

No. 702,591.

Patented June 17, 1902.

F. A. ROBINSON.
POWDER FILLING AND FOLDING MACHINE.

(Application filed Apr. 1, 1901.)

(No Model.)

4 Sheets—Sheet 1.

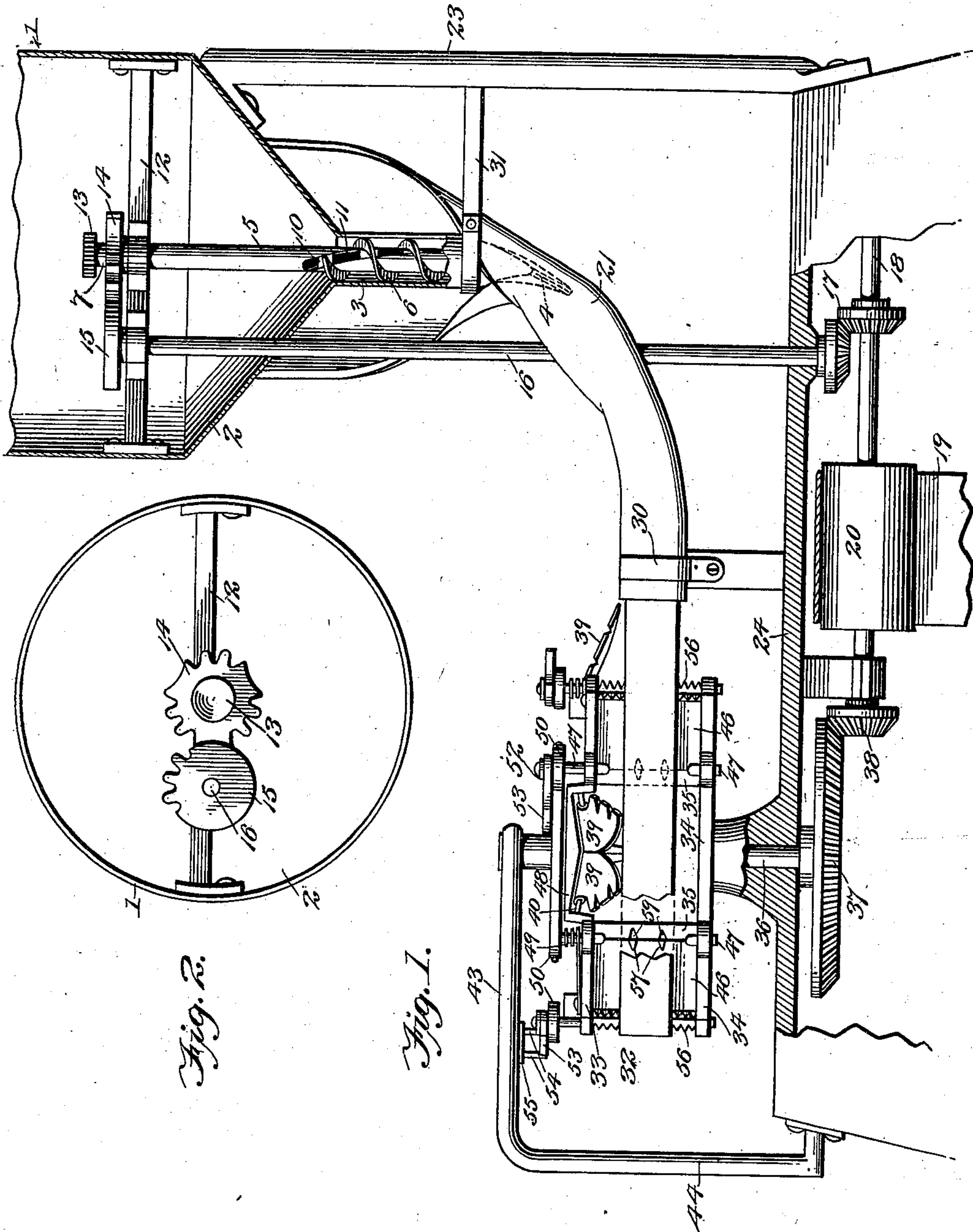


Fig. 2.

Fig. 1.

Witnesses
Am. North
B. Brink

Inventor
Frank Alexander Robinson

By *Victor J. Evans*
Attorney

No. 702,591.

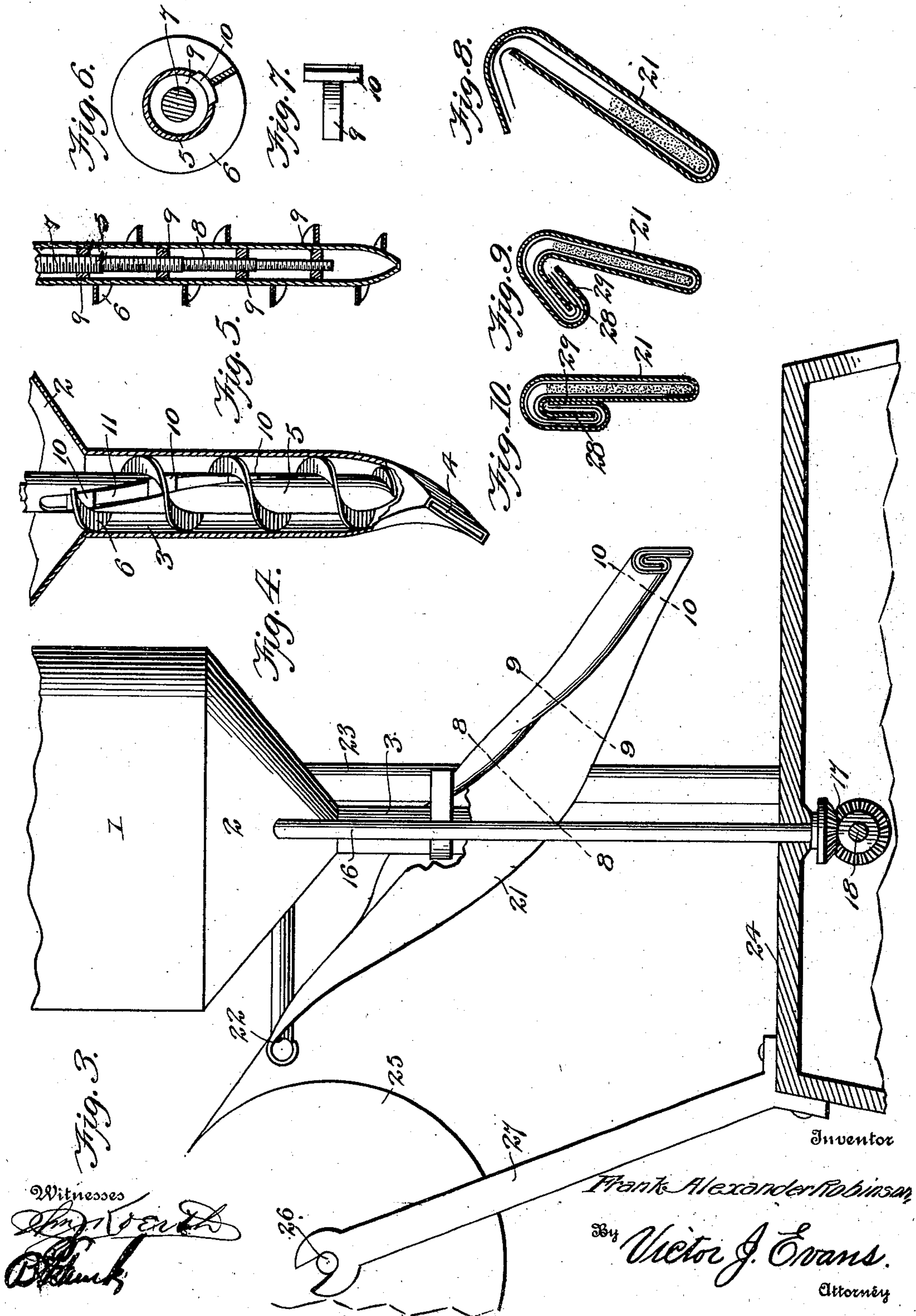
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Fig. 11.

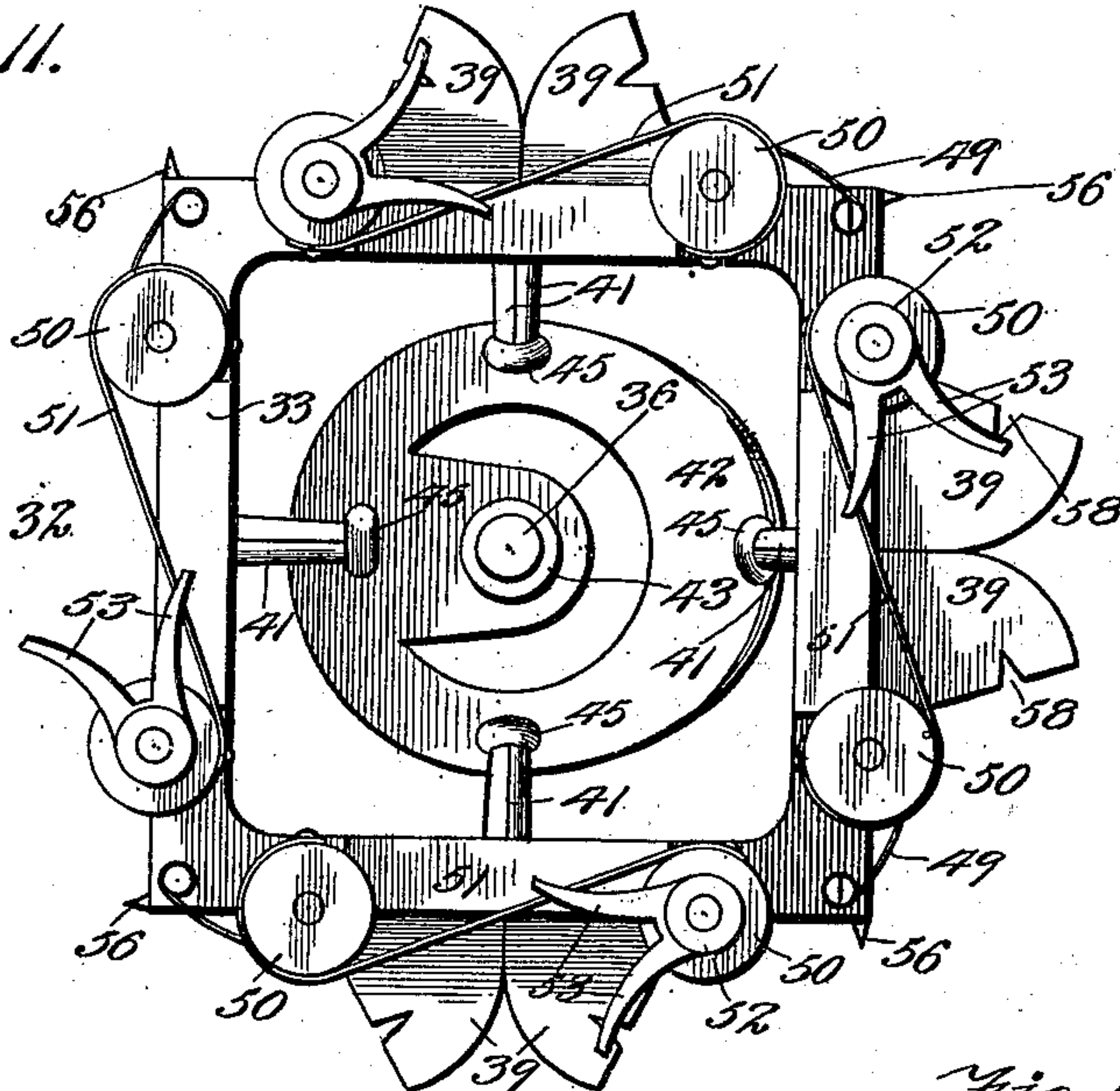


Fig. 13.

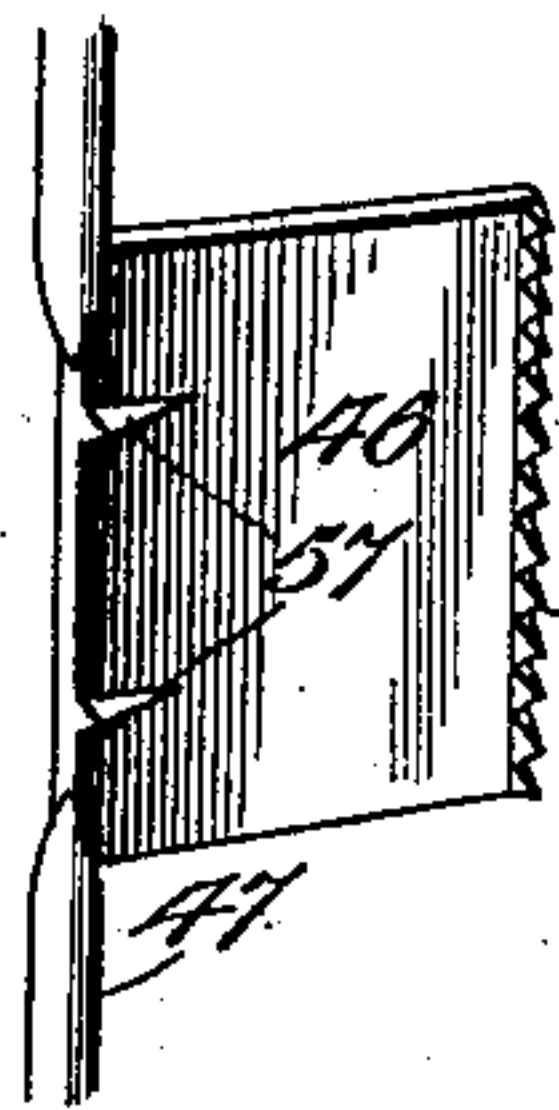


Fig. 14.

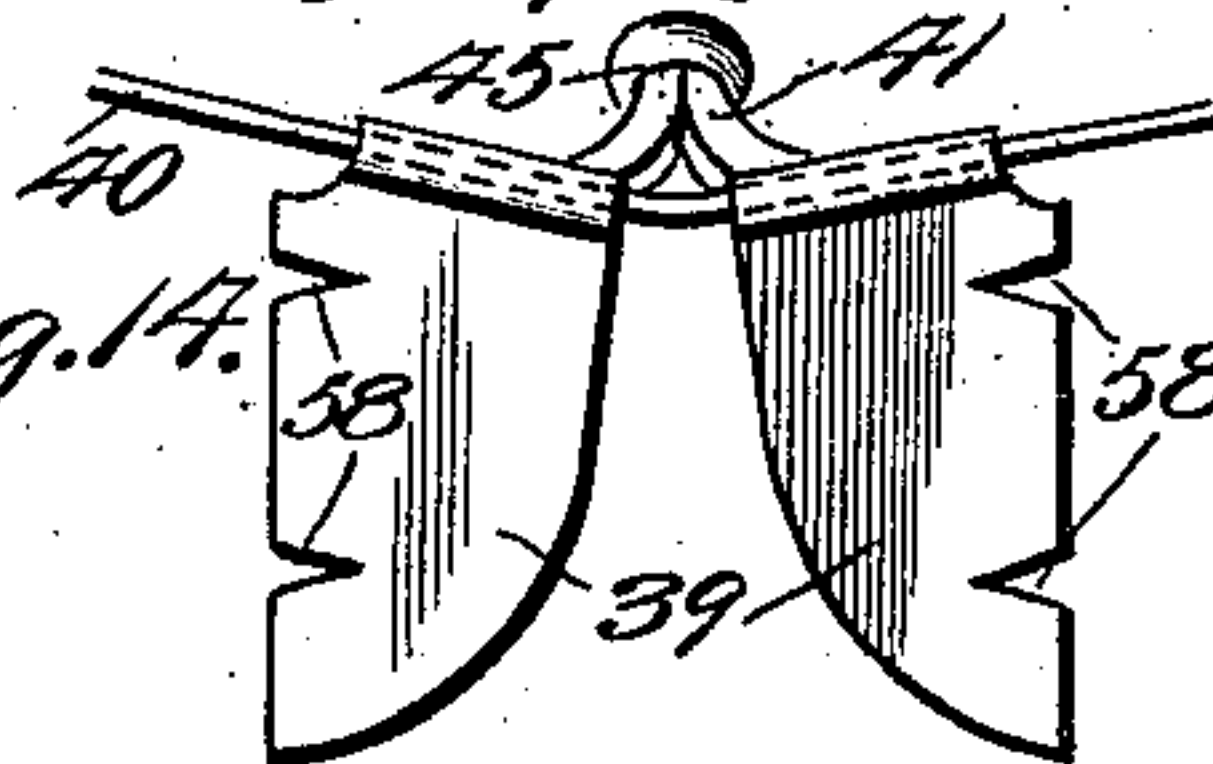


Fig. 15.

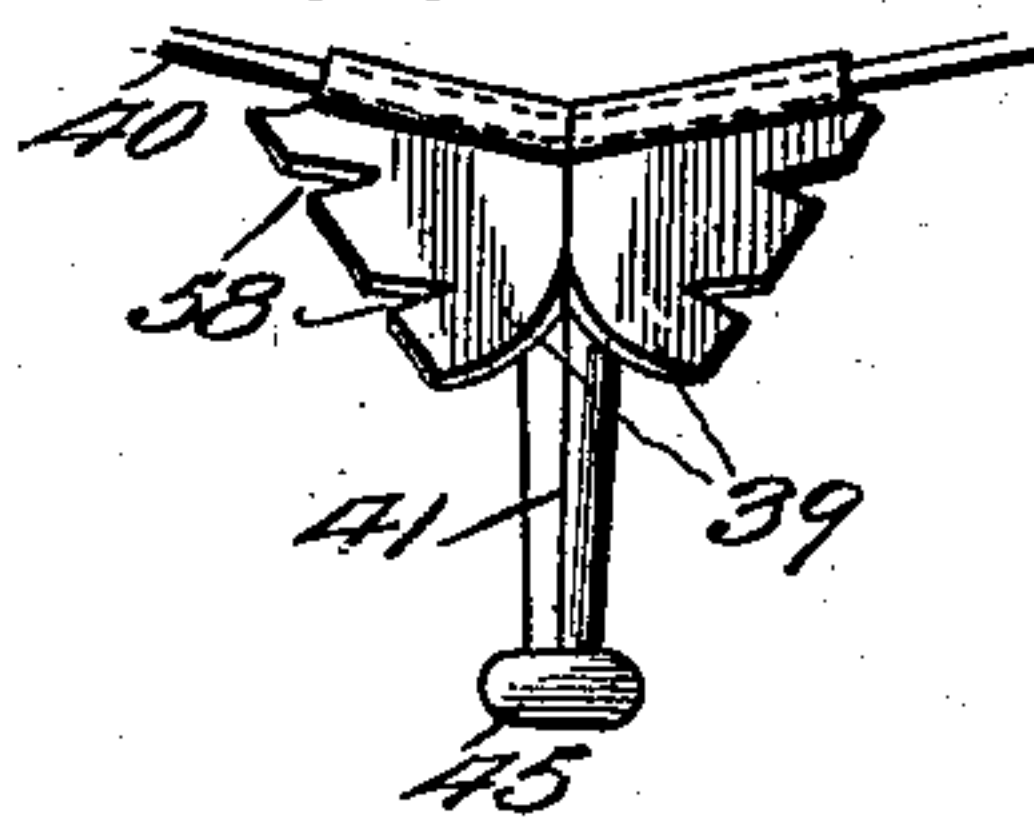
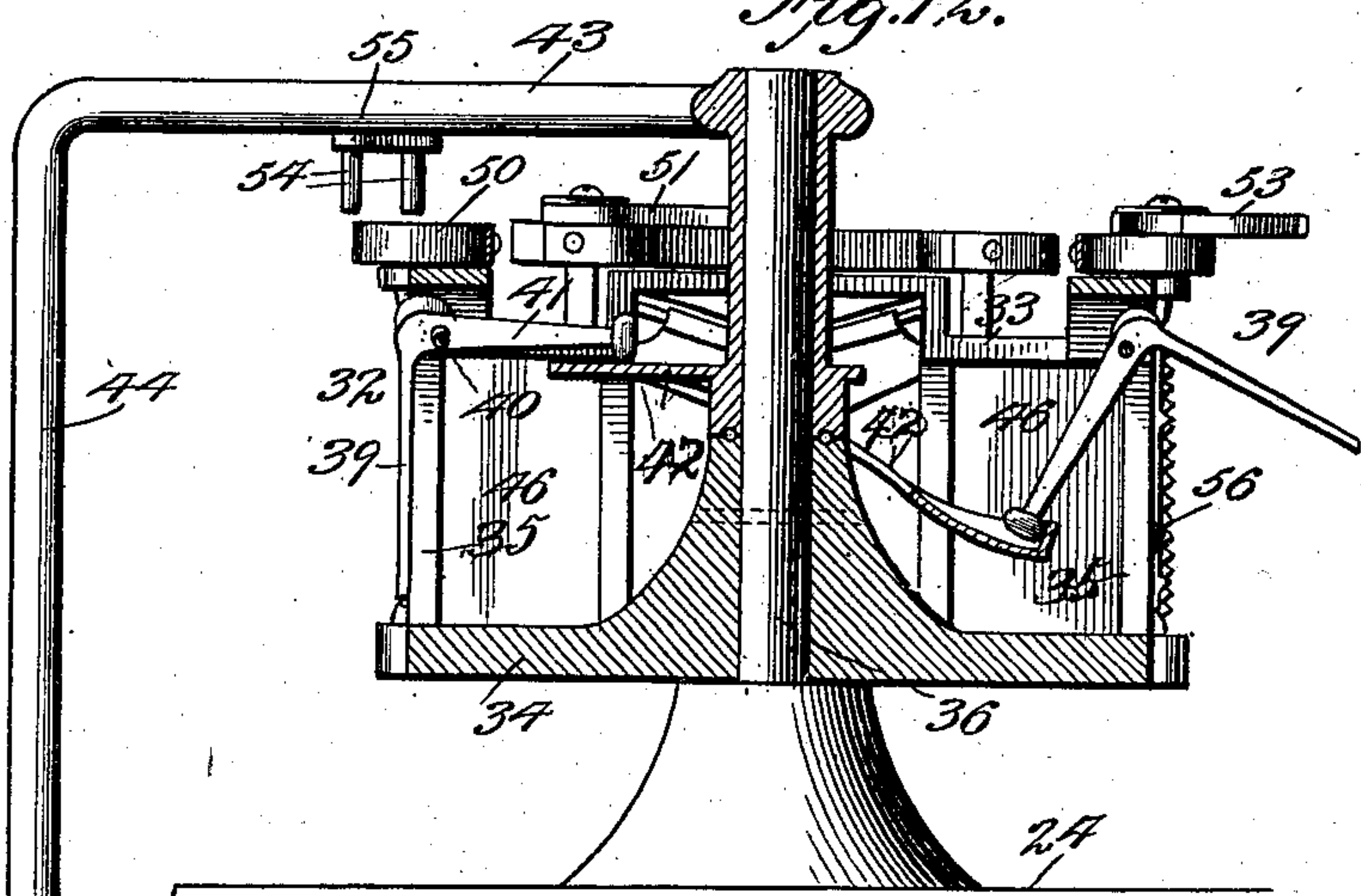


Fig. 12.



Witnesses

James North
Chas. H. Smith

Inventor

Frank Alexander Robinson

By

Victor J. Evans

Attorney

No. 702,591.

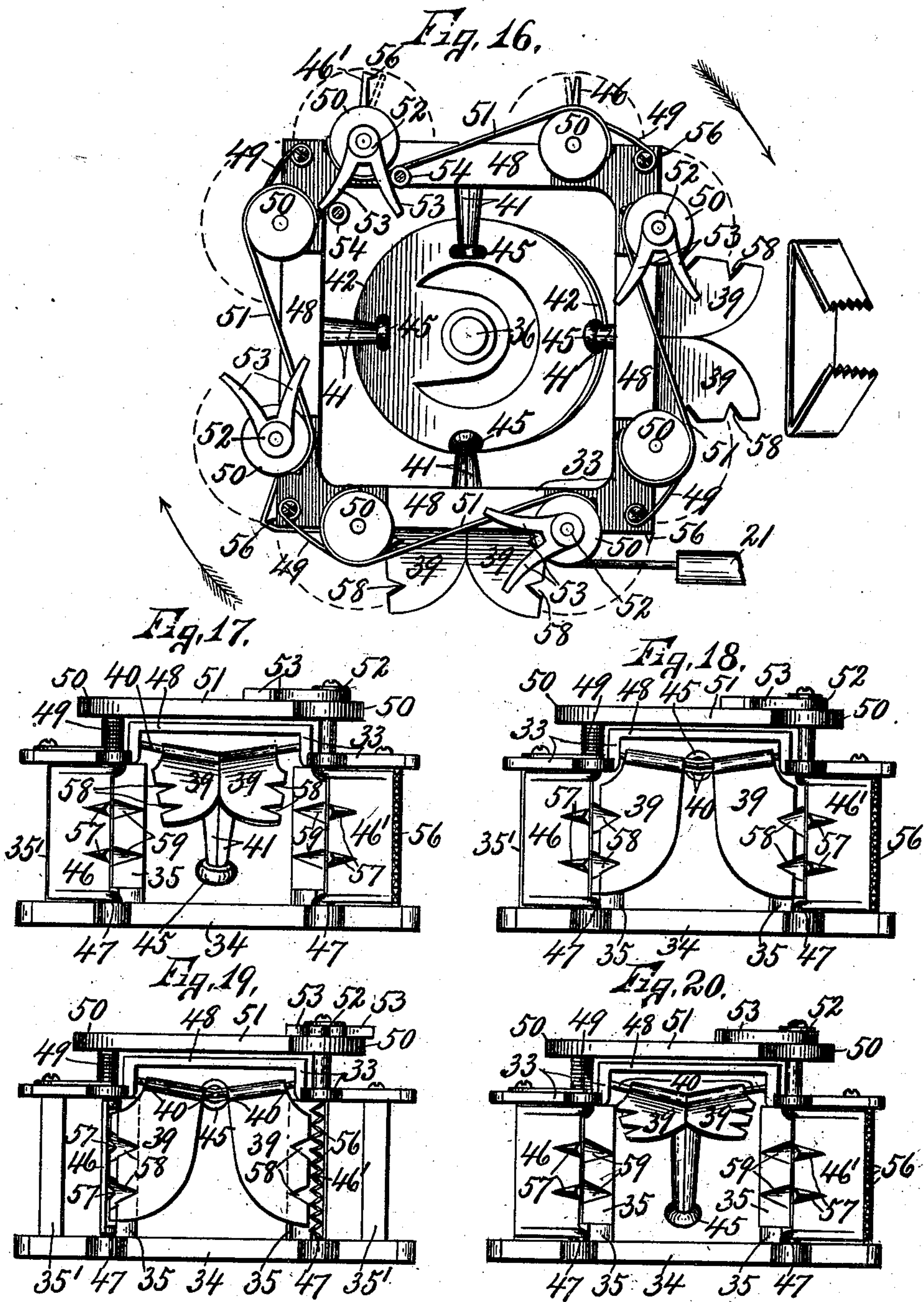
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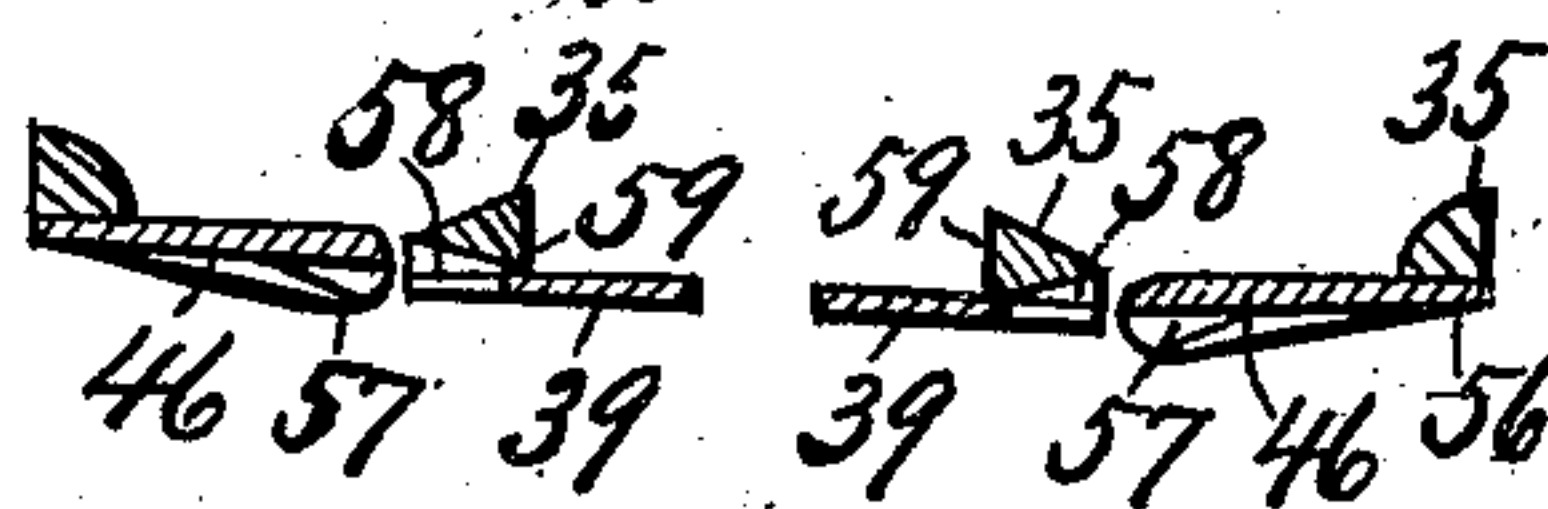
4 Sheets—Sheet 4.



WITNESSES:

W. Arthur,
W. C. Chase.

Fig. 21.



INVENTOR

Frank A. Robinson

BY

Smith & Davidson

ATTORNEYS.

UNITED STATES PATENT OFFICE.

FRANK ALEXANDER ROBINSON, OF AUBURN, NEW YORK, ASSIGNOR,
BY DIRECT AND MESNE ASSIGNMENTS, TO MORRIS LARY, OF NEW
YORK, N. Y.

POWDER FILLING AND FOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 702,591, dated June 17, 1902.

Application filed April 1, 1901. Serial No. 53,993. (No model.)

To all whom it may concern:

Be it known that I, FRANK ALEXANDER ROBINSON, a citizen of the United States, residing at and whose post-office address is No. 5 Orchard street, Auburn, in the county of Cayuga and State of New York, have invented new and useful Improvements in Powder Filling and Folding Machines, of which the following is a specification.

10 The object of this invention is to produce a wrapping-machine especially designed for applying wrappers to powders used for medicinal or other purposes, the powder being delivered by suitable feeding mechanism to
15 a strip of paper which is acted upon by folding mechanism operating to fold the paper around the powder and subsequently sever the wrapper into predetermined lengths and
20 fold inward the ends of the wrapper in a manner similar to the method now employed by pharmacists. In connection with the machine I also employ means for regulating the feed of powder from the hopper to the wrapper, whereby a predetermined amount of
25 powder may be fed to the wrapper as it is folded by the folding mechanism, the feeding mechanism being intermittently actuated, whereby the feeding of the powder is intermittently cut off as the wrapping-paper continues its passage through the machine.

30 A further object of the invention is to provide means operating automatically to crease the end folds of the wrapper for the purpose of preventing the accidental opening of the
35 end folds and the escape of powder therefrom.

With the above and other objects in view the invention consists in a wrapping-machine embodying certain novel features and details of construction and arrangement of
40 parts, as hereinafter fully described, illustrated, and claimed.

In the accompanying drawings, Figure 1 is a sectional elevation of a wrapping-machine constructed in accordance with the present
45 invention. Fig. 2 is a plan view of the supply-hopper. Fig. 3 is a transverse section through the machine. Fig. 4 is an enlarged detail longitudinal section through the discharge-nozzle of the hopper, showing the ex-
50 pansible spiral feeder. Fig. 5 is a detail lon-

gitudinal section through the tubular shaft of the spiral feeder. Fig. 6 is a cross-section through the same. Fig. 7 is a detail view of one of the nuts forming part of the expanding mechanism. Fig. 8 is a detail cross-section through the former, taken on the line 8 8 of Fig. 3. Fig. 9 is a similar view taken on line 9 9 of Figs. 3. Fig. 10 is a similar view taken on line 10 10 of Fig. 3. Fig. 11 is a plan view of the reel and its mechanism. 60 Fig. 12 is a central vertical section through the same. Fig. 13 is a detail perspective view of one of the end-folders, constituting also the breaker or wrapper-severing device. Fig. 14 is a detail view of one of the expansible gripping devices. Fig. 15 is a plan view of the same. Fig. 16 is a top plan view of the detached revolving folding table or reel, showing particularly the grippers and folders in their respective positions when one set of the grippers are about to engage the powder-wrapper, the cam for operating the grippers being shown in full and the studs or pins for actuating the folders to cut and fold the wrapper or powder-package, one set of the folders 75 being shown in their position assumed just after cutting or severing a section of the wrapper, said folders being in the act of folding the opposite ends of the detached powder-containing section upon itself. Figs. 17, 18, 80 19, and 20 are face views of the four sides of the revoluble folding table or reel, showing the successive positions of the grippers and folders as the revolving table advances from the position for receiving the wrapper to the position for discharging the completed powder-containing package. Fig. 21 is a detailed sectional view showing a pair of grippers and the adjacent pair of folders in their positions just before severing the powder-containing section of the wrapper or just after the grippers have operated to draw the wrapper from the folding-tube.

Similar numerals of reference designate corresponding parts in all figures of the drawings. 95

While the present invention is susceptible of considerable modification in the details of construction and means for accomplishing the desired results, the preferred embodiment 100

of the invention is illustrated in the accompanying drawings, in which—

1 designates a supply-hopper adapted to receive any desired quantity of powder or other material to be wrapped in packages. The said hopper is provided with a conical bottom 2, terminating in a cylindrical discharge-nozzle 3, the lower discharge end of which is flattened, as shown at 4, to provide a long and narrow discharge-orifice, the length of which is approximately equal to or slightly less than the width of the folded package.

Mounted rotatably within the nozzle 3 is an expansible spiral feeder, which comprises, essentially, a tubular shaft 5, encircled by a spiral web 6, which is mounted so as to rotate with the shaft 5, but left free, so that it may be extended or stretched outward lengthwise by the means to be described. Within the tubular shaft 5 is an expander comprising a stem 7, provided with stepped portions 8 of different sizes and provided with threads of different pitch or threads of different numbers to the inch. On each of the stepped portions 8 of the stem 7 is mounted a nut 9, adapted to slide lengthwise within the tubular shaft 5, and the said nuts are provided with radial extensions 10, which project through and work within a spiral slot 11 in the shaft 5, where they connect with the inner edge of the spiral web 6 at intervals. One end of the spiral web 6 may be connected directly to the tubular shaft 5. The shaft 5 is journaled in suitable bearings, one of such bearings being preferably in the form of a cross-bar 12 within the hopper, and in order to expand or stretch the spiral web the stem 7 is projected above the upper end of the shaft 5, where it is provided with a milled head 13, adapted to be turned by hand. When said head 13 is turned in one direction or the other, the nuts 9 are moved toward or away from each other, thereby moving the different turns of the spiral web nearer to or farther from each other and diminishing or increasing the distance between the turns, so that they will accommodate a larger or smaller quantity of powder.

Intermittent motion is imparted to the spiral feeder by means of an intermittent gear-wheel 14, fast upon the tubular shaft 5 and which is periodically engaged by a mutilated gear-wheel 15, mounted on a counter-shaft 16, geared, as shown at 17, to the main driving-shaft 18 of the machine, to which motion may be imparted by means of a motor-actuated belt 19, engaging a pulley 20 on the driving-shaft, as illustrated in Fig. 1.

Arranged beneath the hopper 1 is a former or chute 21, which is preferably formed of sheet metal bent for a portion of its length in the form of a flat tube, the longitudinal edges of which are overlapped and recurved in involute form, as illustrated in Figs. 8, 9, and 10, the upper portion of the former being left open and the initial edge thereof being rolled over into half-circular form and

connected to and supported upon a bracket-arm 22, extending laterally from a support or post 23, extending upward from the bed or base-plate 24 of the machine. Arranged adjacent to the upper portion of the former is a reel of paper 25, mounted upon a shaft 26, detachably mounted in bearings in a supporting frame or bracket 27 of any suitable construction, the reel of paper being so arranged that the paper drawn therefrom passes over the initial end of the former, downward into and through the former, where the internally-arranged flanges 28 and 29 operate to overlap the edges of the paper strip and then bend or fold inward one side of the paper strip, the strip emerging from the discharge end of the former or paper-race in the shape of a folded paper tube corresponding with the shape of the ordinary wrappers such as are ordinarily folded by hand by druggists in dispensing medicinal powders.

The discharge end of the nozzle projects a short distance into the tubular portion of the former 21 to a point where the strip of paper has been partially folded into tubular shape, and by the intermittent operation of the force-feed device hereinbefore described a predetermined amount of powder or other material from the hopper is deposited in the partially-folded paper tube, which continues its passage through the former, being continuously drawn and fed forward by a mechanism to be hereinafter described. The discharge end of the former is upheld by a suitable support 30, and the nozzle 3 of the hopper is also preferably supported by a bracket-arm 31 on the post 23 or in any other convenient manner. It may be stated at this point that I do not limit myself to any particular construction of frame or device for supporting the various elements of this machine, as such details may be readily changed or varied at the will of the manufacturer according to the size of the machine and other conditions.

Having thus described the mechanism for folding the strip of paper into a tubular wrapper and delivering the powder or other material by an intermittently-operated force-feed device from the hopper to the interior of the folded paper tube, I will now proceed with a description of the devices for drawing or feeding the paper tube forward, severing the tube or wrapper into predetermined lengths, gripping the wrapper, folding the ends of the wrapper, and crimping such folded ends, and finally releasing or discharging the folded packages. In carrying out this part of the invention I employ a reel 32, which is mounted for rotation on a vertical axis. The said reel by preference comprises upper and lower heads or frame-plates 33 and 34, respectively, which are rigidly connected by posts or cross-bars 35 and 35'. The frame of the reel is mounted fast upon a reel-shaft 36, journaled in suitable bearings in the base-plate or bed 24 and having fast thereon a gear-wheel 37, which meshes with an-

other gear-wheel 38 on the main driving-shaft 18. Any suitable form of gearing may be employed for imparting motion from the driving-shaft to the reel-shaft and for giving to said reel-shaft a continuous rotary motion. The reel is substantially square in plan or provided with four sides of equal length and height, the length of each side being substantially equal to the length of the paper tube or wrapper before the ends thereof are folded. The reel is arranged with one of its side faces substantially in the plane of the discharge end of the wrapper-former or paper-race 21, so that the portion of the paper tube or wrapper having the powder folded therein is automatically impinged between said face of the reel and suitable grippers carried thereby in the manner illustrated in Fig. 1.

In order to securely clamp the wrapper containing the powder against the side of the reel, I provide at each side of the reel an expansible gripping device, each gripping device consisting of a pair of grippers 39, mounted upon inclined journals 40, carried by the reel-frame, the said grippers being provided with inwardly-extending arms 41, which operate in contact with a stationary cam 42, connected rigidly with the stationary bracket-arm 43 of a support or post 44, connected for convenience to the base-plate or bed-piece 24, as illustrated in Figs. 1 and 12. The arms 41 of the grippers 40 are substantially at right angles to the bodies of the grippers, and as the reel rotates the arms 41 travel against the cam 42 and are alternately lifted and lowered, thus rocking the grippers 40 inward or outward, as illustrated in Figs. 12, 16, and 17 to 21, inclusive, the said gripper when rocked inward serving to clamp the powder-wrapper and contents against oppositely-lying posts 35 of the reel. In addition to the rocking movement of the grippers they also have a sliding movement toward and away from each other upon the reversely-inclined journals 40, the arrangement being such that when the grippers are rocked inward to clamp the wrapper they simultaneously slide endwise upon their inclined bearings away from each other and their outer opposite edges are located at a much greater distance apart than when the said grippers are rocked outward, this movement serving to flatten the package with a sliding pressure and when reversely moved enabling the grippers to release the wrappers after the ends thereof have been folded over the grippers, as presently described.

Antfriction-rollers 45 are mounted on the inner ends of the arms 41, the said rollers being intended to travel against the stationary cam and serve to actuate the grippers simultaneously and to permit their independent sliding movement upon their respective bearings.

The means for folding the ends of the powder-packages consists of a pair of plates 46 46' for each set of grippers, hinged at 47 within

the frame of the reel adjacent to the outer edges of the grippers 39. The hinge-pin or journals at the upper ends of each pair of folders 46 46' are extended above the reel-frame and connected by a yoke 48. The folders of each pair are held, by means of a spring 49, flatwise against the side of the reel-frame, or rather against the outer upright posts 35', so as to enable the wrapper to be laid flatwise across the outer faces of the upright bars and folders preparatory to the action of the grippers. In order that both of each pair of folders may be operated simultaneously, the journals 47 thereof are provided with disks or rollers 50, which are connected by a flexible band 51, having its opposite ends secured in any convenient manner to the disks and wound in reverse directions thereon. One of the end-folders, as 46, of each pair also has an operating-head 52 fast upon its journal, the said head being shown for convenience as comprising fork-arms 53, which as the reel rotates are acted upon by one or more pins or studs 54, connected to a plate 55 on the bracket-arm 43, hereinabove referred to. The pins 54 are arranged in the path of the arms 53 and as the reel rotates operate to turn the head 52 and swing the end-folders connected therewith inward, so as to sever and fold the ends of the wrappers around the adjacent edges of the grippers and against the outer sides thereof. By means of the connection 51 the opposite end-folder, 46', is simultaneously swung, so as to fold the opposite ends of the wrapper outwardly toward each other. One of the end-folders, 46', is provided along its free edge with outward and angularly-extended teeth 56, which serve to break or sever the paper tube or wrapper into the requisite length, the said teeth being located immediately at the corner of the reel-frame.

In order to crimp the end folds of the wrapper, the folders 46 and 46' are provided adjacent to their hinged edges with sharp-edged crimping projections 57, which as the folders are swung toward each other pass through correspondingly-shaped notches 58 in the outer edges of the grippers and are received in correspondingly-shaped sockets or notches 59 in the adjacent posts 35 of the reel. In this way crimps are formed in the folded ends of each wrapper, which crimps extend in a direction lengthwise of the wrapper and materially strengthen the end folds for preventing the same from accidental opening and permitting the escape of powder as the wrapped powders are released in the outward-swinging movement of the grippers and dropped into a suitable receptacle placed beneath.

From the foregoing description the operation of the machine will be readily understood. The strip of paper coming from the reel 25 passes through the tubular former or paper-race 21, being drawn or fed forward by the grippers on the reel and folded into the form of a paper tube by means of the in-

ternal flanges within the former. Simultaneously the force powder-feed device is intermittently operated, so as to deliver a predetermined quantity of powder to the interior of the folded paper tube, the powder being laid within the tube for a distance approximately equal to the distance between the end folds of the completed wrapper. The paper tube or wrapper containing the powder passes from the discharge end of the former to the reel, against which it is clamped by the gripping device. As the portion of the wrapper thus gripped advances in the direction indicated by the arrows *y* the inside arm 53 of the folder 46' engages the inner face of the first stud 54, which rocks the toothed folder 46' outwardly, thereby severing the wrapper at this point. The other arm 53 then engages the other stud 54, and thereby continues to rock the folders outwardly toward each other, thus folding the ends of the severed piece of wrapper or powder-containing package around the adjacent edges of the grippers. As the reel continues its rotation the arm 53 leaves the last stud 54 and the spring 49 retracts said folders to their normal positions. It is thus evident that means are provided for simultaneously severing the wrapper at the corner of the reel and making each wrapper of a length corresponding with the length of each side of the reel.

Just after the return of the folders to the normal positions the grippers are automatically forced outwardly, preferably by the gravity of their inner roller-carrying ends or arms or by the cam 42, the grippers of each pair at the same time moving or sliding endwise toward each other upon their inclined bearings, which latter movement serves to release the powder-package and permits the same to fall therefrom. The cam is so arranged that as the reel-frame continues its rotation the grippers are elevated to their limit as they approach the outfeeding wrapper, and the operation just described is then repeated.

The severing operation does not take place until after the grippers at the succeeding side of the reel have been thrown into action for gripping a new portion of the paper tube or wrapper. As the end-folders are swung inward they fold the ends of the wrapper around the edges of the grippers and at the same time indent or crimp the folded ends of the wrapper for the purpose above described.

In the further movement of the reel the arms of the grippers are released, the grippers swing outward, and the package is thereby released and dropped into a suitable receptacle.

I do not desire to be limited to the details of construction illustrated and described, but reserve the right to change, modify, and vary the construction within the scope of the appended claims.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a wrapping-machine, the combination with wrapper-folding mechanism, of a hopper, and mechanism for feeding material from the hopper to the wrapper comprising an expansible spiral feeder and means within the feeder for expanding the helices of the spiral. 70

2. In a wrapping-machine, the combination with wrapper-folding mechanism, of a supply-hopper for the material to be wrapped, a spiral feeder for conveying the material from the hopper to the wrapper, and a single operating member having means actuated thereby for expanding the spiral feeder. 75 80

3. In a wrapping-machine, the combination with wrapper-folding mechanism, of a supply-hopper for the material to be wrapped, a feeder for the material comprising a spiral web, and rotary means engaged with the helices of the spiral web for expanding the same. 85

4. In a wrapping-machine, the combination with wrapper-folding mechanism, of a supply-hopper for the material to be wrapped, a discharge-nozzle therefor, an expansible spiral feeder for the material operable within the nozzle means for expanding and contracting the helices of the spiral, and a single member to operate said means. 90 95

5. In a wrapping-machine, the combination with wrapper-folding mechanism, of a supply-hopper, and an expansible feeder comprising a tubular shaft, a spiral web, and a threaded stem operatively connected to portions of the spiral web. 100

6. In a wrapping-machine, the combination with wrapper-folding mechanism, of a supply-hopper, and an expansible feeder comprising a tubular shaft, a spiral web, a threaded stem, and a plurality of nuts attached to the spiral web at intervals and operatively associated with the threaded stem. 105

7. In a wrapping-machine, the combination with wrapper-folding mechanism, of a supply-hopper and an expansible feeder comprising a tubular shaft, a spiral web, and threaded stem having threads of different pitch and a plurality of nuts attached to the spiral webs at intervals and operatively associated with the threaded stem. 110 115

8. In a wrapping-machine, the combination with wrapper-folding mechanism, of a supply-hopper and an expansible feeder comprising tubular shaft provided with a spiral slot; a threaded stem, and a plurality of nuts attached to the spiral web at intervals and operatively associated with the threaded stem and working in the spiral slot. 120

9. In a wrapping-machine, the combination with wrapper-folding mechanism and means for feeding material to the wrapper, of a reel and independently-movable means carried by the reel for severing and folding the wrappers. 125 130

10. In a wrapping-machine, the combination with wrapper-folding mechanism, and means for feeding material to the wrapper, of a reel having wrapper-grippers, a wrapper-

severing and end-folding devices carried by the reel, and means for intermittently actuating the gripping, severing, and folding devices.

5 11. In a wrapping-machine, the combination with wrapper-folding mechanism, and means for feeding material to the wrapper, of a reel having wrapper gripping, severing and end-folding devices carried by the reel, 10 a stationary cam for operating the gripping devices and independent means for operating the severing and end-folding devices.

12. In a wrapping-machine, the combination with wrapper-folding mechanism, and 15 means for feeding material to the wrapper, of a reel having oscillatory wrapper-grippers carried by the reel, pivotally-mounted end-folding devices on the reel, an operative connection between said end-folding devices and 20 means for imparting movement to one of the end-folding devices.

13. In a wrapping-machine, the combination with wrapper-folding mechanism, and means for feeding material to the wrapper, of 25 a reel having oscillatory wrapper-grippers

carried by the reel, pivotally-mounted end-folding devices also on the reel, an operative connection between said end-folding devices whereby one actuates the other, means for actuating one of said devices and a release- 30 spring connected with the other end-folding device.

14. In a wrapping-machine, the combination with wrapper-folding mechanism, and means for feeding material to the wrapper, of 35 a reel having wrapper-gripping and end-folding devices, and means for crimping the end folds of the wrapper.

15. In a wrapping-machine, the combination with wrapper-folding mechanism, and 40 means for feeding material to the wrapper, of a reel having wrapper-gripping and end-folding devices having means for forming crimps across the end folds of the wrapper.

In testimony whereof I affix my signature 45 in presence of two witnesses.

FRANK ALEXANDER ROBINSON.

Witnesses:

GEO. E. FRECH,
B. F. FUNK.