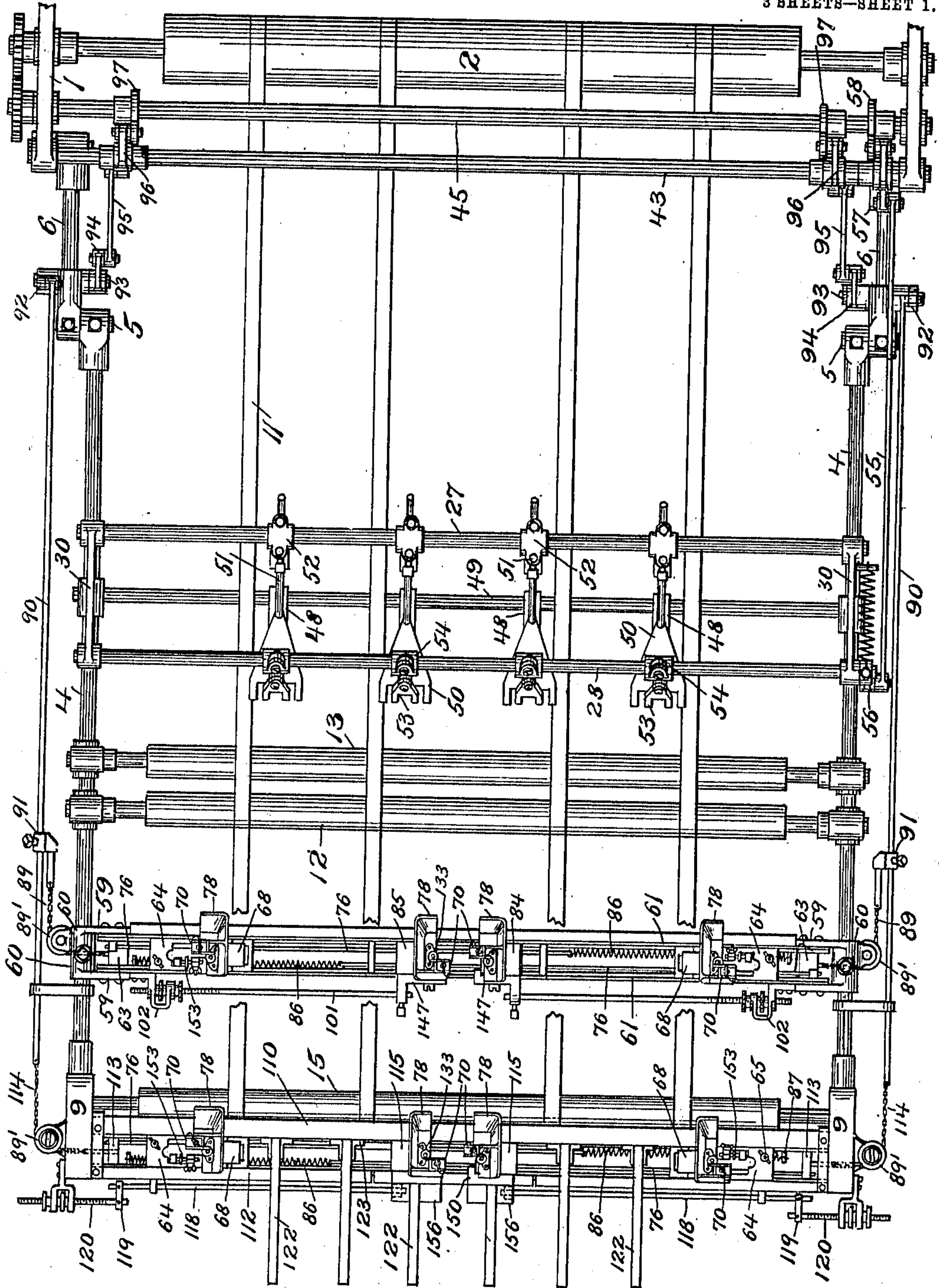


A. COLE.
PAPER FEEDING MACHINE.
APPLICATION FILED APR. 24, 1906.

945,304.

Patented Jan. 4, 1910.

3 SHEETS—SHEET 1.



Witnesses
J. F. Graves
G. L. Linn

Fig. 1.

Inventor
Archibald Cole
By his Attorneys
Philip J. Vane, Rice & Kennedy

[illegible]

Witnesses
J. A. Graves
H. Galiani

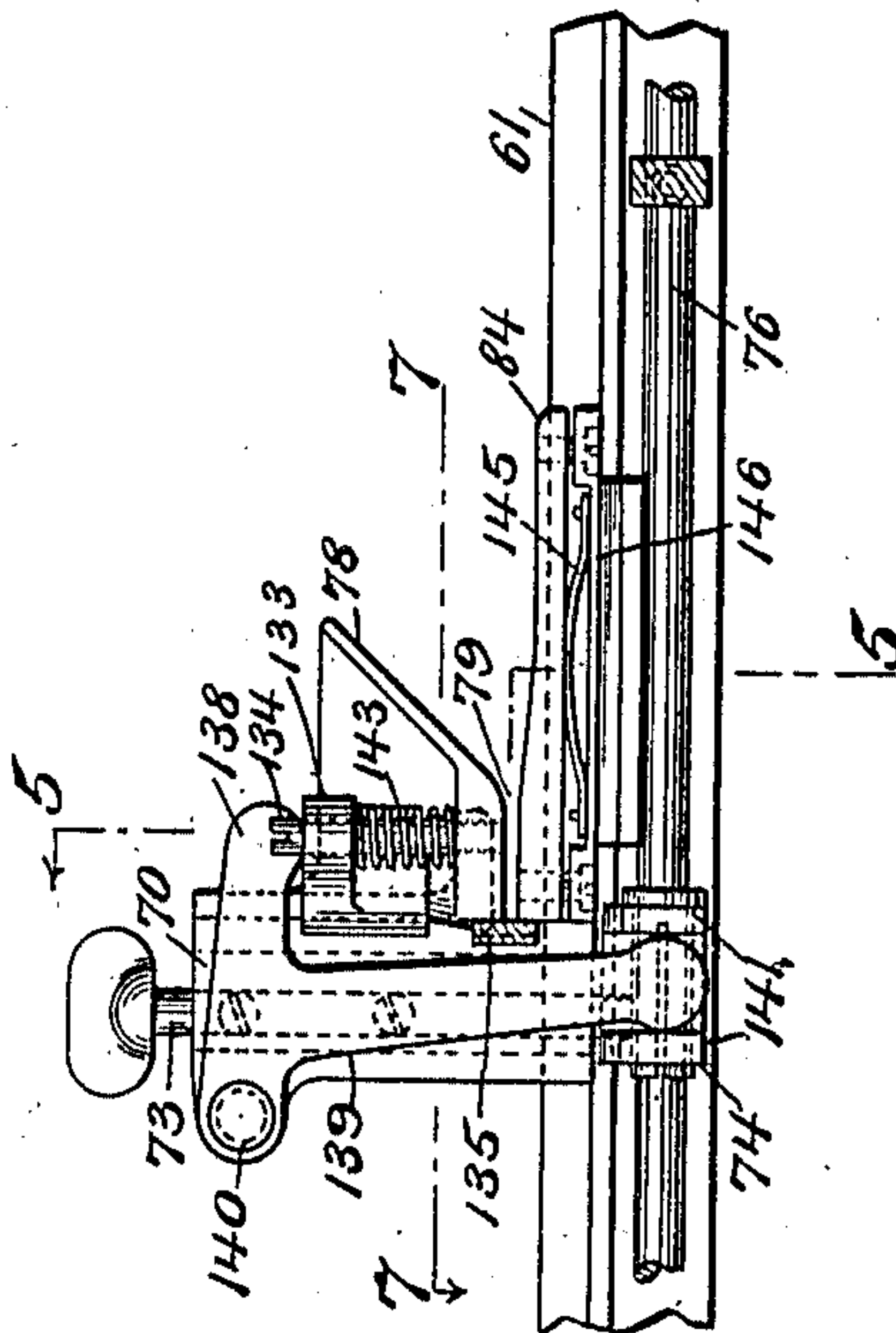
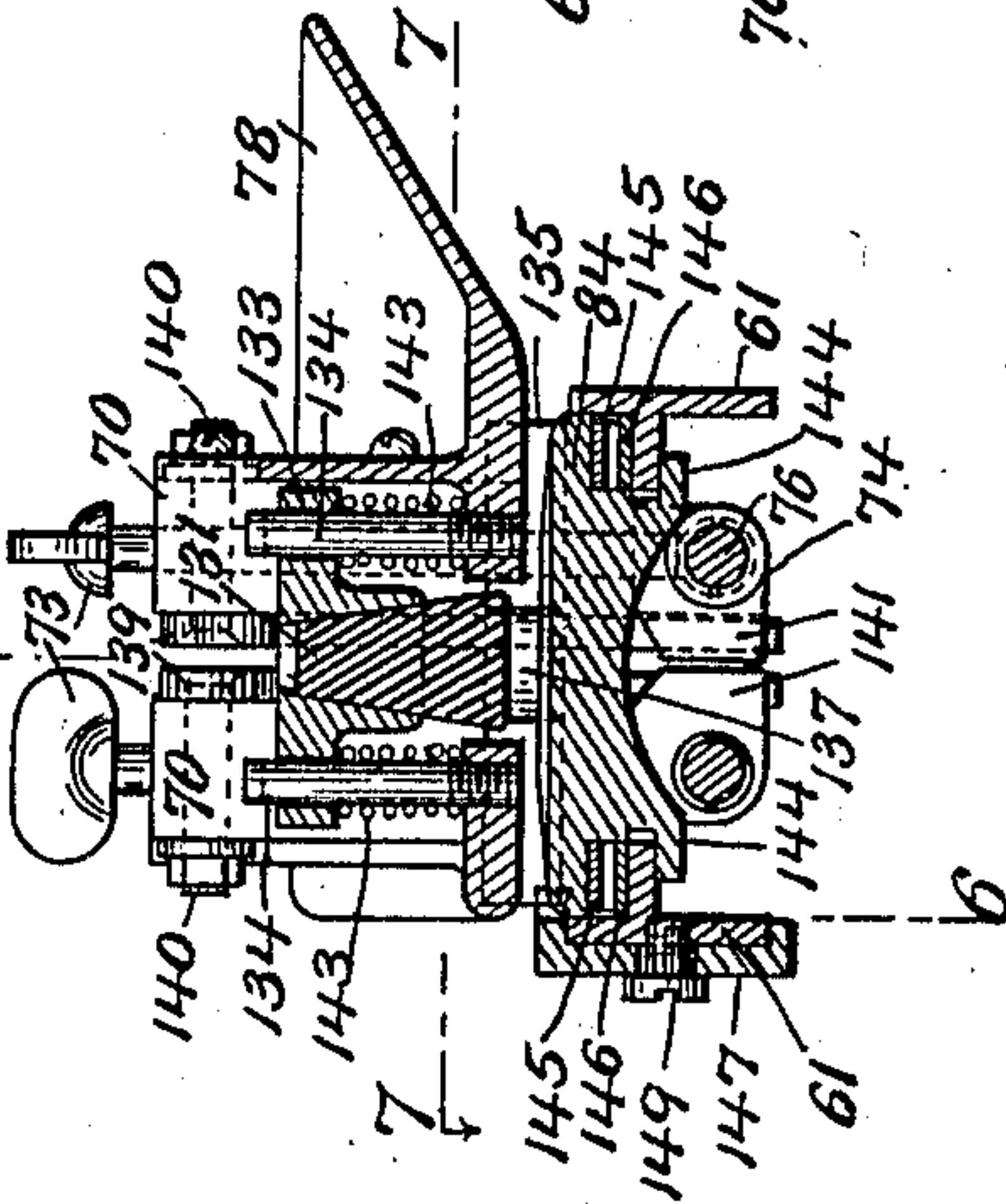
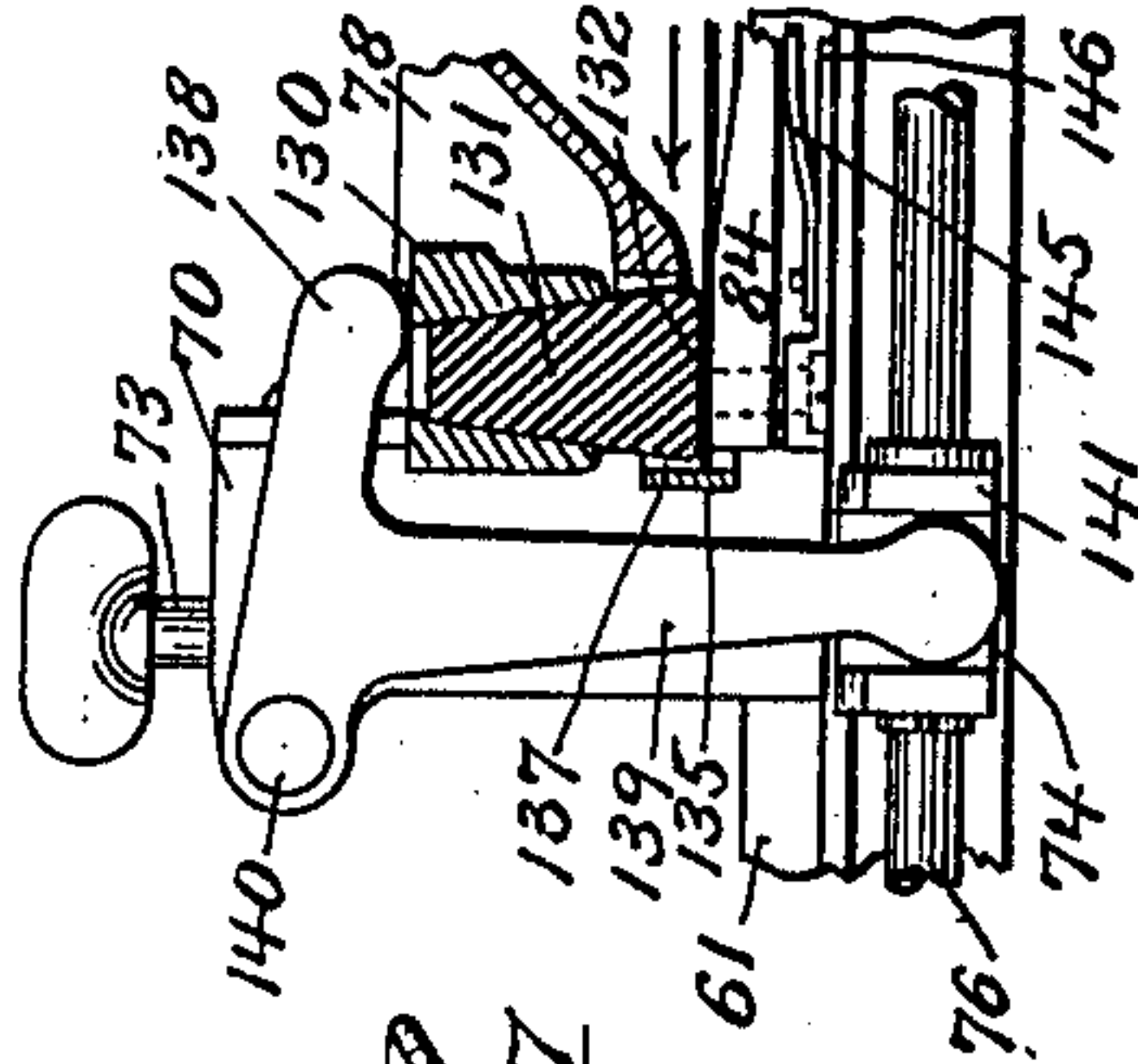
Fig. 4.

Archibald Cole Inventor
By his Attorneys-
Philip. S. Fournier Rice & Kennedy

3 SHEETS—SHEET 2.

Fig. 6

Fig. 5.



945,304.

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3 SHEETS—SHEET 3.

Fig. 9.

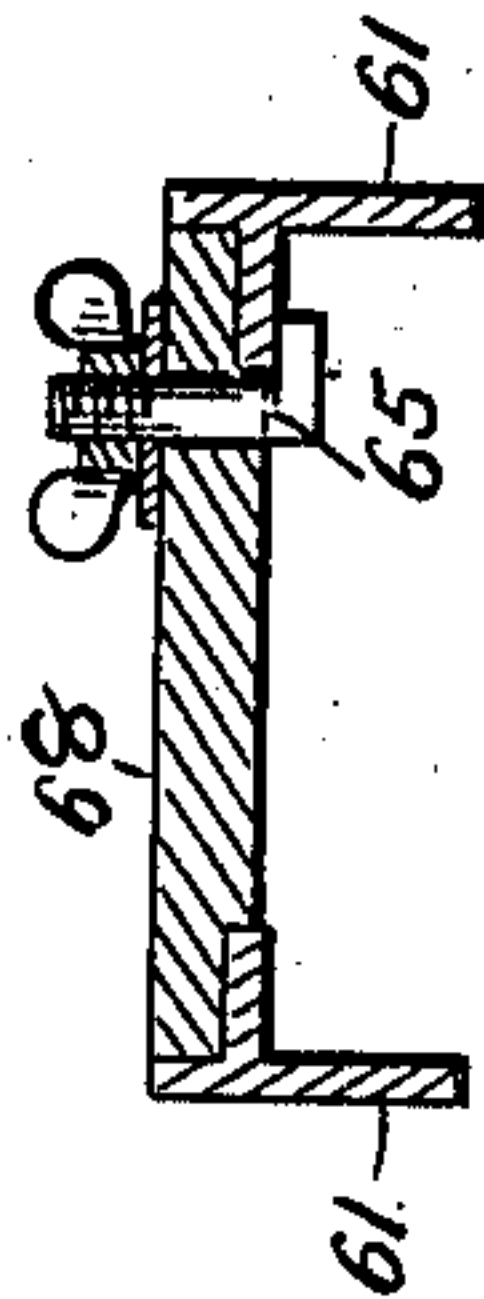


Fig. 10.

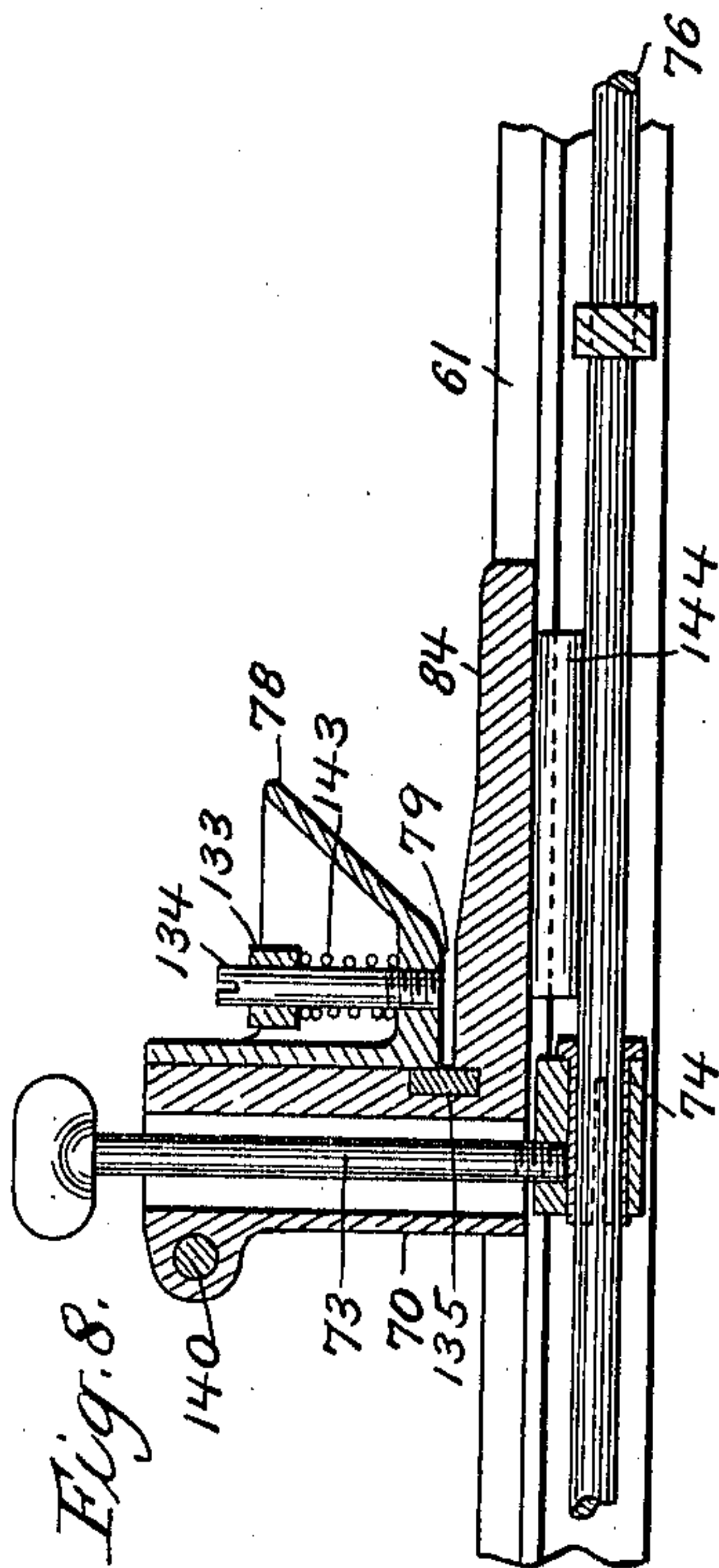
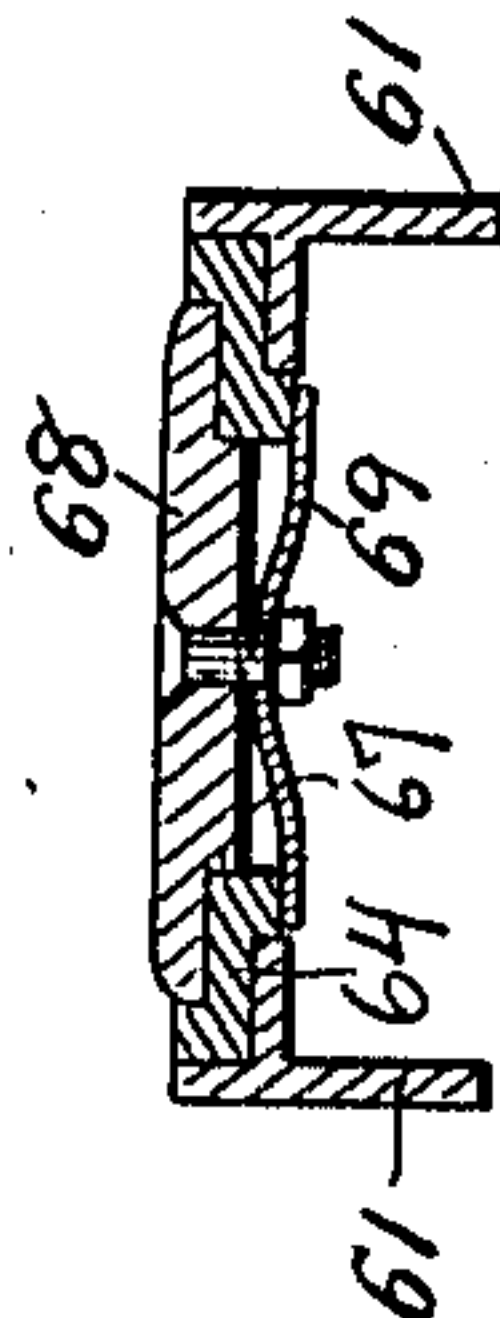
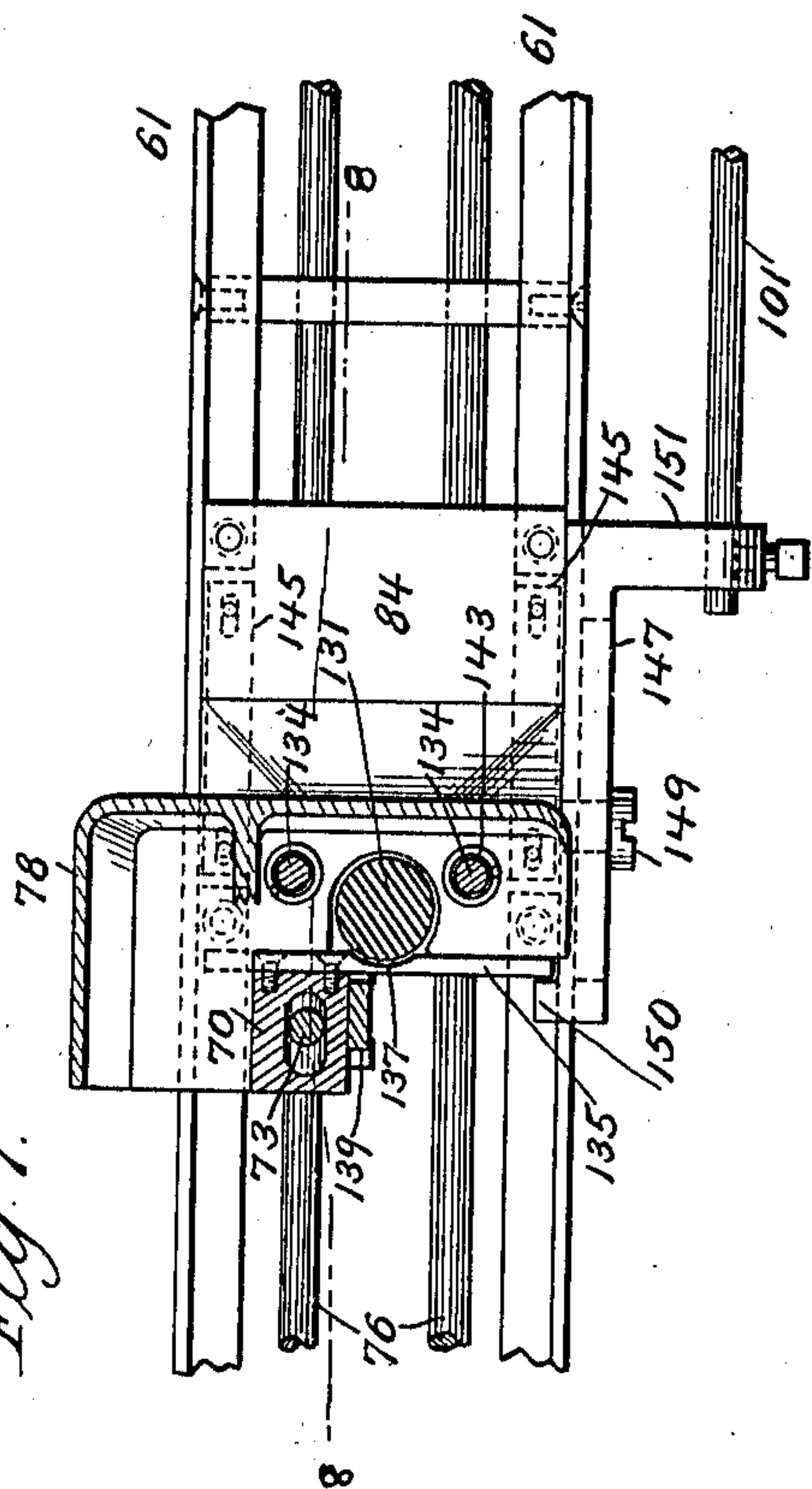


Fig. 8.

Fig. 7.



Witnesses
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G. A. Lian

Inventor
Archibald Cole
By his Attorneys
Philip S. Lamm, Rice & Kennedy

UNITED STATES PATENT OFFICE.

ARCHIBALD COLE, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE FULLER MANUFACTURING COMPANY, OF NEW HAVEN, CONNECTICUT, A CORPORATION OF CONNECTICUT.

PAPER-FEEDING MACHINE.

945,304.

Specification of Letters Patent.

Patented Jan. 4, 1910.

Application filed April 24, 1906. Serial No. 313,392.

To all whom it may concern:

Be it known that I, ARCHIBALD COLE, a citizen of the United States, residing at New York city, county of Kings, and State of New York, have invented certain new and useful Improvements in Paper-Feeding 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 sheet feeding mechanisms of the character employed in feeding and registering a plurality of sheets which are advanced side by side.

Feeding mechanisms of the general character referred to are illustrated in Patent No. 714,847 granted December 2, 1902, in which machine provision is made for forwarding two sheets side by side, the sheets being side registered by means of suitable pushers which operate to shift the sheets toward the center of the sheet pathway against suitably located sheet stops. While these machines are satisfactory for certain classes of work, there are certain other classes of work on which they cannot be efficiently employed.

In Patent No. 836,164, granted November 20, 1906, to the E. C. Fuller Co. as assignee of George R. Williams, a machine is disclosed in which there is provided a pathway through which a plurality of sheets may be forwarded side by side, the machine being provided with pairs of sheet registering devices, each pair, specifically considered, consisting of an outer sheet pusher and an inner sheet pusher, provision being made for connecting any or all of the sheet pushers to the operating mechanism. This machine has a wider range of work than the machine disclosed in the patent referred to, but is open to the objection that on certain classes of work, as, for instance, where the sheets are very wide, or the paper is very thin, or both, it is difficult to properly manipulate the sheets by pushers.

The present invention has for one of its objects to produce an improved sheet feeding mechanism of the character employed for feeding and registering a plurality of sheets advanced side by side, the mechanism being of such a character as to properly ma-

nipulate the sheets without regard to their width or thickness.

A further object of the invention is to improve the details of construction of machines of the character referred to, thereby producing a more efficient machine.

With these and other objects in view, the invention consists in certain constructions and in certain parts, improvements and combinations such as will be hereinafter fully described and then specifically pointed out.

Referring to the drawings—Figure 1 illustrates in plan view one embodiment of the improved sheet feeding mechanism. Fig. 2 is a detail view, on an enlarged scale, illustrating the mechanism for operating the sheet registering devices. Fig. 3 is a side elevation of the construction illustrated in Fig. 2. Fig. 4 is an enlarged detail view, in side elevation, of the gripper mechanism and part of its operating devices. Fig. 5 is a section, on an enlarged scale, on the line 5—5 of Fig. 4, the plane of section also being indicated by the line 5—5 of Fig. 2. Fig. 6 is a section on the line 6—6 of Fig. 5. Fig. 7 is a section on the line 7—7 of Fig. 4. Fig. 8 is a section on the line 8—8 of Fig. 7. Fig. 9 is a section on an enlarged scale on the line 9—9 of Fig. 2. Fig. 10 is a section on the line 10—10 of Fig. 2.

The feeding mechanism which forms the subject of the present invention is designed to be used in connection with automatic devices for loosening and removing the sheets from piles, these devices, including as is well known sheet bucklers and pushers. These devices, however, form no part of the present invention and are not illustrated.

In the particular construction selected to illustrate the invention, the parts of the side frames which sustain the sheet loosening and pushing devices are indicated at 1, the sheets being advanced to these devices by a pair of forwarding rolls, one of which is indicated at 2, these rolls being journaled in the frames 1. From these rolls, the sheets are forwarded, in the particular mechanism shown, in the manner to be hereinafter described, to the printing mechanism which is not illustrated.

In the particular construction selected to illustrate the invention, two side bars are employed, these bars being marked 4 and

being pivoted at 5 to arms or extensions 6 which extend forward from the side frames 1. Suitable standards will be employed to support these bars and extensions which usually rest upon the feed-board of the printing machine, not illustrated.

In the particular construction illustrated, the sheets are intended to be forwarded by tapes indicated at 11 in Fig. 1. These tapes run around the roll 2 which is a driven roll, suitable driving gearing being indicated, and then around over the idle roll 12. From this roll, the tapes run back over and around the roll 13, and then over and around the roll 15, from which they run back to the roll 2. Any other suitable forwarding devices may be used instead of these tapes, if desired.

Constructions embodying the invention are designed to be used in connection with sheet feeders in which a plurality of sheets, which have been simultaneously removed from adjacent piles, are forwarded side by side to a printing machine. In the best constructions embodying the invention, the sheets in the process of being forwarded by the tapes or other suitable forwarding mechanism, will be brought to rest against front stops, these stops serving to straighten the sheets. These front stops, when employed may be of any suitable construction. As shown, these front stops embody under guides 48 which are supported by a cross rod 49. These under guides will be located just below the tapes. Above these under guides are located upper guides 50 carried by pins 51 mounted on supports 52 secured to a cross rod 27. The outer ends of the upper guides are shown as recessed and through these recesses work stops 53, these stops being mounted on supports 54 which are fast to a rock shaft 28. The rock shaft 28 and the rods 27 and 49 are supported in brackets 30 which are secured by collars, or in any other suitable manner, to the bars 4. The rock shaft 28 is operated from a connecting rod 55 which is secured to an arm 56 fast on the shaft and to a cam lever 57 pivoted on a rod 43. This cam lever 57 is operated from a cam 58 on a driven shaft 45.

In the operation of the mechanism, the sheets will be forwarded until they strike the front stops 53 by which they are straightened, the stops being then rocked upward to permit the further advance of the sheets. The sheets having been straightened by the straightening mechanism, or the stops, assuming that such mechanism is employed in the machine, pass on to the side registering devices. The particular construction of these devices may be varied within wide limits. These devices, however, will include sheet pullers, that is, devices by which the sheet is seized and positively drawn in one direction or the other to side register the same, as distinguished from de-

vices in which the sheet is shoved or pushed in one direction or the other. In the particular construction shown, the rods 4 carry castings 59, these castings being formed to provide collars 60 which embrace the rods, the castings being adjustable on the rods and held thereon by any suitable means, as by set screws. These castings serve to support ways 61 which extend across the machine, these ways forming a guide. These castings are also formed to provide short pairs of guides consisting of ribs 62 (see dotted lines in Fig. 3) these ribs supporting operating blocks or slides 63 which will be hereinafter referred to, there being one of these blocks or slides on each side of the machine. The ways 61 support plates 64, there being one of these plates on each side of the machine. These plates may be adjusted in the ways and held in adjusted position by clamp screws 65, these screws, after passing through the plates 64, taking under the ribs on the ways 61. The plates 64 are formed to provide ways 67 and in these ways are mounted slides 68, these slides being held in the ways by means of tension springs 69 illustrated in Fig. 10.

Rising from the plates 68 and, in the construction illustrated, in one piece therewith, are standards 70 which serve to support guides or guards 78, the function of which is to prevent the ends or edges of the sheets from curling up and to insure that the sheets are acted upon by the pulling devices which will be described. These guards 78 are so located with respect to the slides 68 as to leave narrow openings 79 in which the edges of the sheets to be registered enter. These openings, with respect to the particular registering devices now being described, to wit, the outer devices, face inwardly, that is, toward the center of the sheet path, and serve, therefore, to receive the outer edges of the sheets being advanced along the path. The particular construction of these pulling devices may, as has been indicated, be widely varied, but in the best constructions these devices will embody a gripper or similar device which has a movement in a right line which is perpendicular to the sheet, as distinguished from a rocking movement, or a movement in an arc, such a construction having specific advantages.

In the particular construction shown, the gripper comprises a plunger composed of a casting 130 and a plug 131 which is preferably of cork, rubber or some similar compressible material. The casting has a conical opening in which the plug is inserted and held by friction. The lower edge of this plug forms a gripping face 132. The plunger, in the particular construction illustrated, is provided with ears 133 which take over a guide consisting of vertical pins 134, these pins rising from the guard 78. These

pins insure a right line movement of the plunger. In the best constructions and as illustrated, there will be employed in connection with this gripper and guard a sheet stop, as illustrated, this sheet stop consisting of a plate 135 (see Figs. 4, 6, 7 and 8). These plates are let into suitable recesses formed in the standards 70 and in the plates 68. The construction is well illustrated in Figs. 7 and 8, which, however, represent the inner side registering devices the construction of which differs in some respects from the outer side registering devices, although it is the same in this particular. As the sheets come into position to be registered, the grippers are given a slight movement toward the edge of the sheet, this movement being sufficient to cause the sheet stops to strike the edge of the sheet, after which the grippers are closed, as will be hereinafter described, and moved in the opposite direction to register the sheet. There is liability, however, that the impact of the stops against the sheet may be strong enough to slightly curl the edges of the sheets, thus interfering with the exact positioning of the sheets necessary to secure an exact register. In the best constructions and as shown, the movable element of the gripper will be so positioned that the gripping face thereof lies partly in front and partly behind the sheet stop, so that when the gripper closes it will, if the edge of the sheet has been curled, push it back slightly, the result of which is that the gripper seizes the sheet at the precise point with respect to its edge which is necessary in order to effect perfect register. This positioning of the operating face of the movable gripper element so that when the sheets are seized, it will be partly in front of and partly behind the operating face of the sheet stop, may be effected in various ways. As shown, it is effected by recessing the operating face of the sheet stop slightly, as indicated at 137 (see Fig. 7).

The gripper may be operated in various ways. In the construction illustrated, there is provided a bell-crank lever 138, 139 pivoted at 140 to the standard 70. The end of the arm 138 of the lever overlies the top of the plunger before referred to, and the other end of the arm takes in between ears 141 on a collar 74, this collar being held fast on a slide rod 76 by means of long bolts 73 which pass through standards 70. It will be understood that when the slide rod is moved by suitable mechanism, the bell-crank lever will be operated to throw the plunger down against the sheet, the plate 68 acting as an abutment for the gripping face of the plunger, so that the gripper is caused to seize the sheet. A further movement of the slide rod will then, through connections hereinafter described, move the gripper mechanism as a whole so as to position the

sheet. A movement of the slide rod in the reverse direction releases the pressure on the top of the plunger, the plunger being then returned in any suitable manner, as by springs 143 which surround the pins 134.

The inner side registering devices are the same in all essential features of construction as the outer ones just described, but for the purpose of more readily distinguishing them, however, as to certain features of constructions which will be described, the plate on which the standard and guard of the right hand inner gripper is mounted is marked 84, and the plate on which the standard and guard of the left hand inner gripper is mounted is marked 85, these plates being slides mounted on the ways 61 before referred to. These plates 84, 85 are provided with ribs 144 which take under the inwardly extending flanges of the guide 61, and in order to hold them firmly and at the same time permit them to slide on the guide 61, friction springs 145 are provided, these springs being secured to gibs 146 which run on the ways. The inner registering devices have openings 79 between the guards and the plates facing outwardly as is shown. The side registering devices are, therefore, arranged in pairs, one member of each pair lying alongside the outer edge of the sheet and having its sheet receiving opening facing inwardly, and the other member of each pair being arranged alongside the inner edge of each sheet and having its sheet receiving opening facing outwardly. It will be seen that by properly manipulating the two inner gripping devices, two sheets passing along the sheet path may be seized by their inner edges and drawn inwardly, or by properly manipulating the outer devices two sheets may be seized by their outer edges and drawn outwardly into register. Certain other operations which will be hereinafter referred to may be performed.

While the devices for giving the gripping devices their registering movements may be widely varied, this, in the particular construction shown, is effected through the rods 76 and the slides 63 before described. The rods 76 are connected at one end to the slides 63 before referred to and at the other end are connected by springs 86 to studs 87 fast on the ways 61 before referred to. The slides 63 carry studs 88 to which are connected chains 89, these chains running around suitable guide pulleys 89'. These chains are connected to adjustable collars 91 which are in turn connected to rods 90. These rods are fast to arms 92 on short rock-shafts 93, these shafts being journaled in brackets which are carried on the rods 6. These rock-shafts 93 have operating arms 94 connected to them, these arms being connected by links 95 to cam lever 96 pivoted on the shaft 43 before referred to and oper-

ated by cams 97 on the shaft 45. In this construction, the rods 76 are moved in one direction by the cams and connections described, and in the opposite direction by the spring. In the construction illustrated, it will be understood that the cams will be so formed as to permit the springs to pull the grippers slightly toward the edges of the sheets just prior to the time the grippers are closed, as has been heretofore described; that is, in the operation of the grippers they first move slightly toward the sheets to bring the sheet stops in contact with the edges of the sheets, the grippers are then closed and the sheets pulled into register.

It will be readily understood that the bolts 73 of the several registering devices may be operated to either lock or release these registering devices from the rods 76. By releasing the bolts 73 of the outer gripper mechanisms, the sheets may be registered by their inner edges, as before indicated. By releasing the bolts 73 of the inner registering devices, the sheets may be registered by their outer edges, as before indicated. By releasing a bolt 73 of an inner registering device and the bolt 73 of the outer registering device of the other pair, one sheet may be registered by its inner edge and the other by its outer edge. By connecting all the registering devices to the rods, four sheets may be fed down the pathway and registered, two being registered by their inner edges and two by their outer edges; or, by releasing all the bolts 73 except one, a single sheet may be registered either by its inner or outer edge.

In the best constructions and as shown, four pairs of registering devices will be employed, two pairs being arranged in advance of and in line with the other two pairs, so that the sheet is registered by being seized at two points. The additional pairs of registering devices shown are or may be similar in all respects to those previously described. In the particular construction illustrated, castings 9 are mounted on the rods 4, these castings supporting a guard plate 110. This guard supports a way or guide not illustrated, for the reason that it underlies the guard plate, there being a cooperating way or guide 112 which is supported by the castings 9. Slide blocks 113 are employed, these blocks being generally similar to the slides 63 before described. These slide blocks are connected by chains 114 to the rods 90 before described and they have extending from them rods 76 connected to springs 86, this construction being similar to the construction already described. The exterior registering devices are mounted on slides 68 similar to those before described. The interior registering devices are mounted on slides 115 which while they operate like the slides 84, 85, are slightly different in configuration.

Secured to these slides are blocks 156 which are similar to and effect the same function as the plates 147, hereinafter referred to, these blocks being provided with stop lugs 150. These blocks 156 are positioned by adjusting the rods 118 connected by cross bars 119 to screw adjusting devices 120.

It is of course important not only that the several registering devices be capable of adjustment, but that the adjustment be such that after operation, the said devices will return with exactness to the initial point from which they began their movement. The construction by which this adjustment is effected may be considerably varied.

In the particular construction shown, the adjustment of the two inner registering devices is effected by providing plates 147, these plates being provided with slots 148 through which pass screws 149, these screws being tapped into holes in the ways 61. These plates are provided with inwardly projecting lugs 150 which take behind the plates 84, 85. These plates 147 have projecting ears 151 which are connected to rods 101, these rods being supported in brackets 102 connected to the ways 61. These rods may be threaded, and in order to adjust them, a nut 104 is provided, this nut lying between the two parts of the bracket 102. Jam nuts 105 may be provided to hold the rods in adjusted position. The adjustment of the outer registering devices is provided by adjusting the plates 64 by means of the screw 65 before described. These plates 64 carry stop lugs 152 against which abut screws 153, these screws being threaded into short standards 154 rising from the plate 68. The upper ends of these standards are cleft, so that the screws can be clamped after adjustment by means of the bolt and wing nut 155. It is very important where sheets are to be run a plurality of times through a machine and registered that the devices by which they are successively registered operate on the sheet at points which are equally distant from the head of the sheet. In order to effect this, in a construction in which a plurality of sheets are fed through the machine, it is desirable that the registering devices be exactly in line across the machine. In the particular construction illustrated, this is effected by arranging the several grippers exactly in line with each other across the machine. A sheet will, therefore, be always seized by any gripper at the precise distance from the head of the sheet at which it was seized by the preceding gripper. In order to bridge the space between the guides or rails which carry the lower set of adjusting devices, under guides 122 are employed, these guides being fingers of spring metal of the usual construction. Two of these fingers are mounted on the blocks 156 before referred to and the others are

mounted on sliding blocks 123 of a usual construction. The fingers 122 are intended to coöperate with the front stops such as usually employed in connection with printing machines.

Changes and variations may be made in the construction by which the invention is carried into effect. The invention is not, therefore, to be limited to the specific construction herein shown and described.

What is claimed is:—

1. In a sheet feeding mechanism, the combination with means for forwarding sheets side by side, of sheet pulling devices for each sheet, and means whereby said devices can be operated to shift each sheet sidewise in either direction.

2. In a sheet feeding mechanism, the combination with means for forwarding two sheets side by side, of a pair of sheet registering devices comprising a sheet puller arranged alongside the path of the inner edge of one sheet and a sheet positioning device arranged alongside the path of the outer edge of said sheet, a second pair of sheet registering devices also comprising a sheet puller arranged alongside the path of the inner edge of the second sheet and a positioning device arranged alongside the path of the outer edge of said second sheet, operating means, and means for connecting either puller and either positioning device of the pairs to the operating means.

3. In a sheet feeding mechanism, the combination with means for forwarding two sheets side by side, of a pair of sheet pullers, one of said pullers being arranged alongside the path of the inner edge and the other alongside the path of the outer edge of one sheet, a second pair of sheet pullers, one of said pullers being arranged alongside the path of the inner edge and the other alongside the path of the outer edge of the second sheet, an operating mechanism, and means for connecting either outer and either inner puller to the operating mechanism.

4. In a sheet feeding mechanism, the combination with means for forwarding two sheets side by side, of two pairs of sheet registering devices one pair being arranged ahead of the other pair and each pair comprising a sheet puller arranged alongside the path of the inner edge of one sheet and a sheet positioning device arranged alongside the path of the outer edge of said sheet, two other pairs of sheet registering devices one pair being arranged ahead of the other pair and each pair comprising a sheet puller arranged alongside the path of the inner edge of the second sheet, and a positioning device arranged alongside the path of the outer edge of said second sheet, operating means, and means for connecting either the pullers of the pairs or the positioning devices of the pairs to the operating means.

5. In a sheet feeding mechanism, the combination with means for forwarding two sheets side by side, of two pairs of sheet registering devices, one pair being arranged ahead of the other and each pair comprising a sheet puller arranged alongside the path of the inner edge of the sheet and a sheet puller arranged alongside the path of the outer edge of the sheet, two other pairs of sheet registering devices one of said pairs being arranged ahead of the other and each pair comprising a sheet puller arranged alongside the path of the inner edge of the second sheet, and a sheet puller arranged alongside the path of the outer edge of said second sheet, an operating mechanism, and means for connecting either the outer or the inner pullers of the pairs to the operating mechanism.

6. In a device for side registering sheets, the combination with a gripper, of a single means for first moving the gripper in a right line which is perpendicular to the sheet for opening and closing it to seize the sheet and for then giving it a sidewise positioning movement after it has seized the sheet.

7. In a device for side registering sheets, the combination with an edge stop for the sheets, of a gripper having an operating face which, when the gripper is closed, lies partly in front of and partly behind the operating face of the stop, and a single means for first moving the gripper in a right line which is perpendicular to the sheet to open and close it and for then giving it a sidewise positioning movement after it has seized the sheet.

8. In a device for side registering sheets, the combination with an edge stop for the sheets, of a gripper having a right line closing movement toward the sheet, a lever for effecting said movement, and operating means whereby the lever is first caused to close the gripper and then effect a sidewise positioning movement thereof.

9. In a device for side registering sheets, the combination with an edge stop for the sheets, of a plunger having a gripping face, a guide for causing the plunger to move in a right line which is perpendicular to the sheet, a lever for operating the plunger to close the gripper, springs for opening the gripper, and means for operating the lever to first close the gripper and then to give it a sidewise positioning movement.

10. In a device for side registering sheets, the combination with an edge stop for the sheet, of a plunger having a gripping face, a guide for causing the plunger to move in a right line which is perpendicular to the sheet, a lever for operating the plunger to close the gripper, springs for opening the gripper, and means including a slide for operating the lever to first close the gripper and then to give it a sidewise positioning movement.

11. In a sheet feeding mechanism, the com-

bination with means for forwarding two sheets side by side, of two sheet pullers arranged alongside the inner edges of the sheets and operating means for the pullers.

5 12. In a sheet feeding mechanism, the combination with means for forwarding two sheets side by side, of two sheet pullers arranged one in advance of the other and alongside the path of the inner edge of one
10 sheet, two other sheet pullers arranged one in advance of the other and alongside the inner edge of the other sheet, and operating means for the pullers.

13. In a sheet feeding mechanism, the
15 combination with means for forwarding two sheets side by side, of two inner sheet pullers arranged to operate on the sheets at points located at the same distance from the heads thereof.

20 14. In a sheet feeding mechanism, the combination with means for forwarding two sheets side by side, of two outer sheet pullers arranged to operate on the sheets at points located at the same distance from the heads
25 thereof.

15. In a sheet feeding mechanism, the combination with means for forwarding two sheets side by side, of two inner sheet pullers and two outer sheet pullers, said pullers being
30 arranged to operate on the sheets at points located at the same distance from the heads of the sheets.

16. In a sheet feeding mechanism, the combination with means for forwarding
35 sheets side by side, of two inner sheet registering grippers, said grippers being arranged to act on the sheets at points located at equal distances from the heads thereof, and means for moving the grippers in a
40 right line which is perpendicular to the

sheets to seize the sheets and for giving them sidewise positioning movements after the sheets have been seized.

17. In a sheet feeding mechanism, the combination with means for forwarding 45 sheets side by side, of two outer sheet registering grippers, said grippers being arranged to act on the sheets at points located at equal distances from the heads thereof, and means for moving the grippers in a 50 right line which is perpendicular to the sheets to seize the sheets and for giving them sidewise positioning movements after the sheets have been seized.

18. In a sheet feeding mechanism, the 55 combination with means for forwarding sheets side by side, of two inner sheet registering grippers and two outer sheet registering grippers, said grippers being arranged to act on the sheets at points located 60 at equal distances from the heads thereof, and means for moving the grippers in a right line which is perpendicular of the sheets to seize the sheets and for giving them sidewise positioning movements after the sheets have 65 been seized.

19. In a sheet feeding mechanism, the combination with a plurality of outer sheet pullers, of a plurality of inner sheet pullers, suitable operating mechanism, and means 70 for connecting any or all of said pullers to the operating mechanism.

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

ARCHIBALD COLE.

Witnesses:

J. J. KEATING,
MORTON FOSTER.