

(No Model.)

3 Sheets—Sheet 1.

W. SCOTT.
FOLDING MACHINE.

No. 506,448.

Patented Oct. 10, 1893.

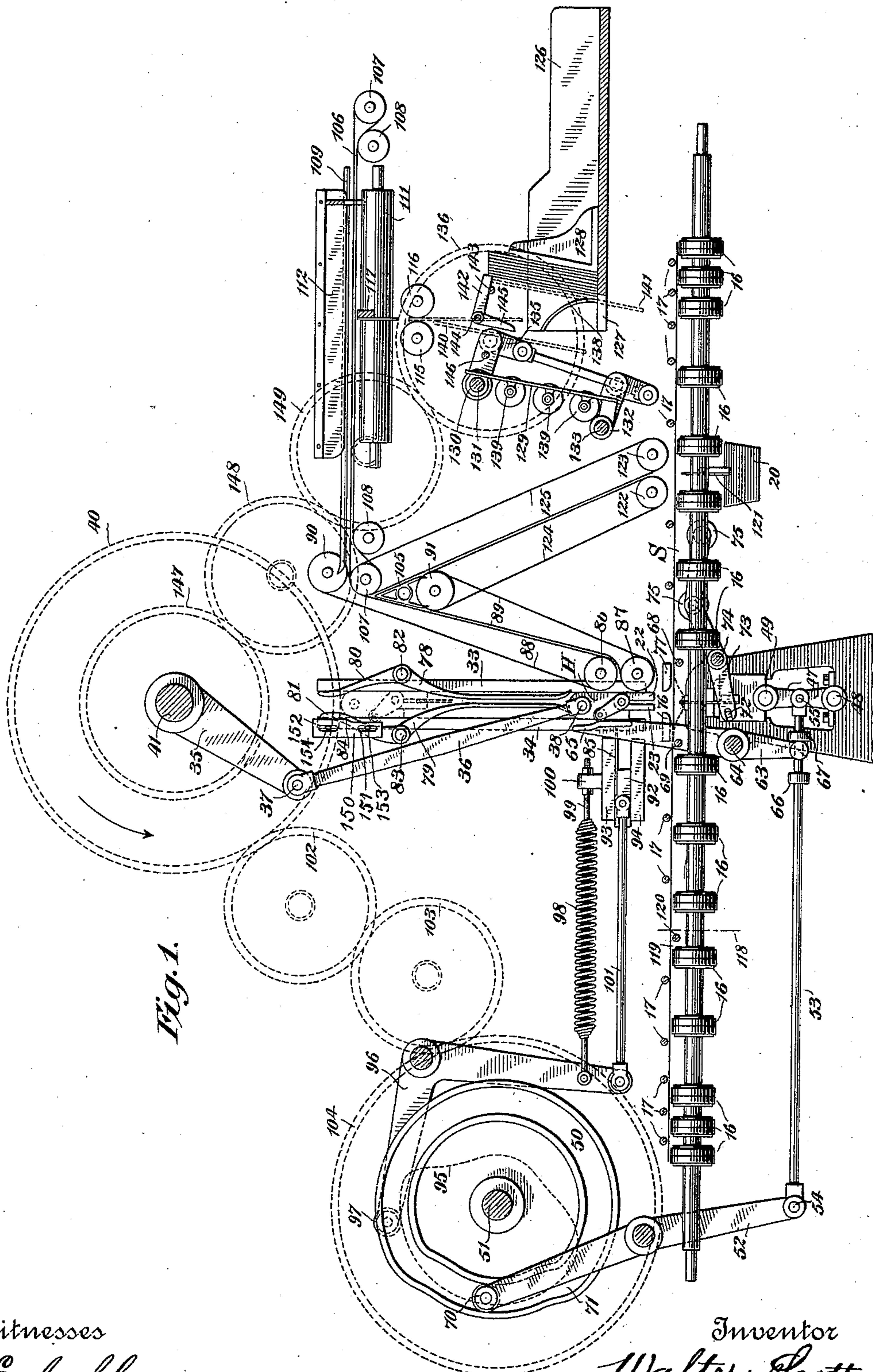


Fig. 1.

Witnesses
C. E. Ashley
H. W. Lloyd.

Inventor
Walter Scott,
By his Attorneys
Wilcox & Barkley.

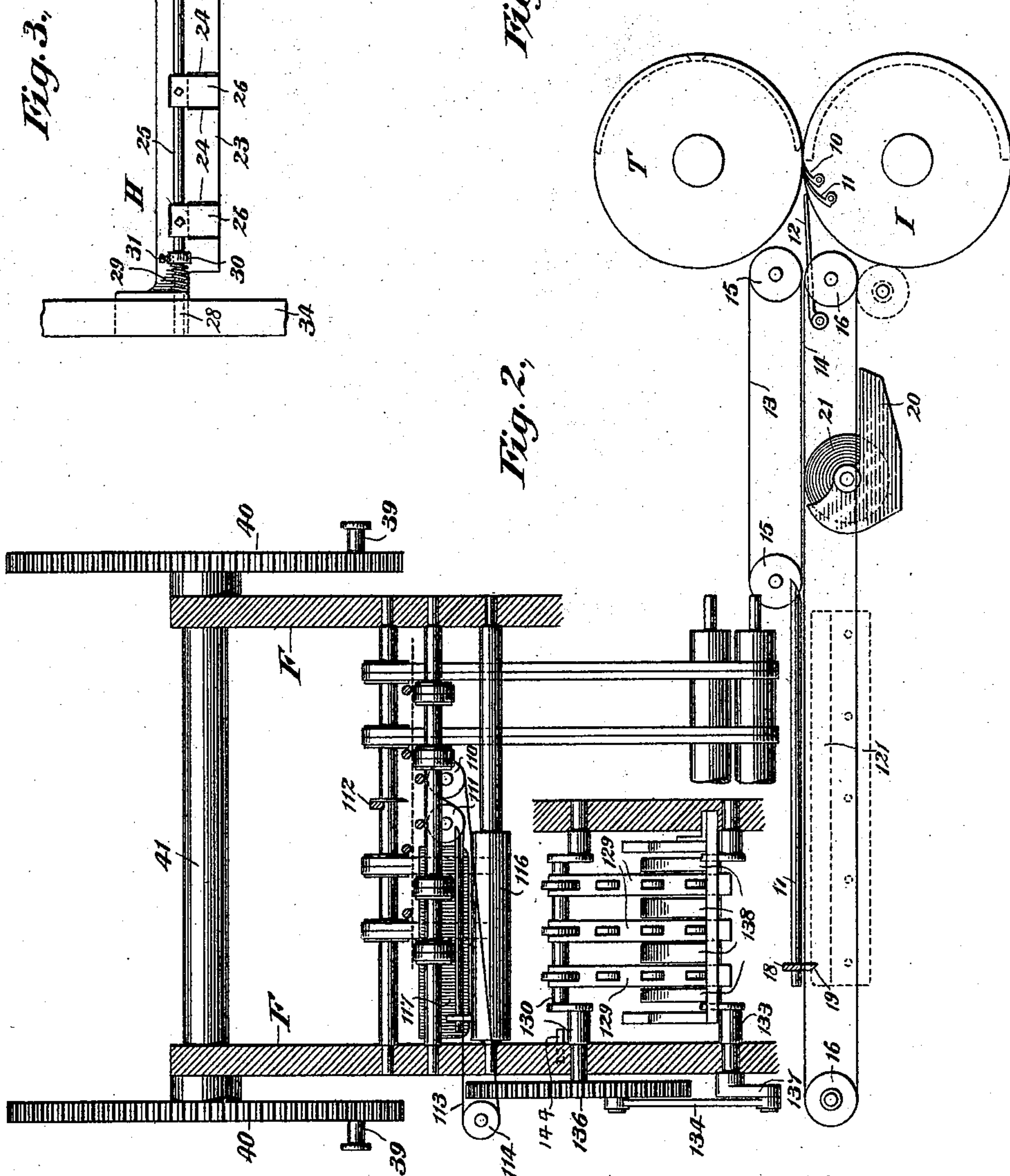
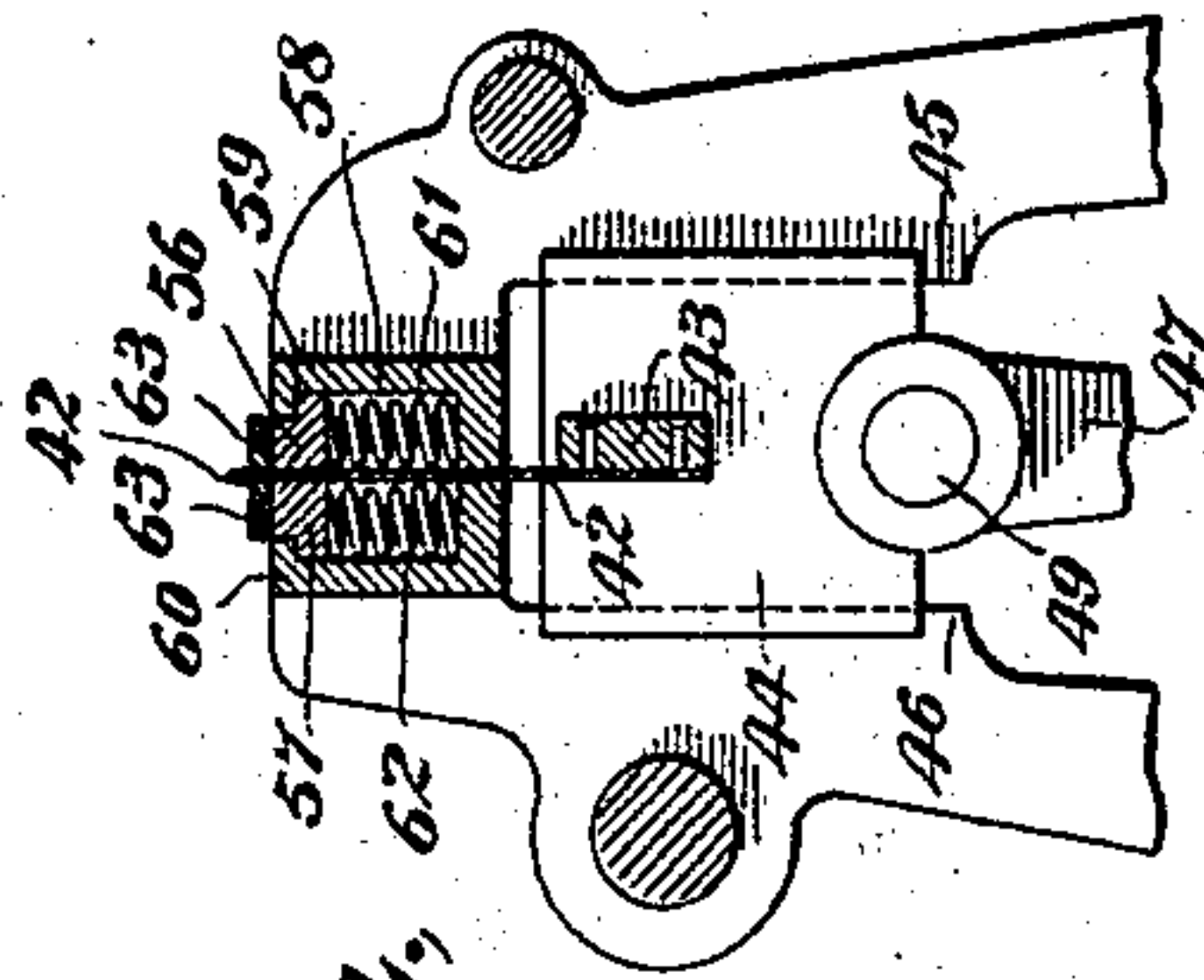
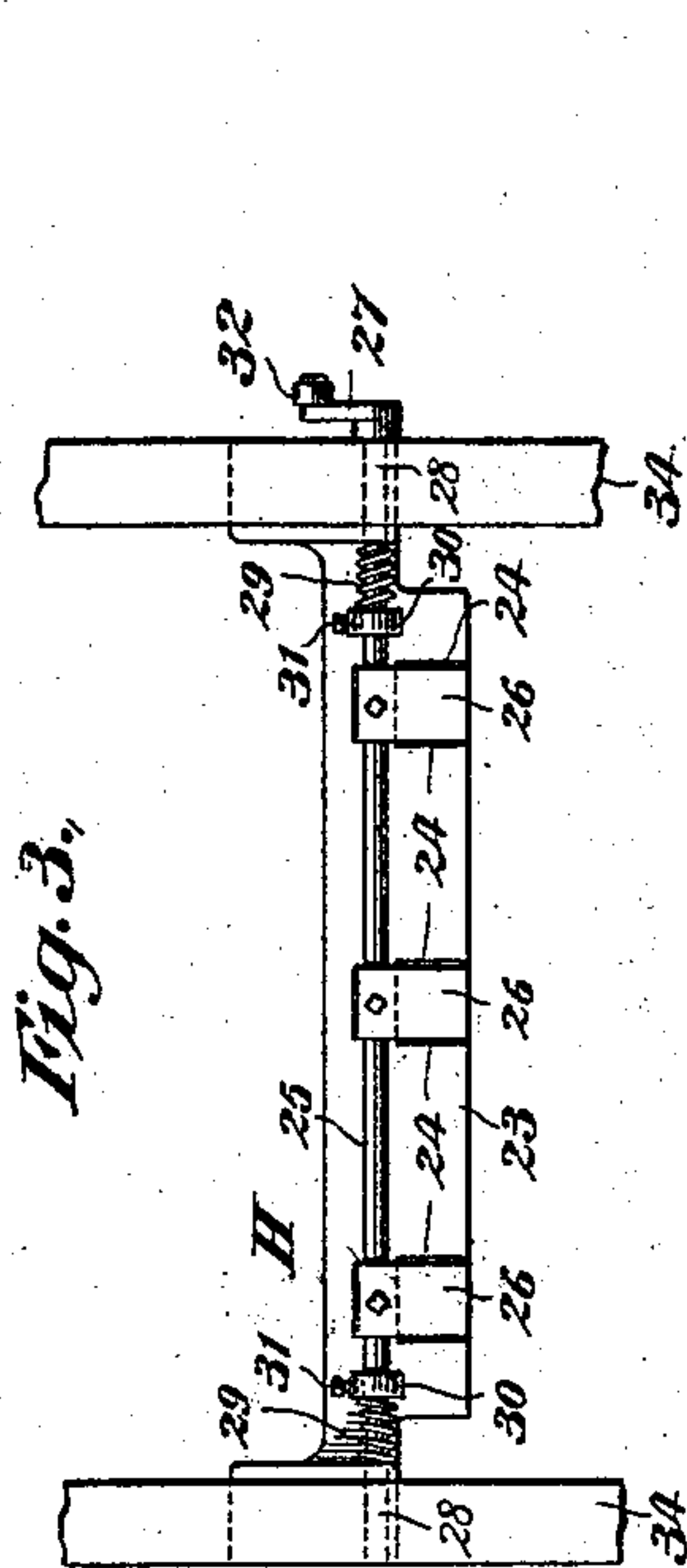
(No Model.)

3 Sheets—Sheet 2.

W. SCOTT.
FOLDING MACHINE.

No. 506,448.

Patented Oct. 10, 1893.



Witnesses
C. E. Ashley
H. W. Lloyd.

Inventor
Walter Scott,
By his Attorneys
Wilcox & Barkley.

(No Models.)

3 Sheets—Sheet 3.

W. SCOTT.
FOLDING MACHINE.

No. 506,448.

Patented Oct. 10, 1893.

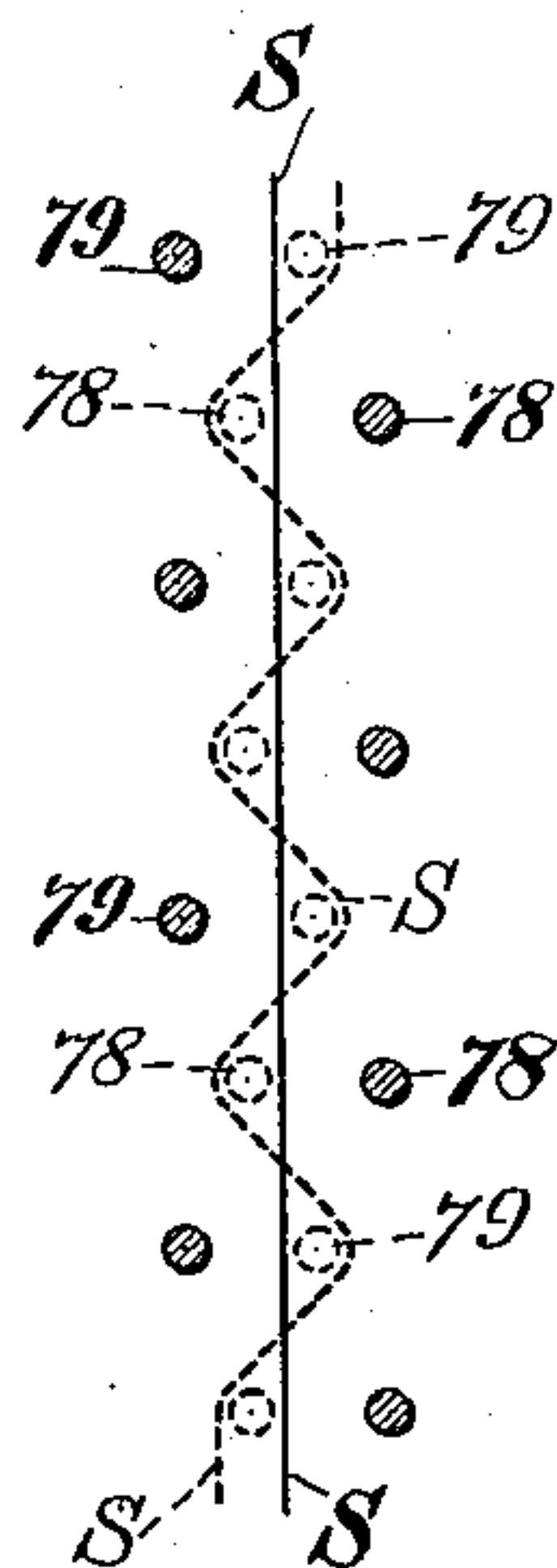


Fig. 5,

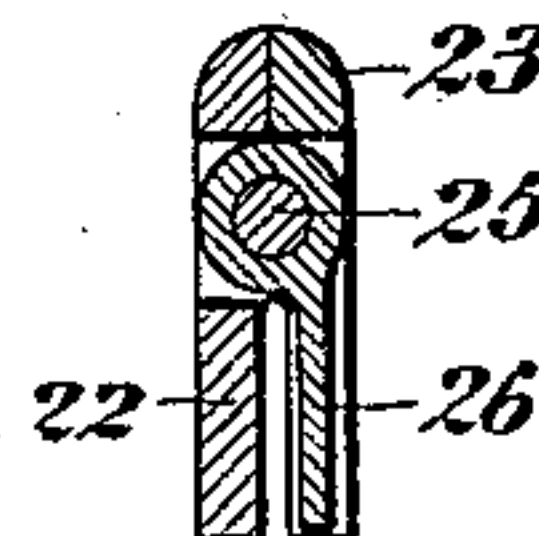
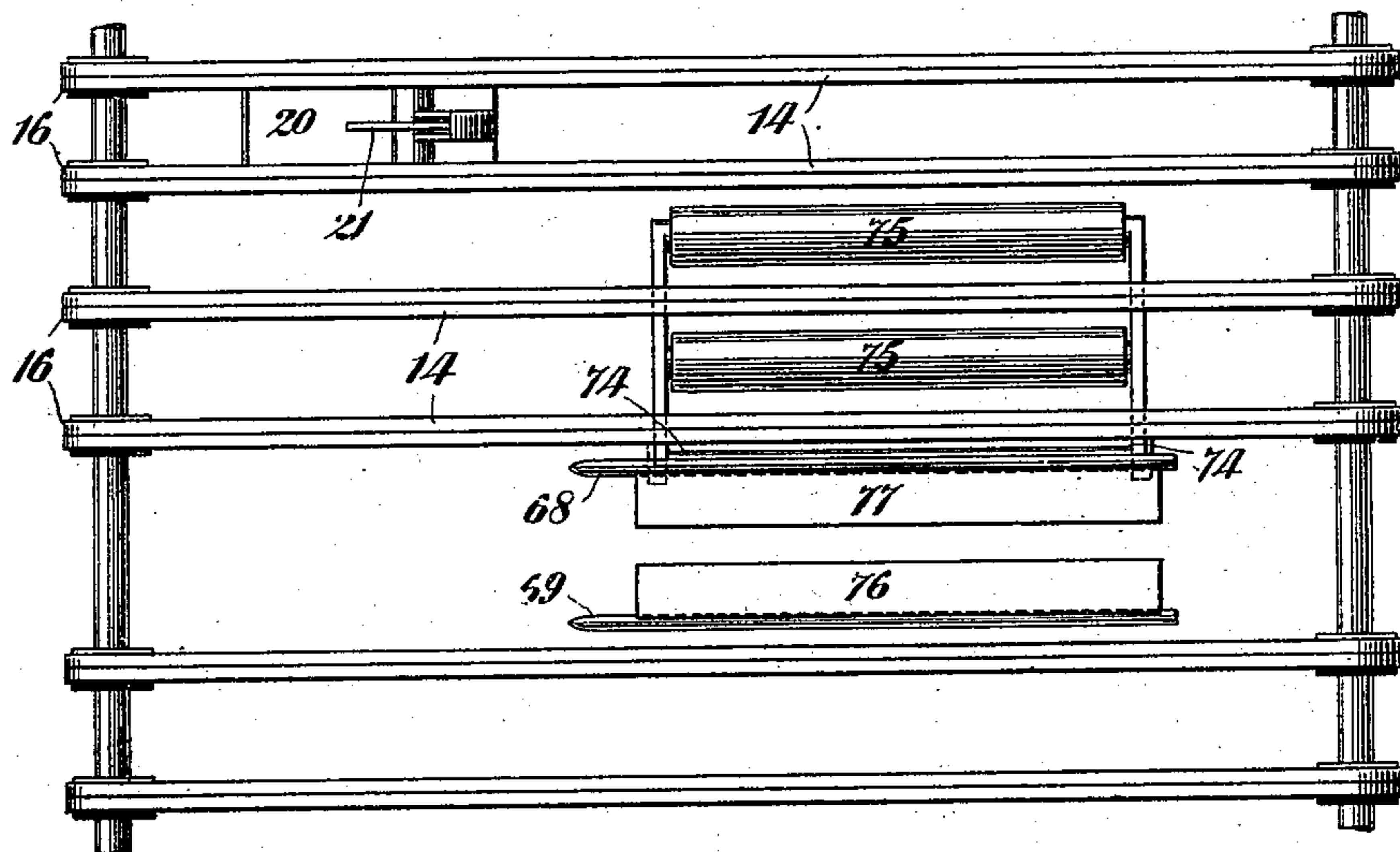


Fig. 6,

Fig. 7,



Witnesses
C. E. Ashley
M. S. Powers.

Inventor
Walter Scott
By his Attorneys
Wilcox & Parkey.

UNITED STATES PATENT OFFICE.

WALTER SCOTT, OF PLAINFIELD, NEW JERSEY.

FOLDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 506,448, dated October 10, 1893.

Application filed July 6, 1891. Serial No. 398,534. (No model.)

To all whom it may concern:

Be it known that I, WALTER SCOTT, a citizen of the United States, and a resident of Plainfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Folding-Machines, of which the following is a specification.

My invention relates to paper folding machines, and consists of combinations of devices hereinafter described and more particularly pointed out in the claims concluding this specification.

In the accompanying drawings forming part of this specification, Figure 1 is an end elevation looking to the right in Fig. 2. Fig. 2 is a side elevation looking to the left in Fig. 1. Figs. 3 and 4 illustrate certain parts more in detail. Fig. 5 is a cross-section of the guide friction-fingers used to keep the sheets taut; full lines indicating the positions of the parts as the sheets enter between the fingers, and the broken lines showing the positions when the fingers grip the sheets, the same being exaggerated for clearness sake. Fig. 6 is a cross-section of Fig. 3 showing the arrangement of the parts, and Fig. 7 is a plan of the feeding tapes, paster and lifting rollers.

The printed sheets may be fed in by hand, or fed direct from a printing machine, such as that shown, or from other machines, or they may be fed by other means.

In the construction shown, the sheets are perfected by the type cylinder T and impression cylinder I; the grippers 10 open, and throw-offs 11 direct the sheets onto guides 12, whence they are taken by tapes 13, 14, running about pulleys or rollers 15, 16, respectively. Tapes 14 carry the sheets under guide rods 17 which are supported in any suitable way, as by the bar 18 from which the stops 19 depend. Or the bars 17 may be supported in the frame work and have the stops 19 adjustably secured to them by set screws or otherwise.

I sometimes use a suitable device to apply paste to a central margin of the sheet. The device shown consists of a fountain 20 from which the wheel 21, journaled in the sides of the fountain, takes paste and applies it to a central margin as the sheet is run along over the same. Other paste supplying means may be used in lieu of the one described. The

next step is the cutting of the sheet S along a central margin. For this purpose, I employ a reciprocating head provided with jaws 55 for holding sheets while being cut and for holding the edges of the sheets after they are severed. Co-acting with said head and jaws is a knife or cutter working between two yielding cushions whereby the sheets are first clamped, then cut, and the edges grasped by the jaws or grippers, the knife simultaneously being withdrawn. In Fig. 1, I show a head H having two jaws 22, 23, of which I prefer to have one, as 22, fixed, and the other, 65 as 23, movable. I accordingly show the jaw 23 as pivoted to the head H, it being forced toward and from jaw 22 by suitable means. In the operation of this construction, the jaws 22, 23 are separated at the time the 70 sheet is cut into two sheets as shown in Fig. 1, by dotted lines, and come together to grasp the upturned edges of such two sheets.

Instead of being movable, the jaw 23 may be fixed in the position shown in Fig. 1, (that 75 is, separated from jaw 22 by a small open space or groove, the lower edges of the two being in the same horizontal level,) and have a series of notches 24 cut through it. A shaft 25, journaled in the head H, is provided with 80 a series of grippers or jaws 26, one for each notch 24. The grippers 26 are preferably narrower than the notches, and also do not extend downward to the plane of the lower edge of jaw 23. Shaft 25 has an arm 27 at one end 85 by means of which it is operated at proper times, as hereinafter described. The jaw 23, when movable, may be carried by shaft 25 and be operated thereby.

The shaft 25 is journaled in the ends of the 90 head H, as at 28. One or more coiled springs 29, fast at one end to the head H and at the other end to the shaft 25 or to a collar 30 held in place thereon by a set screw 31, act to hold the grippers normally in notches 24. The 95 arm 27 may have roller 32 on it to reduce friction in the operation of the machine.

The knife 42 is placed so that the sheets are fed in over it, and is carried by the head 43. The head has a slide block 44 at each end, 100 which is guided by vertical ways 45, 46 on the framework. For the purpose of giving the knife and head a rising and falling motion, I employ any suitable mechanism. The mech-

anism shown consists of a toggle, cam, lever and connecting rod. The toggle 47 has one arm pivoted at 48 to the framework and the other pivotally connected to the head 43 at 49. Two toggles, one at each end of the head 43, may be used if desired, and both may be operated by one cam and lever, or each may have its own operating mechanism. The toggle shown is operated by cam 50 on shaft 51, lever 52, and rod 53 pivoted to lever 52 at 54 and to the toggle at the joint 55 of the latter. The cam 50 is shown as a closed cam, but it may be an open one and the lever 52 be held against it by a spring.

Knife 42 moves between two clamps, shown in Fig. 4. These clamps may be of rubber, or other yielding material or of the form shown wherein two (wooden) bars 56, 57, one on each side of the knife 42, are mounted in a groove or box 58 in the framework partly open on the upper side. Lips 59, 60 project inwardly from the sides of this box and each engages a corresponding rabbet on one of the bars 56, 57 when the latter are forced up by springs, as 61, 62. The bars 56, 57 are faced with rubber, or felt, or other suitable material. Such facing is shown at 63, 63. Springs 61, 62, may be placed in holes in the bars, which may extend nearly to the bottom of box 58. The head H moves between guides 33, 34, there preferably being a pair of these guides at each end of the head. The guides 33, 34 shown in Fig. 1 end at a short distance above the tapes 13, 14, so that the sheets may enter without obstruction. At the other end of the head H, the guides may or may not end in this way. The head H may be reciprocated by any suitable means. I have shown cranks 35 and rods 36, pivotally connected to crank pins 37 and to pins 38 on head H in Fig. 1. Or the rods 36 may be pivotally connected to wrists 39 on gear wheels 40 on shaft 41 as shown in Fig. 2. Shaft 41 is the driving shaft of the machine shown, and may be driven itself by any suitable means.

The means for opening the jaw 23 or grippers 26 will now be described.

A lever 63, pivoted at 64 in the framework, carries a cam 65 at its upper end. The lower end of the lever 63 is alongside of, or is forked and straddles, the rod 53 hereinbefore described in position to be operated by the collars 66, 67 on said rod 53 as the same moves back and forth. Other means for moving lever 63 may be used if desired, but I prefer the means shown. The position of parts shown in Fig. 1 occurs during the descent of the head H. It will be noticed that cam 65 has just opened jaw 23 or the grippers 26 as the case may be. As head H continues to descend, the jaws strike the sheet along a central margin thereof, carry it down against and bend it over the knife 42 and clamps 56, 57, as shown by dotted line, the paper being clamped between the clamps and the jaws. The clamps yield to the pressure of the jaws, while the knife remains stationary. The sheet is

severed by the knife and the freshly cut edges thereof are turned upwardly by the downward movement of the clamps and jaws. Rods 68, 69 between which the jaws pass, may be used to support the sheets at this time. While the sheet is being cut as described, roller 70 on lever 52 has reached the operating part 71, of cam 50 and lever 52 begins to operate toggle 47 by pushing it to the right in Fig. 1. This lowers knife 42 until it is below the top surfaces of or is sheathed between clamps 56, 57. Collar 66 strikes lever 63 and moves the upper end thereof to the left in Fig. 1, whereupon springs 29 move jaw 23 to its normal position, whereby the upturned edges of the (now two) sheets are gripped between jaws 23, and 22. I sometimes use the following devices to keep the sheets having paste thereon clear of the tapes 14: As head 43 moves the knife 42 downward, a pin 72 (on the head or one of its slide blocks) resting in the forked end of lever 73 pivoted at 74 on a shaft or on the frame, moves said lever 73 and raises the other end thereof, bringing the wheels 75 up against and lifting the sheet clear of the tapes. As many of these levers 73 and wheels 75 may be used as desired. As head H rises, the two sheets are drawn inward and upward by the jaws, the bars 76, 77 guiding and directing the said sheets. During the ascent of the head, it passes between the two series of guides or guide fingers 78 and 79, and when it has about reached its upper position (shown in dotted lines) it engages the upper arms 80, 81 of the shafts 82, 83 carrying these fingers and moves the fingers toward each other. By preference, the fingers on one side (as 78) are opposite the intervals between the fingers of the other side. By this construction, the sheets are frictionally held up after the arm 27 has struck stationary cam 84 and jaw 23 been opened to release the sheets.

I sometimes apply paste to a central margin as above described. In such cases, when the sheets are lifted by head H, their central margins are brought in juxtaposition, with the paste between the sheets. After head H has lifted the sheets as described and as the movable jaw is opened, the folding blade 85 strikes the two sheets along their central margins and pushes the bight between folding rollers 86, 87, and tapes 88, 89 passing about rollers 86, and 87 respectively. Tapes 88 pass about another roller or set of pulleys 90, and tapes 89 about roller or pulleys 91. These tapes carry the once folded sheets away to a suitable folding machine, as will be hereinafter described.

Folding blade or creaser 85 may be a vibrating or a rotary or a reciprocating one as shown. Fig. 1 shows blade 85 as carried by a head 92 that moves between guides 93, 94. Head 92 is moved at proper times by any suitable means. I show a cam 95 on shaft 51, a lever 96 having roller 97 bearing on cam 95, and held thereagainst by a spring 98.

Spring 98 is secured at one end to the lever and at the other to the framework. As shown, its tension may be adjusted, since the rod 99 is screw-threaded; nuts on each side of lug 100 through which the rod passes serve to adjust the tension of the spring by moving the rod. A rod 101, jointed to lever 96 and head 92, completes the means for moving the head. Shaft 51 is driven from shaft 41 by means of suitable gearing, as spurs 40, 102, 103, 104.

Returning now to the sheets after they have been taken by tapes 88, 89, the sheets are delivered by tapes 88 and guide 105 (which is shown double or V shaped for a purpose presently to appear) to the tapes 106 of the folding machine running about rollers 107, and guided by rollers 108. Suitable rods 109 keep the sheets from rising from tapes 106, which carry the sheets along over the folding rollers 110, 111. At the proper time, blade 112, vibrating or reciprocating, descends and forces the bight of the sheets between folding rollers 110, 111; tapes 113 which pass about roller 110 and pulleys or roller 114 carry the (now twice folded) sheets over folding rollers 115, 116. When the sheets are in proper position over these rollers, blade 117 descends and forces the bight between the rollers. The thrice folded sheet is now dropped into the packer hereinafter described, or otherwise delivered as may be desired.

The devices thus far described cut and fold or paste, cut and fold sheets of six or eight pages.

When cutting and folding a six page sheet on the machine shown, the sheet may extend only to the line 118. If, however, it is desired to have the margin of the two page sheet folded in with central margin of the four page sheet, the sheet may extend to the point marked 119. This edge of the sheet may be sustained by rod 120, if desired.

If a four page sheet is to be folded, it is run by the tapes 13, 14, or otherwise fed with its central margin over the creaser 121, which may be moved in any suitable way (such movement being well known) at the proper time to carry the bight of the sheet between rollers 122, 123. Tapes 124, running about roller 122 and roller 91, and tapes 125 running about roller 123 and roller 107, carry the sheet up to tapes 88 and 106, which carry it into the folding machine just described and is folded thereby.

All the tapes, folding rollers and pulleys are run by any means ordinarily used for such purposes. The sheets are fed toward the observer in Fig. 1.

In the machine shown, the sheets, after being folded by rollers 115, 116, are packed together by the mechanism shown. This consists broadly of a receiver, shown as an open-ended trough, a slidable holder therein and a flat packer or pusher having a motion of circumduction. The packer may be a board

or preferably a series of slats, and I prefer to have anti-friction rolls projecting beyond its working face. The receiver 126 is of trough-like shape, has both ends open, and its bottom is cut away or notched at one end, as at 127, to allow of the packer entering for the purposes to be described. The holder or detent 128 can be slid along in the receiver, being held by friction only. The packer shown consists of slats 129, each slat being secured to two collars, one 130 on cranked shaft 131, the other 132 on cranked shaft 133. The collars 130, 132, hold the slats 129 at some distance from the centers of shafts 131, 133, where the latter pass through the collars. The effect of this is that the line joining the centers of the circles described by the ends of the slats does not coincide with the line joining the axes of motion of the cranked shafts, but lies to one side thereof, and in the case shown intersects the same when both are produced. This last is due to the fact that the arms joining the slats with the shafts 131, 133 are of unequal length. The cranked shafts turn loosely in the collars, but the latter have no motion endwise of the shafts. The shafts are journaled in the framework F as shown, and are connected together by the slats 129 and by a link 134 pivotally connected to a crank 135 preferably forming part of the gear 136 on shaft 131, and to crank 137 of shaft 133. The cranks 135 and 137 are preferably at right angles to the cranked parts of these shafts that support collars 130 and 132. From this it will be seen that the slats 129 lie in a plane which always remains parallel to itself; the same is true of each slat; this is called a motion of circumduction in the books. It will be observed that the axes of motion of the shafts 131, 133, which are marked y, z , in Fig. 1, are to one side, while the receiver 126 is on the other side, of the path of the copies as delivered by rolls 115, 116. The trough 126 has curved guides 138 against which the lower ends of the folded sheets impinge after they are fed downward by the rollers 115, 116. The upper ends of the slats 129 come against the sheets at or near the top thereof as they fall, and by the time they impinge on the guides 138, the slats bear against them from top to bottom. The curve of guides 138 is that of the path of the lower edges of the folded copies or any point therein, which path is the resultant of two forces; one, the force impelling the copies downward, the other, the packer forcing them horizontally. In the instances shown, these guides have a radius about equal to that of the circle of motion of any point in the slats; which is that of the cranked shafts. The copies are carried along by the slats at the same time they are slipping along the faces thereof and down the guides until stopped by coming against the bottom of the receiving trough, pushing the holder 128 and any sheets already held in the trough to the right in Fig. 1. The slats now move downward away from the sheets. The guides 138

also have the function of holding the bottoms of the copies against slipping in the receiver. The use of rollers 139 is preferred as they give a rolling contact between the sheets and slats during the placing of the folded copies in the receiver and at the moment of separation, thereby avoiding possible rumpling of the sheets.

When anti-friction rolls as 139 are used, I prefer to journal them on the rear face of the slats in lugs or risers and to have their peripheries project beyond the face of the slats through slots therein.

The position of the slats at the moment of first contact with the folded sheets is shown in dotted lines 140, and their position at the moment of last contact by dotted lines 141.

I may sometimes use a detent device to hold the tops of the sheets in the receiving trough 126 from falling over toward the slats. I show an arm or lever 142 for this purpose. The end of this arm rests behind the sheets, a stop 143 limiting its downward movement. Arm 142 is carried by pin 144 in the framework at the left of Fig. 2 (but is not shown therein) and arm 145 extends downward and at one side of the path of the sheets in position to be struck and moved by pin or stud 146 on one of the cranks that carry the slats 129. This lifts the arm 142 in time for the sheets to be forced to the right (in Fig. 1) whereupon the arm drops in behind them as pin 146 slides off arm 145.

The shaft 130 is driven from shaft 41 by suitable means. I show gears 147, 148, 149 and 136 for this purpose.

While I have described jaws 22, 23 as fixed, or one fixed and the other movable, it is obvious that both may be movable if desired, and both be moved to open and close in the manner and for the purposes described.

In so far as certain features of my invention are concerned, the packing device may be omitted, and the sheets be folded and delivered in any usual way after being creased by the blade 85. The last named folding apparatus (creaser 85 and co-acting rollers) may be replaced by other forms of folding apparatus without departing from my invention.

The holder 128 in the trough 126 is not essential, and may be dispensed with.

The fingers 78 and 79 are not essential to the operation of the machine, and may be dispensed with if desired.

In case it is desired to fold sheets of narrower pages than that shown, the machine can be readily adjusted for such purposes as follows:—The head H lifts the sheets until arm 27 of shaft 25 is operated by cam 84. This cam is part of an adjustable plate, 150, which may be adjusted in any suitable way. It is shown as having two slots 151, 152, through which set screws 153, 154 pass into the framework. By adjusting this plate, the shaft 25 is operated, and the grippers 26 opened sooner or later so as to bring the central margins opposite the creaser 85. The sheets cease to

rise when the grippers 26 open. In this way, the machine is adjusted to fold sheets having pages of different widths.

The tapes, creasers and rollers of the folding apparatus are run by any suitable means commonly used for that purpose.

I have not shown the framework for supporting the various parts for clearness, but it may be of any ordinary character.

Knife 42 may have a serrated edge and it may have a vibrating instead of a sliding motion.

Bars 76, 77 may be fixed at one or both ends in the framework, while bar 69 (which is behind lever 63 in Fig. 1) is supported at one end. Bars 76, and 77 may be replaced by rollers, if desired, the two being equivalents for the present purposes.

I do not limit myself to the form of auxiliary mechanism shown and described herein for operating the jaw 23 or gripper 26, since it may be replaced by other forms without departing from my invention.

The knife shown rests with its edge above the cushions during the descent of the head until the sheets are severed. It may be operated differently if desired; thus, it may have its edge flush with or below the top of the cushions and be raised as the head approaches it and then be lowered as described.

The movability of the knife 42 is not an essential feature of the present invention; the knife may be fixed and the gripping jaws will still grip the edges of the sheets and bring the two parts along side of each other in the manner described.

In so far as the packer or pusher is concerned it is immaterial whether a trough as 126, be used to receive the folded copies or whether they be carried away by delivery belts or otherwise.

The throw of head H may be made adjustable by suitable means to render the machine capable of folding sheets of different dimensions. To do this it is only necessary to lengthen or shorten the arm 35, and to shorten or lengthen the rod 36, things within the knowledge of ordinary mechanics.

The cam 84 to open the gripping jaws is not essential since the sheets may be frictionally held with only sufficient force to lift them out and be pulled from between the jaws by the folding devices without the opening of the jaws.

It will be observed that the open jaws on the head H form a groove which is both a cutting and a gripping groove.

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

1. The combination with sheet-feeding appliances, or clamping, cutting, and gripping mechanism substantially as described which clamps a sheet along a central margin, severs it there-along, then grips the adjacent edges and brings the two parts alongside each other, guides directing the said two parts, a cam opening the gripping part of said mechanism,

and auxiliary folding mechanism, substantially as and for the purposes described.

2. The combination with sheet-feeding appliances, of clamping cutting and gripping mechanism substantially as described which clamps a sheet along a central margin, severs it therealong, then grips the adjacent edges and brings the two parts alongside each other, guides directing the said two parts, cams opening the gripping part of said mechanism, and auxiliary folding mechanism, substantially as and for the purposes described.

3. In a folding machine the combination of sheet feeding appliances, a reciprocating head having clamping and gripping jaws, a movable knife, yielding clamps between which the knife works and which co-act with the said jaws to clamp the sheets as described, mechanism sheathing the knife as described, a cam device opening the jaws, guides directing the two parts into which the sheets are cut, and means closing the jaws when freed from the cam device, whereby a sheet is fed, clamped, severed, and the two parts are gripped and brought together, substantially as described.

4. In a folding machine, the combination of sheet feeding appliances, a reciprocating head having clamping and gripping jaws, a movable knife, yielding clamps between which the knife works and which co-act with the jaws to clamp the sheets as described, mechanism sheathing the knife as described, cam devices opening the jaws toward the end of the movement of the head in each direction, means closing the same when freed from the cam devices, guides directing the two parts into which the sheets are cut, a creaser, and folding devices co-acting therewith, whereby sheets are fed, clamped, severed, the parts brought together, and folded, substantially as described.

5. In a folding machine, the combination of sheet feeding appliances, a reciprocating head having clamping and gripping jaws, a movable knife, yielding clamps between which it works and which co-act with said jaws to clamp the sheets as described, mechanism sheathing the knife as set forth, cam devices opening the jaws toward the end of the movement of the head in each direction, means closing the same when freed from the cam devices, guides directing the two parts into which the sheets are cut, a creaser, folding devices co-acting therewith, and friction devices for keeping the upper parts of the sheets taut; whereby sheets are fed, clamped, severed, the two parts brought together and then folded, substantially as described.

6. In a folding machine, the combination with sheet feeding appliances of a reciprocating head having fixed and movable clamping and gripping jaws, means to keep them closed, a movable knife, toggle, yielding clamps between which the knife works and which co-operate with the jaws to clamp a sheet along a central margin, mechanism moving the toggle,

thereby sheathing the knife as described, a movable cam device to open the jaws to straddle the knife, a cam to open the jaws to free the sheets, guides directing the two parts into which the sheets are cut, a creaser and folding devices as described, whereby sheets are fed, clamped, severed, the two parts brought alongside each other and folded, as described.

7. The combination with sheet feeding appliances of clamping, cutting and gripping mechanism, substantially as described, clamping a sheet along a central margin, severing it therealong, then gripping the adjacent edges and bringing the two parts alongside each other, guides directing the said two parts, a movable cam device opening the gripping parts of said mechanism and releasing the same after the severance of the sheets, an adjustable cam opening the gripping parts of said mechanism to free the two parts, a creaser and folding devices, whereby sheets of different sizes may be cut and folded, substantially as described.

8. The combination with sheet feeding tapes, a paste device applying paste to a central margin of the sheets, and means substantially as described to raise the pasted sheets from the tapes, of clamping, cutting and gripping mechanism substantially as described clamping the sheets along a central margin, severing the sheets therealong, then gripping the adjacent edges and bringing the two parts alongside each other, guides directing the said two parts, cam devices opening the gripping parts of said mechanism, a creaser and folding devices, substantially as described, whereby sheets are pasted, cut and folded, substantially as described.

9. The combination with sheet feeding tapes, a device applying paste to a central margin of the sheets, and means, substantially as described, raising the pasted sheets from the tapes, of a reciprocating head having clamping and gripping jaws, a movable knife, yielding clamps between which the knife works and which co-act with the said jaws to clamp the sheets as described, mechanism sheathing the knife between said clamps, guides directing the two parts of the severed sheets, cam devices to open the jaws as described, means to close the jaws when freed from the cam devices, a creaser and folding devices substantially as described, whereby sheets are pasted, cut and folded, substantially as described.

10. The combination with devices delivering folded copies, of a receiver, substantially as described, curved guides therein, shaped to the path of the lower edges of entering copies and a flat packer having a motion of circumduction, substantially as described.

11. The combination with devices delivering folded copies, of a trough-like receiver open at the ends and its bottom partly cut away at one end, to receive the packer and a flat packer having a motion of circumduction and composed of a series of slats having anti-

friction rollers projecting slightly beyond the working faces of the slats, substantially as and for the purposes set forth.

12. The combination with devices delivering folded copies, of a trough-like receiver open at the ends and its bottom partly cut away at one end, to receive the packer and a flat packer having a motion of circumduction, substantially as described.

13. The combination with devices delivering folded copies, of a trough-like receiver open at the ends and its bottom partly cut away at one end, to receive the packer curved guides shaped to the path of the lower edges of entering copies in the receiver at the cut-away end, and a flat packer having a motion of circumduction, substantially as described.

14. The combination with printing mechanism, delivery tapes, clamping, cutting and gripping mechanism, substantially as described, a movable creaser and folding rollers taking the six or eight page copies from said mechanism, a movable creaser and rollers folding four page copies and tapes running the sheets from each of said creasers and their folding rollers to a common point to the tapes of a folding machine, substantially as described.

15. The combination with sheet conveyers and stops of a reciprocating head having cutting and gripping groove, a cutter acting with said groove to sever the sheet, and folding devices whereby a sheet is cut on one margin and folded on another margin, substantially as set forth.

16. The combination of the sheet feeder, a reciprocating head having a cutting and gripping groove, a knife blade, yielding bars between which the knife is placed and above which it normally projects and folding devices whereby sheets are cut on one margin and folded on another margin, substantially as set forth.

17. The combination of a reciprocating grooved gripping head or bar located above the path of the sheet, a cutting device located beneath the path of the sheet and arranged to co-act with the grooved head or bar to sever the sheet, and folding devices within the range of which the head brings the severed sheets, substantially as set forth.

18. The combination of sheet feeding means, a paste device to supply paste on one

margin on one side of the sheet, a cutting blade as described, located on the same side of the sheet, a reciprocating head having a gripping groove, and folding devices located on the opposite side of the sheet operating substantially as described, whereby a sheet is pasted on one margin, cut on another and folded on the pasted margin, as set forth.

19. The combination of sheet feeding means, a paste wheel to apply paste to a margin on the lower side of the sheet, a cutting device as described, located below the line of travel of the sheet, a reciprocating head having a gripping groove, and folding devices located above the path of the sheet whereby a sheet is pasted on one margin, severed on another and folded on the pasted margin, substantially as set forth.

20. The combination of sheet delivery rollers, a receiving trough and a packer or pusher having a motion of circumduction, substantially as described.

21. The combination of sheet delivery rollers, a sheet receiving trough, a packer or pusher having a motion of circumduction, and a sheet holder, as set forth.

22. The combination of sheet delivery rolls, a packer or pusher, two crank shafts on which it is mounted, a crank on each shaft placed at an angle to the cranked part supporting the packer or pusher, and a connecting rod between said cranks, with a sheet receiver substantially as set forth.

23. The combination of sheet delivery rollers, a pusher and crank shafts on which the pusher is mounted, the axes of the shafts being located behind the path of the sheet as it is delivered from the rolls, and a sheet receiver substantially as described.

24. The combination of sheet delivery rolls, a pusher, two crank shafts on which it is mounted, the axes of the shafts being located behind and at an angle to the path of the sheet as delivered from the rolls, and a sheet receiver as set forth.

Signed at New York, in the county of New York and State of New York, this 1st day of July, A. D. 1891.

WALTER SCOTT.

Witnesses:

R. W. BARKLEY,
PAUL WILCOX.