, a collecting mechanism, one or more controlling fingers under which the collected signatures are carried, and devices for controlling the throw out mechanism from said fingers, substantially as described.
21. A signature gathering machine having in combination, a mechanism for throwing the machine out of operation, a signature collecting mechanism, controlling fingers under which the collected signatures are carried, a reciprocating part the arrest of which renders the throw out mechanism active, and a device connected to the controlling fingers for arresting the movement of said part, substantially as described.
22. A signature gathering machine having in combination, a mechanism for throwing the machine out of operation, a signature collecting mechanism, a reciprocating part the arrest of which renders the throw out mechanism active, a controlling finger under which the collected signatures are carried, an arm connected with the controlling finger and arranged to be moved by the movement of said finger into the path of the reciprocating part, substantially as described.
23. A signature gathering machine having in combination, a mechanism for throwing the machine out of operation, a collecting table along which the collected signatures are advanced, a transverse shaft 109 arranged over the collecting table, one or more fingers 110 adjustably secured to said shaft, and arranged to overlie the signatures fed along the table and devices operated by the shaft for rendering the throw out mechanism active, substantially as described.
24. A signature gathering machine having in combination, a mechanism for throwing the machine out of operation, a collecting table along which the collected signatures are advanced, a transverse shaft 109 arranged over the collecting table, one or more fingers 110 secured to said shaft, an arm 111 mounted on said shaft and adapted to be engaged by an arm secured to said shaft, means for yieldingly holding the arm 111 in position on the shaft,

a reciprocating part the arrest of which renders the throw out mechanism active into the path of which the arm 111 is moved by the rocking of the shaft 109, substantially as described.

- 5 25. A signature gathering machine having in combination mechanism for throwing the machine out of operation, a collecting mechanism, and means for controlling the throw-out mechanism from the pile of signatures advanced by the collecting mechanism, substantially as described.
- 10 26. A signature gathering machine having in combination mechanism for throwing the machine out of operation, a plate against which the edges of the signatures are delivered, and means for rendering the throw-out mechanism active upon a movement of the plate by the signatures, substantially as described.
- 15 27. A signature gathering machine having in combination mechanism for throwing the machine out of operation, a gathering table, signature-delivering devices, means for advancing the signatures along the table, a guard plate at one edge of the table, and devices for rendering the throw-out mechanism active upon a movement of the guard plate by the signatures, substantially as described.
- 20 28. A signature gathering machine having in combination, a mechanism for throwing the machine out of operation, means controlled by the signatures for automatically rendering the throw-out mechanism active, and an additional device for determining the time when the machine is thrown out of operation, substantially as described.
- 30 29. A signature gathering machine having in combination, a driving mechanism, a mechanism for throwing the machine out of operation, means controlled by the signatures for automatically rendering the throw out mechanism active, and a timing latch for determining the time when the driving mechanism is thrown out of operation, substantially as described.
- 35 30. A signature gathering machine having in combination, a driving mechanism, a mechanism for throwing the machine out of operation, means controlled by the signatures for automatically rendering the throw out mechanism active, a timing latch for preventing the action of the throw-out mechanism, and a timing cam for operating the latch, substantially as described.
- 40 31. A signature gathering machine having in combination, a driving mechanism, a mechanism for throwing the machine out of operation, means controlled by the signatures for automatically rendering the throw out mechanism active, means for manually rendering the throw out mechanism active, and a timing mechanism for determining the time when the driving mechanism is thrown out of operation, substantially as described.
- 45 32. A signature gathering machine having in combination, a driving mechanism, a mechanism for throwing the machine out of operation including a shifting bar, a lever for operating said bar to throw the driving mechanism into operation, a locking arm for retaining said bar in position, means controlled by the signatures for automatically operating the locking arm, and a trip arm mounted on the lever for manually operating the locking arm, substantially as described.
- 50 55 60

In witness whereof, I have hereunto set my hand, this ninth day of May 1906.

WILLARD I. LEWIS.

In the presence of—

WILLIAM H. CLARKE,
FRANK O. PILSBURY.