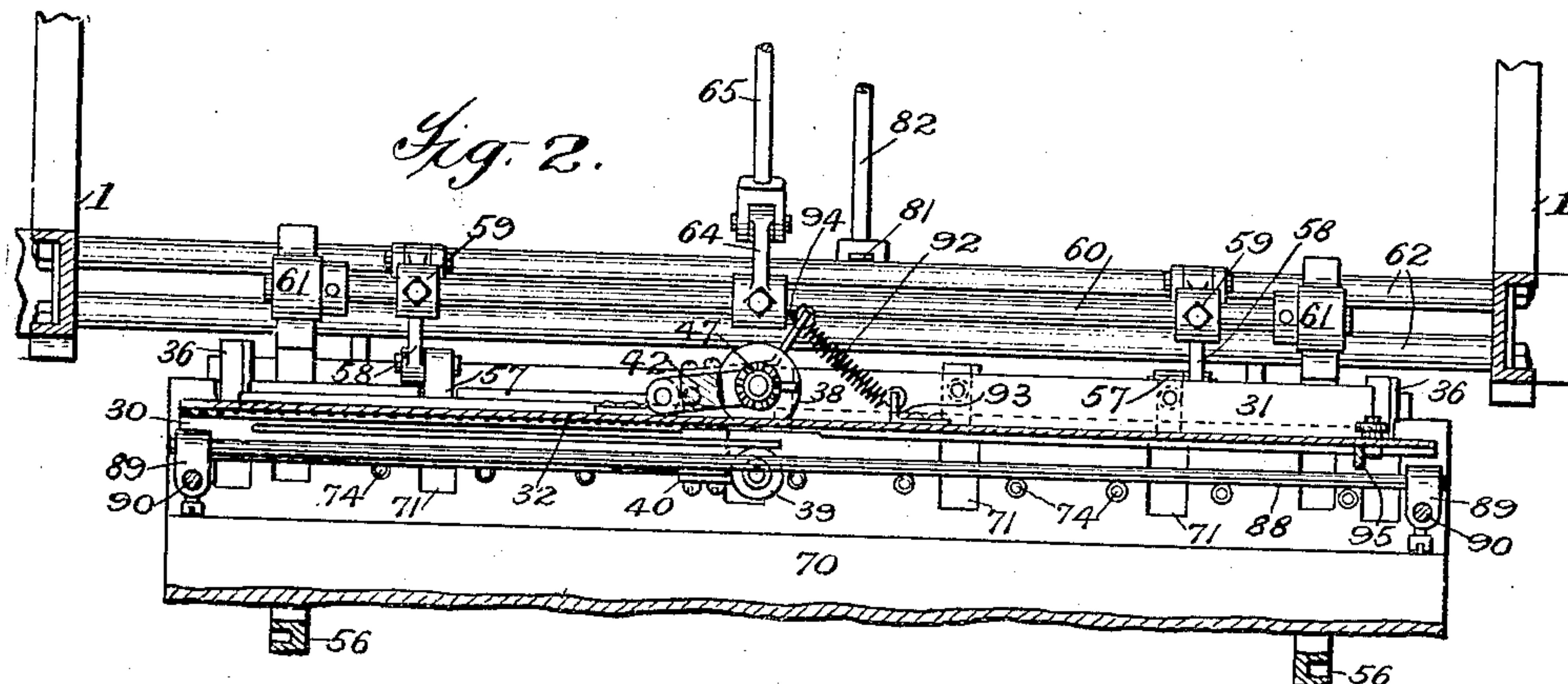
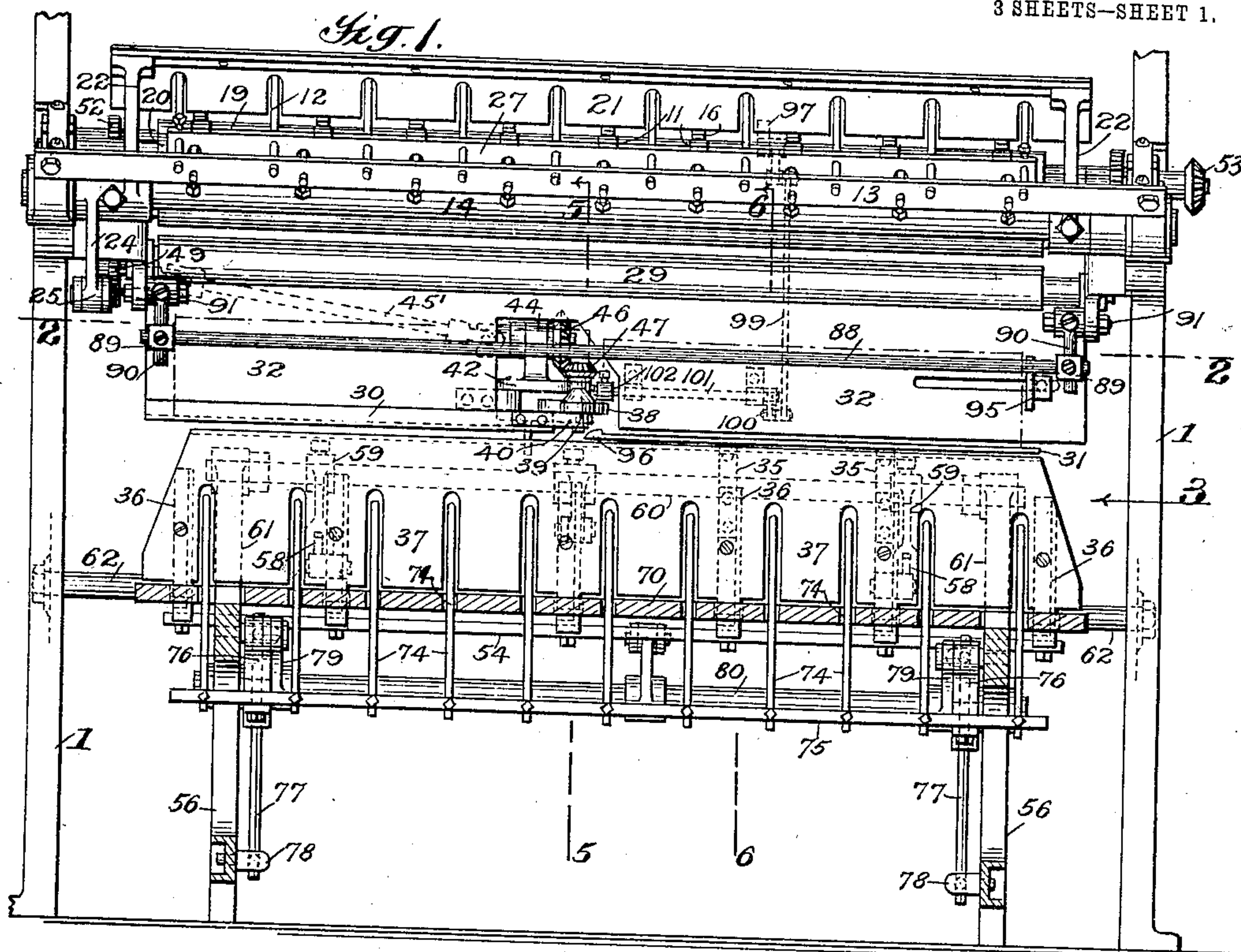


C. A. STURTEVANT.
PAPER FOLDING MACHINE.
APPLICATION FILED APR. 2, 1907.

908,517.

Patented Jan. 5, 1909.
3 SHEETS—SHEET 1.



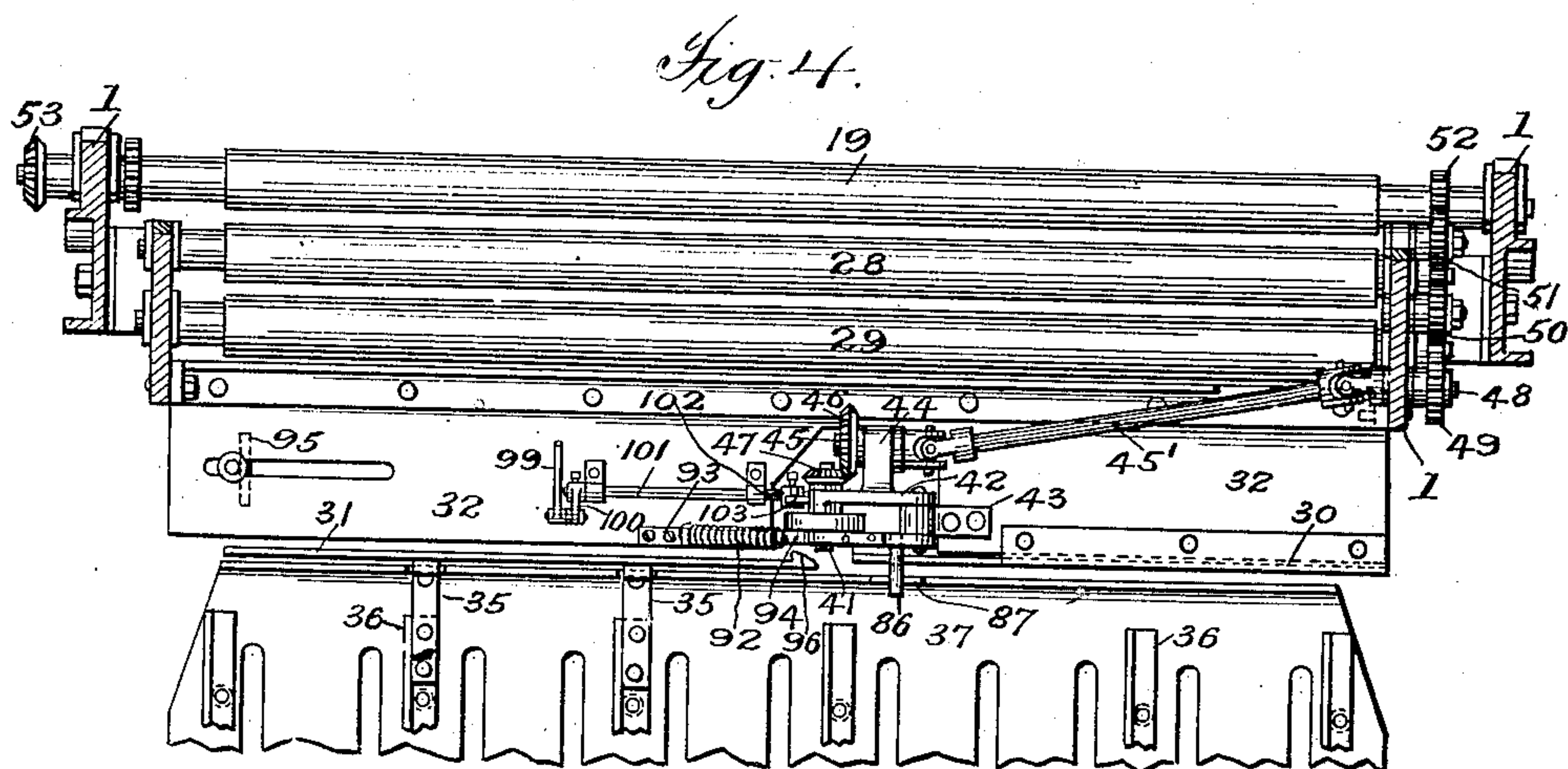
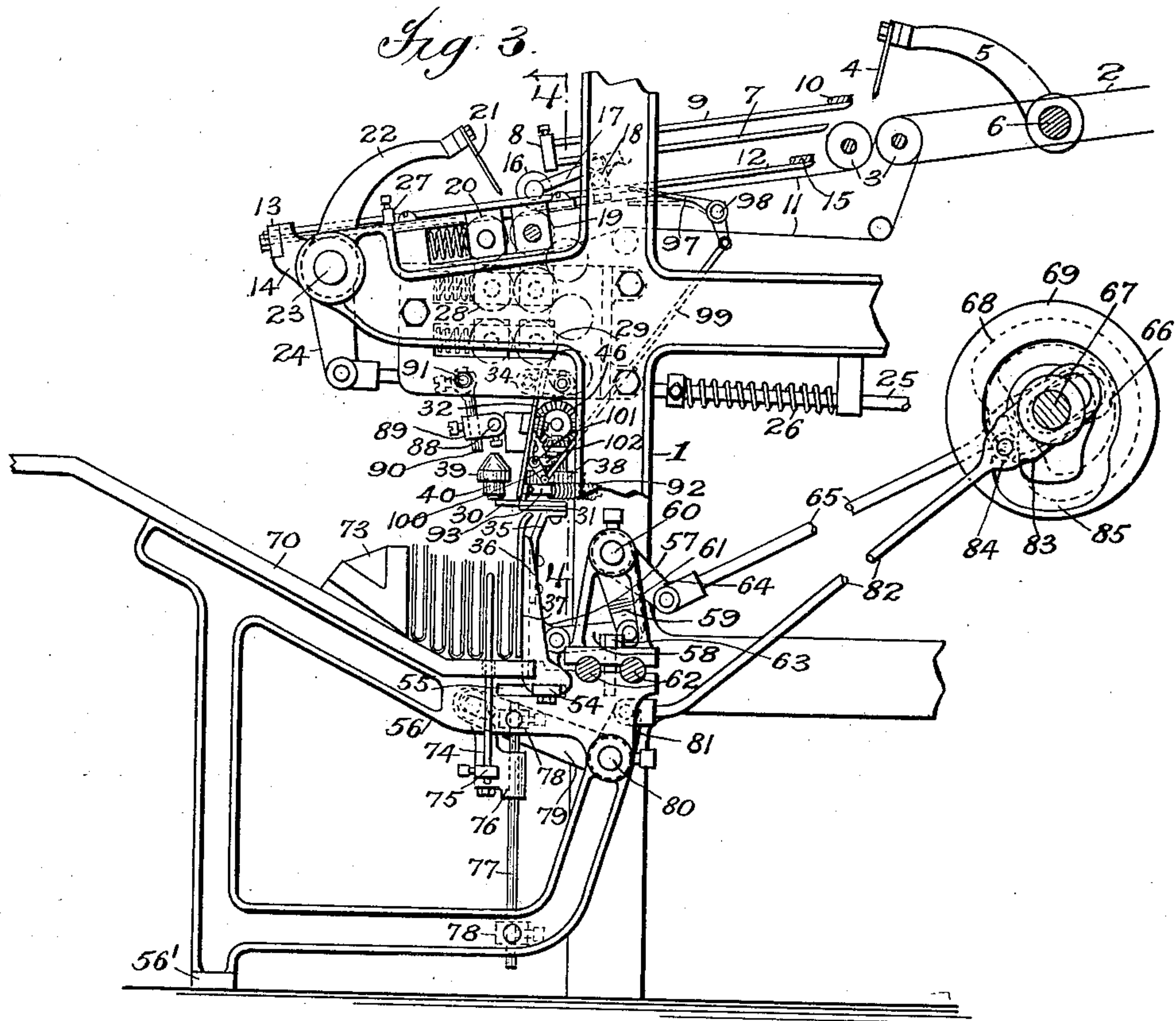
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3 SHEETS—SHEET 3.

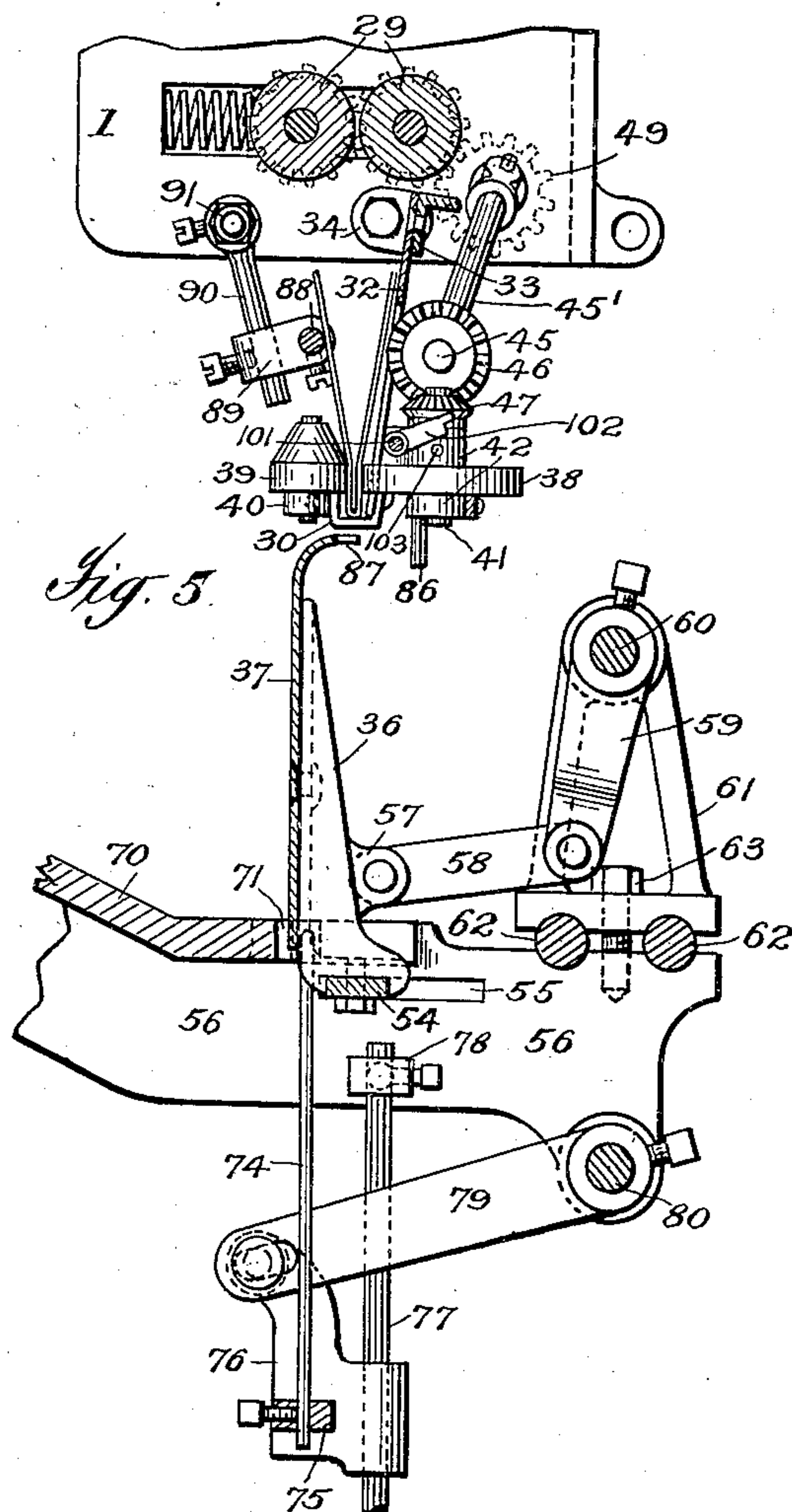


Fig. 5.

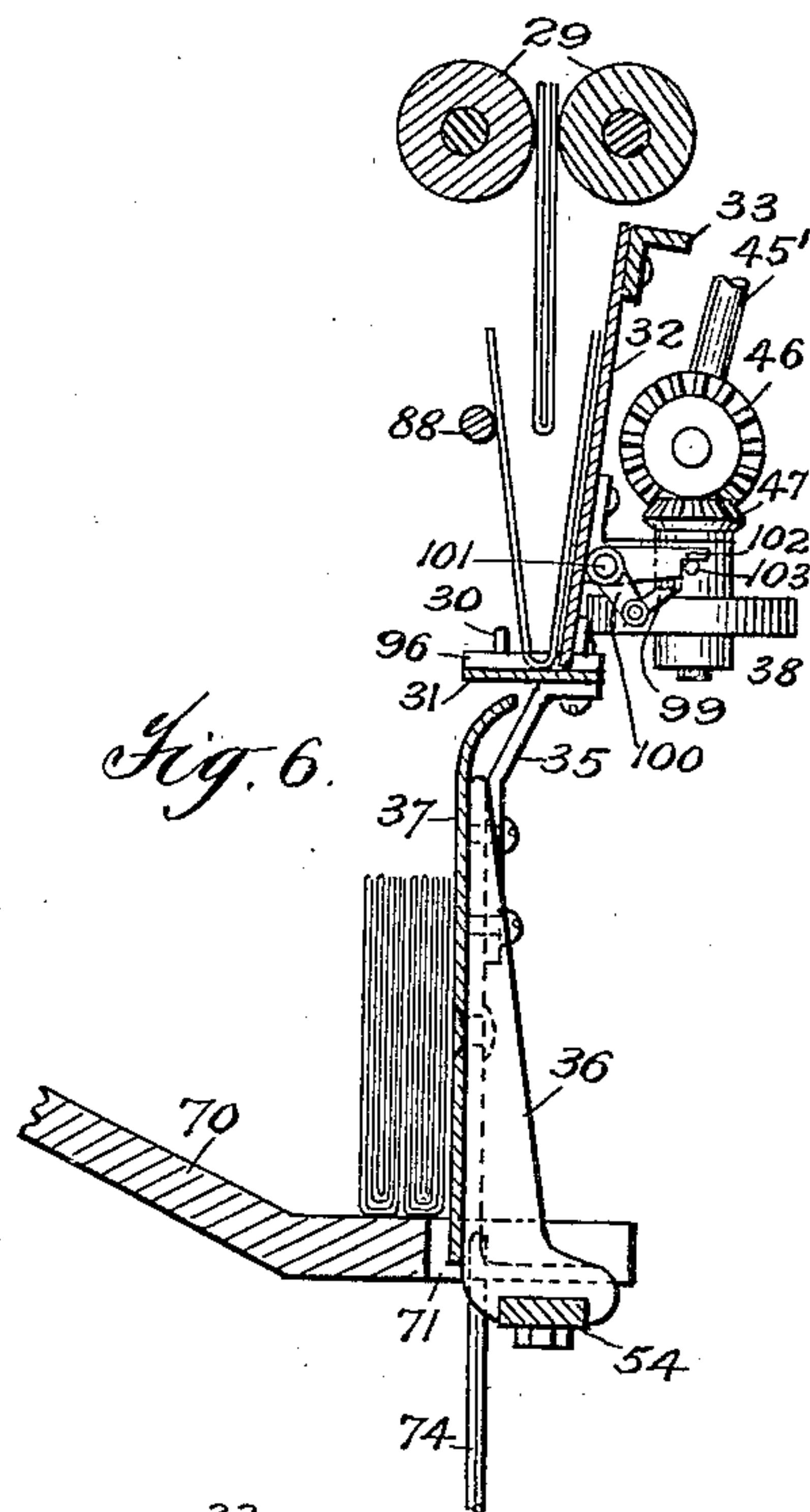


Fig. 6.

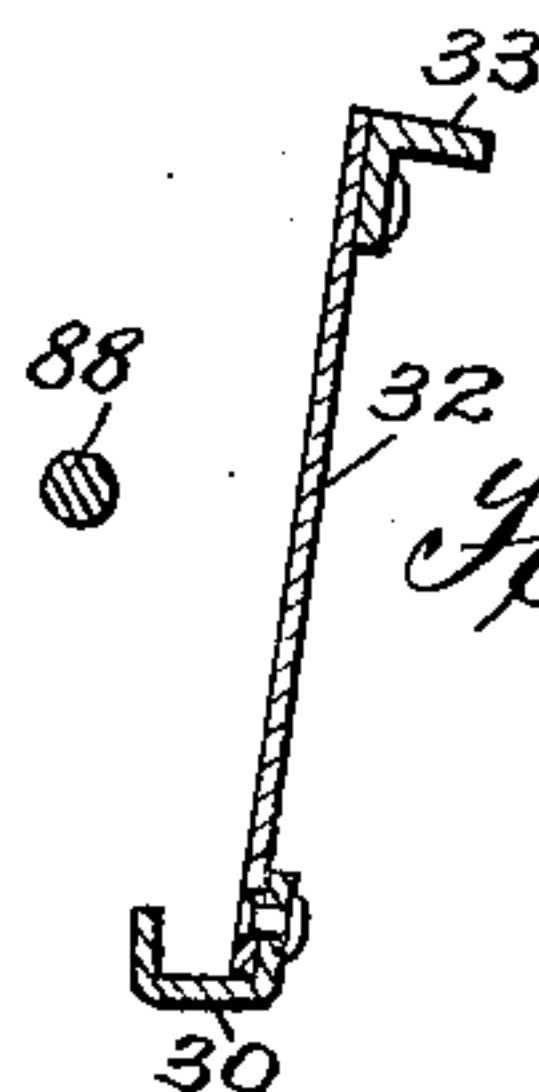


Fig. 8.

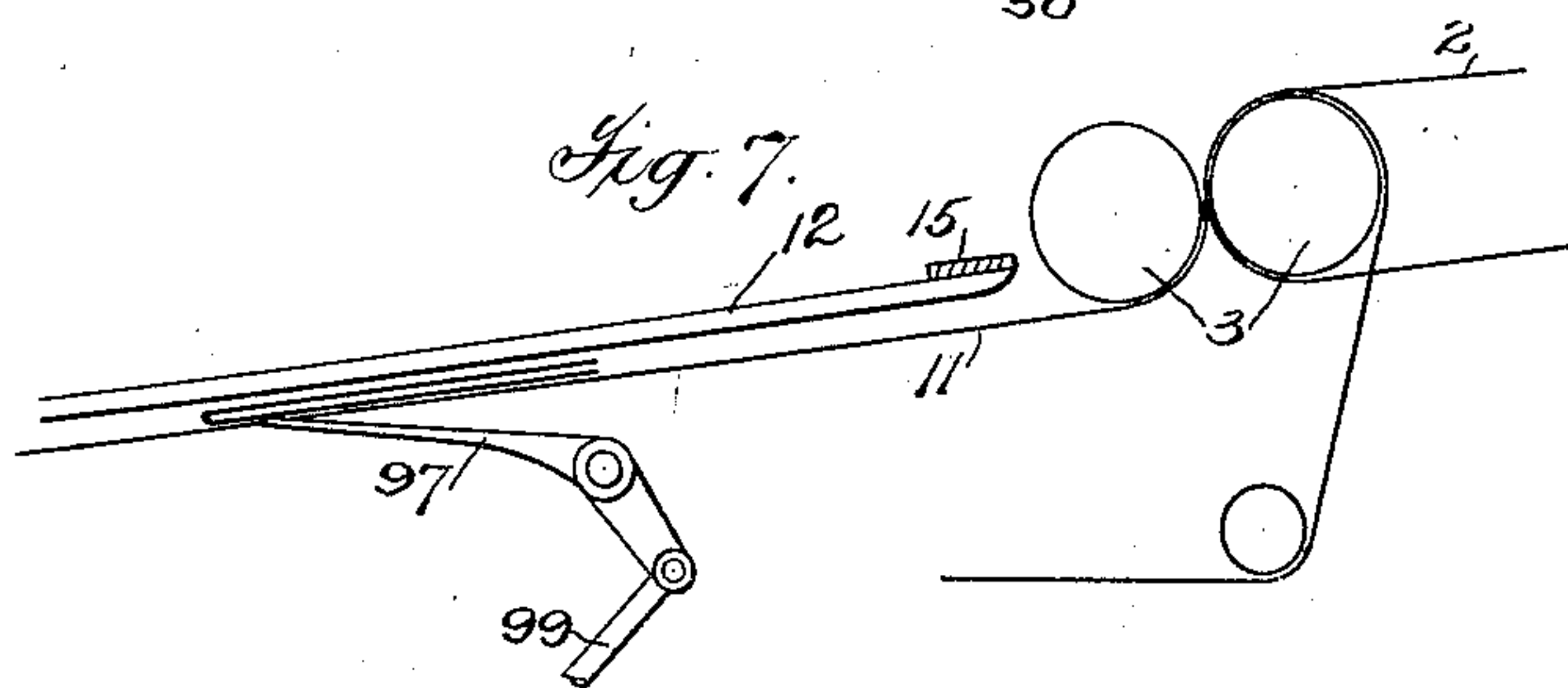


Fig. 7.

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UNITED STATES PATENT OFFICE.

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PAPER-FOLDING MACHINE.

No. 908,517.

Specification of Letters Patent.

Patented Jan. 5, 1909.

Application filed April 2, 1907. Serial No. 365,924.

To all whom it may concern:

Be it known that I, CHARLES A. STURTEVANT, a citizen of the United States, residing at Plainfield, county of Union, and State of New Jersey, have invented certain new and useful Improvements in Paper-Folding Machines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to certain improvements in paper folding machines.

The invention has for its object to produce a machine capacitated to produce a product having a large number of plies, and to do this by a simple mechanism which acts to inset one completed folded product into another completed folded product, by a relative endwise movement between the products after they are folded.

A further object of the invention is to simplify the construction of folding machines which I have referred to, thus making them less expensive to construct, easier to maintain and more certain in operation.

The invention also embraces certain details of construction which will be hereinafter more specifically referred to.

With these and other objects in view, the invention consists in certain parts and improvements in combinations as will be hereinafter more fully described and then pointed out in the claims hereunto appended.

Referring to the drawings, which form a part of this application, and in which like characters of reference indicate like parts:— Figure 1 is a front elevation, partly in section, of a folding machine constructed in accordance with this invention; Fig. 2 is a sectional plan view on the line 2—2 of Fig. 1; Fig. 3 is a side elevation of the construction illustrated in Fig. 1; Fig. 4 is a section on the line 4—4 of Fig. 3; Fig. 5 is a section on the line 5 of Fig. 1. Fig. 6 is a section on the line 6 of Fig. 1. Fig. 7 is a detail view illustrating the operation of a certain trip mechanism which may be employed. Fig. 8 is a detail view illustrating the construction of the sheet receiver.

Referring to the drawings, 1 indicates side frames of the machine which may be of ordinary construction, and in which the operating parts of the particular machine illustrated are mounted. The particular machine illustrated is designed to operate upon

two sheets which are advanced side by side. The means for advancing the two sheets may be of any suitable description, but in the construction shown the sheets are advanced (see Fig. 3) by a taped pathway, indicated at 2.

In machines embodying the invention, the sheets will usually be given a fold at right angles to their path of travel before they are forwarded by the pathway 2. The folding means by which this is or may be accomplished are, however, well-known in the art, and inasmuch as they do not conduce to a better understanding of the invention they are not illustrated.

The sheets folded by the pathway 2 will be given an additional fold, which may be also at right angles to the path of travel of the sheet. The means by which this fold is produced may be of any suitable character, but in the construction illustrated it consists of a pair of rolls 3, with which coöperates an ordinary striker blade 4, this blade being carried on an arm 5 mounted on the shaft 6. This shaft 6 may be operated in any suitable manner from any suitable moving part of the machine and by the agencies commonly employed in folding machines of this character. The operating means for this shaft are omitted, in the interest of brevity and clearness. The ordinary supporting rods 7, for supporting the forward end of the sheet, may be employed, if desired, these rods being mounted on a bracket 8 extending across the machine. Overlying rods, indicated at 9, may, if desired, also be employed for the purpose of controlling the sheet during the folding operation, these rods being partly supported by the bracket 8, before referred to, and by another bracket, shown in section at 10, suitably supported in the frame of the machine.

After receiving the fold referred to, the sheets may be forwarded in any suitable manner, as, for instance, by a taped pathway, indicated at 11. Overlying guiding rods, indicated at 12, may be employed in connection with these tapes 11, if desired, these rods being supported by a bar 13 mounted on brackets 14 extending forward from the side frames, the rods being also additionally supported by a bar 15, extending across the machine. Guiding and controlling rolls 16, which coöperate with the tapes, may also be employed, if desired, these rolls being mounted on rods 17 supported on

brackets 18, (see dotted lines in Fig. 3) these brackets being supported on and movable on the rods 12, before described, this construction being an ordinary one in the art. After the
 5 folded sheets have been advanced by the tapes 11, they may be given a further fold, which may be parallel to the folds already produced. The means for producing this
 10 additional fold may be of any suitable description. In the construction illustrated, this fold is produced by a pair of rolls 19, 20, with which coöperates a striker blade 21. One of these rolls 20 may be mounted in
 15 spring-controlled bearings, as is usual in machines of this character. This blade 21 may be supported by a pair of arms 22, mounted on a shaft 23, which may be suitably supported in the side frames of the machine. The hub of one of these arms 22 may be elongated and may be provided with an operating
 20 arm 24, which may be in turn connected to an operating rod 25. This operating rod may be moved in one direction by connections to a suitable cam (not shown), and in
 25 the other direction by a spring, as 26. A suitable stop, indicated at 27, may be provided to properly position the sheet with respect to the rolls 19, 20, and the striker blade 21.

30 It will be understood that the folding devices so far described are of such character as to permit them to operate on two products running side by side, that is to say, in the particular machine shown, the blades and folding
 35 rolls are long enough to have a capacity to simultaneously fold two sheets running through the rolls side by side. After being folded by the striker blade 21 and its coöperating rolls, the folded product may, if desired,
 40 be caused to pass between suitable folding or calendering rolls, if desired. These rolls may be of any usual construction such as is ordinarily employed in machines of this character, and two pairs of them, indicated
 45 at 28, 29, may be employed.

It will be understood that the devices hereinbefore described operate to effect the forwarding through the machine of the products, and to complete the folding of the same.
 50 While these devices are efficient in producing the result indicated, other mechanism may be substituted for them, in whole or in part, if desired.

After the products have been completely
 55 folded by the mechanism described, or by other suitable mechanism, an endwise movement is produced between them so that one of said products is inset into the other product.

60 The means by which the relative movement, which results in the inseting operation referred to, is produced may be effected by devices differing widely in their construction. In the particular machine illustrated,
 65 there is employed an arresting device by

which the folded product,—and it may be remarked that in the particular machine illustrated, the product produced consists of folded signatures for books,—is brought to a
 stop temporarily while the inseting operation is effected. This arresting device may
 70 be varied in its construction, but in the particular machine illustrated, it comprises two stop plates, marked 30, 31, (see Figs. 6 and 8). The stop plate 30, as shown, may be U-
 75 shaped and may be supported on a plate, as 32, which plate may, if desired, extend across the machine and which may also operate other elements of the machine, as will hereinafter appear. This plate 32 may in turn
 80 be supported by an angle bar 33 provided with ears 34 (see Fig. 5) by which it may be bolted to the inside of the side frames of the machine. The stop plate 31, in the particular machine shown, is a movable plate and
 85 may be supported and carried in any suitable manner. In the construction shown, it is carried on brackets 35 extending upward from arms 36 which carry the packer plate 37 to be hereinafter described.
 90

In the machine illustrated, the relative movement by which one product is inset within the other is effected by moving one of the products or signatures only. While this
 95 may be accomplished in any suitable manner, in the construction illustrated, there is provided a product shifter which may comprise a pair of wheels, as 38, 39 (see Figs. 3 and 5). The wheel 39 may be supported on
 100 a bracket 40 supported on the stop plate 30. The wheel 38 may be movably mounted and may be supported on a stud or short shaft 41, this stud or short shaft being carried in a
 105 frame 42 (see Fig. 4) this frame being pivoted to a bracket 43 secured to the plate 32, this plate being cut away as indicated in Fig. 4 to permit the shifting wheel to act through it. The frame 42 may carry a short standard 44 which serves as a support for a short shaft 45
 110 on which may be mounted a bevel gear 46 meshing with a similar bevel gear 47 fast on the short shaft 41. The shaft 45 may be connected by a universal joint to a rod 45', this rod being in turn provided with another
 115 universal joint by which it is connected to a short shaft 48, this shaft carrying a gear 49 which is one of a train, the other gears, 50, 51, of the train serving to drive the rolls 28, 29 before referred to. The gear 51 may be
 120 in mesh with a gear 52 mounted on the shaft of the roll 19 before referred to. This shaft may be provided with a bevel gear 53 by which it is driven from any suitable driving mechanism such as is common in this class of
 125 machines.

In the particular machine illustrated, the
 130 shifting mechanism, as has been indicated, acts on one of the folded products only and the shifting rolls 38, 39 before referred to are so arranged as to act on that one of the

folded product which is to the left as the machine is shown in Fig. 1, which product may also be the product which is stopped by the arresting plate or stop 30. It has been before stated that the stop plate 31 is a movable plate and is supported from the packer mechanism, although it may be otherwise supported if desired. Referring to this packer mechanism, the packer plate 37 as heretofore indicated may be carried on arms 36 which are in turn supported by a sliding plate 54, this plate being supported in and working in slots 55 in extensions 56, these extensions forming part of a frame which is provided with feet 56' (see Fig. 3). This packer plate 37 may be operated in any suitable manner. It may be conveniently operated by providing one or more of the arms 36 with an ear 57, and to these ears may be connected links 58 which are in turn connected to rock arms 59 carried on a rock shaft 60. The rock-shaft 60 may be journaled in uprights 61 which uprights rest on cross bars 62 mounted in the side frames of the machine. The bases of these uprights 61 may have passing through them screws 63 which are tapped into threaded openings in the rear ends of the arms 56 before referred to. These bars 62, therefore, serve not only to support the bearings for the shaft but through these bearings also assist in supporting the arms 56 and the frame of which they form a part. The shaft 60 may be provided with an arm 64 to which is connected an operating rod 65 having a yoke 66 on its end (see dotted lines in Fig. 3) which surrounds a cam shaft 67 suitably supported in the frame of the machine. This yoke carries a cam roller, not shown, which runs in a cam groove indicated by dotted lines 68 in a cam disk 69 mounted on the shaft 67. This shaft may be driven from any suitable moving part of the machine.

The packer mechanism may include an angular supporting table 70, as is common in such mechanisms, this table being supported on the arms 56 before referred to. This table is cut out at 71 (see Figs. 5 and 6) to provide a space in which the packer plate may be moved. If desired, a weight, as 73, may be used in connection with this packer mechanism. The packer mechanism may also include holding fingers, as 74, the function of which is to hold forward the pile of signatures after the packer plate is operated. These holding fingers may be mounted and operated in any suitable manner. As shown, they are mounted on a bar 75 extending across the machine which is mounted on a pair of slide blocks 76. These slide blocks may work on depending guide rods 77 supported in ears 78 attached to extensions 56 before referred to. The slide blocks 76 may be connected to rocker arms 79 fast on a rock-shaft 80 supported in bearings in the extensions 56

before referred to. This shaft 80 may be provided (see Fig. 3) with an arm 81 to which is attached an operating arm 82 this arm being provided on its inner end with a yoke 83 which surrounds the shaft 67. This yoke may carry a cam stud or roller 84 which works in a cam groove 85 in the cam disk 69.

In the operation of the packer mechanism the packer plate 37 is reciprocated forward and back, the plate being shown in its backward position in Fig. 3 and in its forward position in Fig. 5. It will be noted that in the backward position of the packer the stop plate 31 is moved out of the way so as to allow the folded product or signature to drop freely into the packer mechanism, but that in the forward position of the packer, as indicated in Fig. 6, the plate 31 is in such position as to prevent any signature from dropping into the packer mechanism.

The packer mechanism may be employed not only to carry the stop plate 31, when the arresting mechanism is constructed to employ such a movable plate, but it may also be used to actuate the shifting rollers when such rollers are employed. In the particular construction illustrated, the frame 42 carries a pin 86 and the upper end of the packer plate 37 is provided with a rearward extension 87 which as the packer mechanism retreats strikes the pin 86 and swings the frame on its pivot, thus carrying the roll 38 out of the opening in the plate 32 and back of this plate. To assist the controlling plate 32 in controlling the folded product and for the purpose of preventing the product or signatures from opening too far, a guard rail 88, or similar device, may be employed, this rail being mounted in adjustable blocks 89 which are carried on depending rods 90, these rods being secured to studs or projections 91 secured to the side frames of the machine.

The operation of the mechanism so far described is as follows: It will be remembered that two sheets are being advanced side by side through the agency of the taped path to the folding rolls 19, 20. These two sheets are given a simultaneous fold by the blade 21 and these rolls 19, 20 which fold is, in the particular machine illustrated, the final fold given the sheets. From these folding rolls 19, 20, the sheets pass simultaneously between the rolls 28 and 29 which press and lay the folds, it being understood, as before indicated, that these rolls are long enough to permit the simultaneous passage of the folded product. At the time when the folded products drop from the roll 29, the packer mechanism is in the position indicated in Fig. 3, that is to say, it is back, so that the sheet on the right hand side of the machine, as it is viewed in Fig. 1, drops straight through into the packer mechanism. The descent of the left hand product is, however, stopped by the stop-plate 30, which forms a

part of the arresting device. Assuming that the machine is beginning its operation, the first sheet, which has just dropped into the packer mechanism is a waste sheet. The packer mechanism is now put into operation by its various cams, and the packer plate 37 moves forward, and away from the pin 86 on the frame 42 which leaves the frame free to move, its movement in the particular machine shown being produced by a spring 92 (see Figs. 2 and 3), which is fast to a bracket 93 on the plate 32 and to an arm 94 extending from the frame 42. This movement of the frame causes the wheel 38 to be moved toward its cooperating wheel 39 so that the sheet, which is resting against the stop-plate 30, is gripped between these two wheels. The wheel 38 is being constantly rotated through the driving connections before described, so that as soon as the folded product is nipped between these wheels 38, 39, it is shifted endwise. Before the product has completed its endwise movement under the operation of the shifting wheels 38, 39, the packer plate 37 has retreated so as to bring the plate 31 of the arresting device underneath the product, which is thus being shifted, and at the time when the shifting operation is completed the shifted product will be left resting on the plate 31. A stop, as 95, (see Figs. 1 and 2) may be provided to prevent the sheet from moving too far, and the plate 31 may also have an upturned end 96, as indicated in Figs. 1 and 6, to prevent the sheet from rebounding as it strikes the stop. Fig. 6 illustrates the position of the shifted signature or product after the shifting operation is completed. By the time the shifting operation is completed, a second product will be passing through the rolls 29, and the right hand member of this product will, when it clears the rolls, drop into the open signature or product resting on the plate 31, while the left hand product will drop onto the stop plate 30. While, however, the second product is passing through the rolls 29, the packer plate begins its retreating movement, and just at the time when the second product has passed through the rolls 29 and is inset into the open first product resting on the plate 31, the plate 31 is moved back by the packer plate 37, so that the two products drop simultaneously into the packer mechanism, the left hand product at the same time falling on the stop plate 30, the roll 38 having by this time been moved out of the way so as to permit the product to reach the plate.

Mechanism may, if desired, be provided to prevent the operation of the shifting mechanism if, for instance, a sheet should fail to be fed. While the mechanism for accomplishing this result may be variously constructed, the machine may be provided with a trip finger 97 pivoted on a cross rod 98, located

beneath the upper run of the tapes 11, before referred to. The upper end of this trip finger extends above the tapes and in position to be struck by a passing sheet. This trip finger may have connected to its lower end an operating rod 99, which is in turn connected to an arm 100, fast on a rock-shaft 101 journaled in bearings supported on the plate 32, before referred to. This rock shaft 101 may be provided with a latch finger 102 which engages a stud 103 on the frame 42, before referred to as carrying the shaft 41 of the wheel 38. In case a sheet is passing through the machine, the finger 97 will be rocked down by the passing sheet, and the latch 102 will be held out of operative position so as to permit the frame 42 to be swung inward by the spring 92, in the manner hereinbefore described. If, however, there is no sheet passing, the latch 102 will drop in and engage the pin 103, thus holding the shifting wheel against the tension of the spring and preventing any shifting operation of the product resting on the plate 30, until such time as a sheet passes through the machine.

It will be understood that changes and variations may be made in the construction here described by which the invention is carried into effect, and the invention is not, therefore, to be confined to the particular construction described and illustrated in the drawings.

What is claimed is:—

1. In a folding machine, the combination with an arresting device, of means for depositing folded sheets thereon side by side, means for shifting part of the sheets endwise thereon, and means for throwing said shifting means into and out of operative position.
2. In a folding machine, the combination with an arresting device of means for depositing folded sheets thereon side by side, a roll operating to shift sheets endwise on the arresting device, and means for throwing the roll into and out of operative relation with the sheets.
3. In a folding machine, the combination with an arresting device, of means for depositing folded sheets on different parts thereof, endwise shifting means operating on the sheets on the arresting device to effect the insetting of the sheets deposited on one part of the arresting device in those deposited on another part of the arresting device, and means for delivering the inset product.
4. In a folding machine, the combination with an arresting device, of folding rolls arranged to deliver products to different parts of the arresting device, and a shifting mechanism operating to transfer the product from one part of the arresting device to the other part.
5. In a folding machine, the combination with an arresting device, of a set of folding

rolls arranged to deliver products to different parts thereof, a shifting device including a roll arranged to operate on the product on one part of the arresting device, and means for moving the roll into and out of operative position.

6. In a folding machine, the combination with an arresting device consisting of a stationary part and a movable part, of means for depositing product on each part thereof, and means for shifting the product from the stationary part to the movable part.

7. In a folding machine, the combination with an arresting device, of means for depositing folded products on different parts of the arresting device, means for shifting the product from one part of the arresting device to the other to effect the inset of the product, and a packing device into which the inset product is delivered.

8. In a folding machine, the combination with an arresting device comprising a stationary part and a movable part, of means for depositing folded sheets on each of said parts, a shifting mechanism for producing endwise movement of the product on the stationary part, a packing device, and means whereby the movement of the packing device controls the movement of the movable part of the arresting device.

9. In a folding machine, the combination with an arresting device comprising a stationary plate and a movable plate, of means for depositing folded product on said plates, a shifting roll arranged to operate upon the product of the stationary plate, means for moving the roll into and out of operative position, a packer, and means for moving the movable plate to cause the product resting thereon to be delivered to the packer.

10. In a folding machine, the combination with an arresting device comprising a movable part and a stationary part, of folding rolls, the product of which is deposited on the different parts of the arresting device, means including a shifting roll for moving the product from the stationary part of the movable part, a packer, connections whereby the packer causes the roll to be in and out of operative position, and operating connections between the packer and the movable part of the arresting device.

11. In a folding machine, the combination with an arresting device consisting of a stationary plate and a movable plate, of means including a shifting roll arranged to operate on the product on the stationary plate, a packer located beneath the movable plate, and connections whereby the movement of the packer causes the shifting roll to be in

and out of operative position, the movable plate being supported on the packer.

12. The combination with a folding mechanism, of an arresting device, a shifting device, means for causing the shifting device to move into and out of operative position, means for preventing the movement of the shifting device into operative position, and means controlled by the passing of the sheets through the folding mechanism for causing the preventing means to be inoperative.

13. The combination with a folding mechanism, of an arresting device comprising a movable part and a stationary part, a shifting roll arranged to operate on the product deposited on the stationary part of the arresting device, means for causing the shifting roll to be in and out of operative position, means for preventing the shifting roll from moving into operative position, and means controlled by the sheets passing through the folding mechanism for rendering the preventing means inoperative.

14. The combination with a folding mechanism, of an arresting device comprising a movable plate and a stationary plate, a shifting roll arranged to operate on the product on the movable plate, means for moving the roll into and out of operative position, a latch for preventing the movement of the roll, connections including a finger in the path of the sheets for operating the latch, a packer, and means whereby the movable plate is operated to deliver the product thereon into the packer.

15. The combination with a folding mechanism, of an arresting device to which the folding mechanism delivers, said arresting device comprising a movable plate and a stationary plate, a packer on which the movable plate is mounted, a shifting roll operating on the product on the stationary plate, means including connections to the packer whereby the roll is caused to be in and out of operative position, means for preventing the roll from moving into operative position, means controlled by the passing of the sheets through the folding mechanism for determining the position of the preventing means, and operating means for the packer.

In testimony whereof, I have hereunto set my hand, in the presence of two subscribing witnesses.

CHARLES A. STURTEVANT.

Witnesses:

A. WHITE,
JAMES Q. RICE.