(No Model.) 4 Sheets—Sheet 1.

W. SCOTT.

PRINTING MACHINE.

No. 594,909. Patented Dec. 7, 1897.

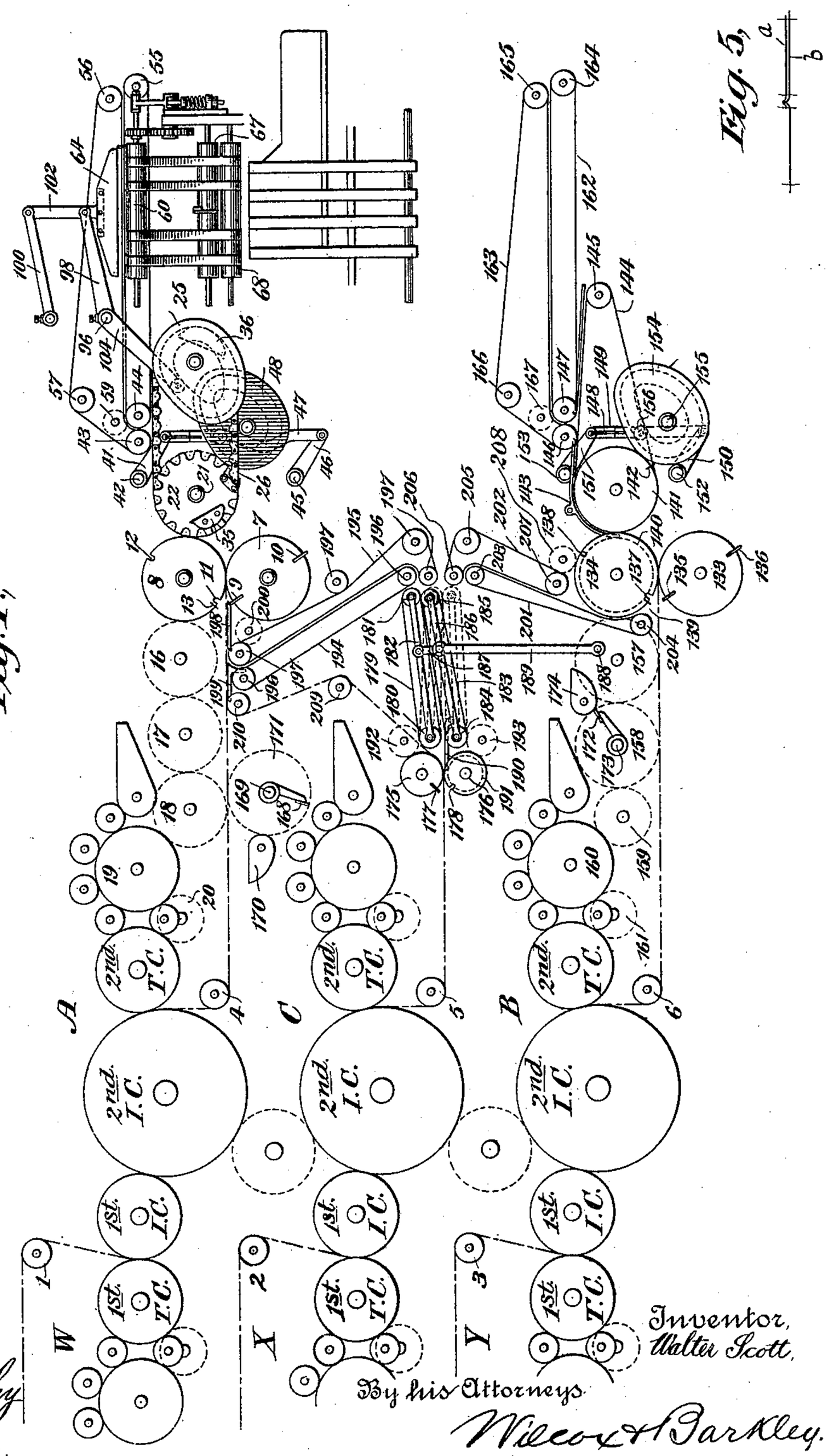

Fig. 1.

Fig. 5.

Witnesses
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(No Model.) 4 Sheets—Sheet 2.

W. SCOTT.

PRINTING MACHINE.

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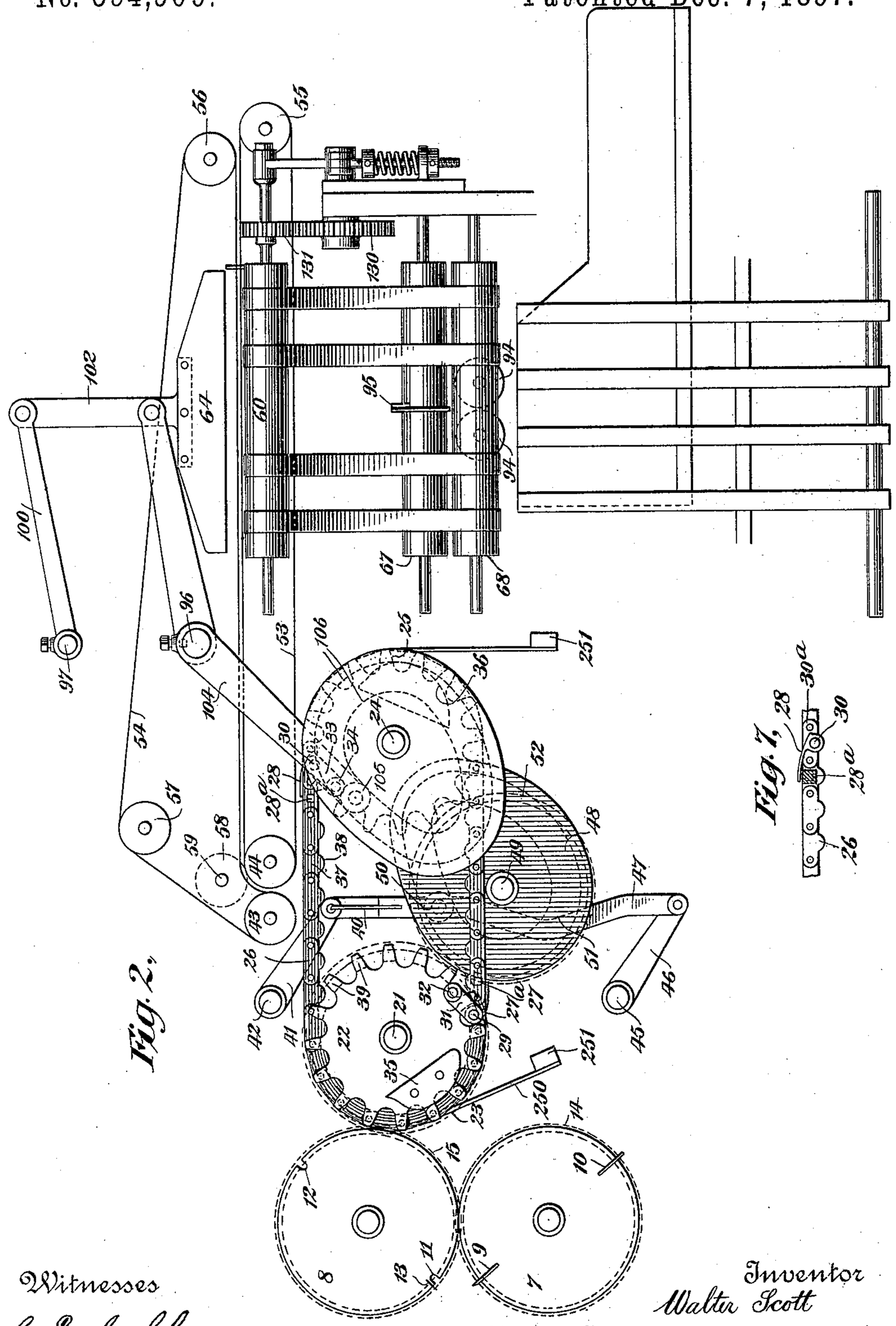

Fig. 2.

Fig. 7.

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(No Model.) 4 Sheets—Sheet 3.

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PRINTING MACHINE.

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Fig. 3.

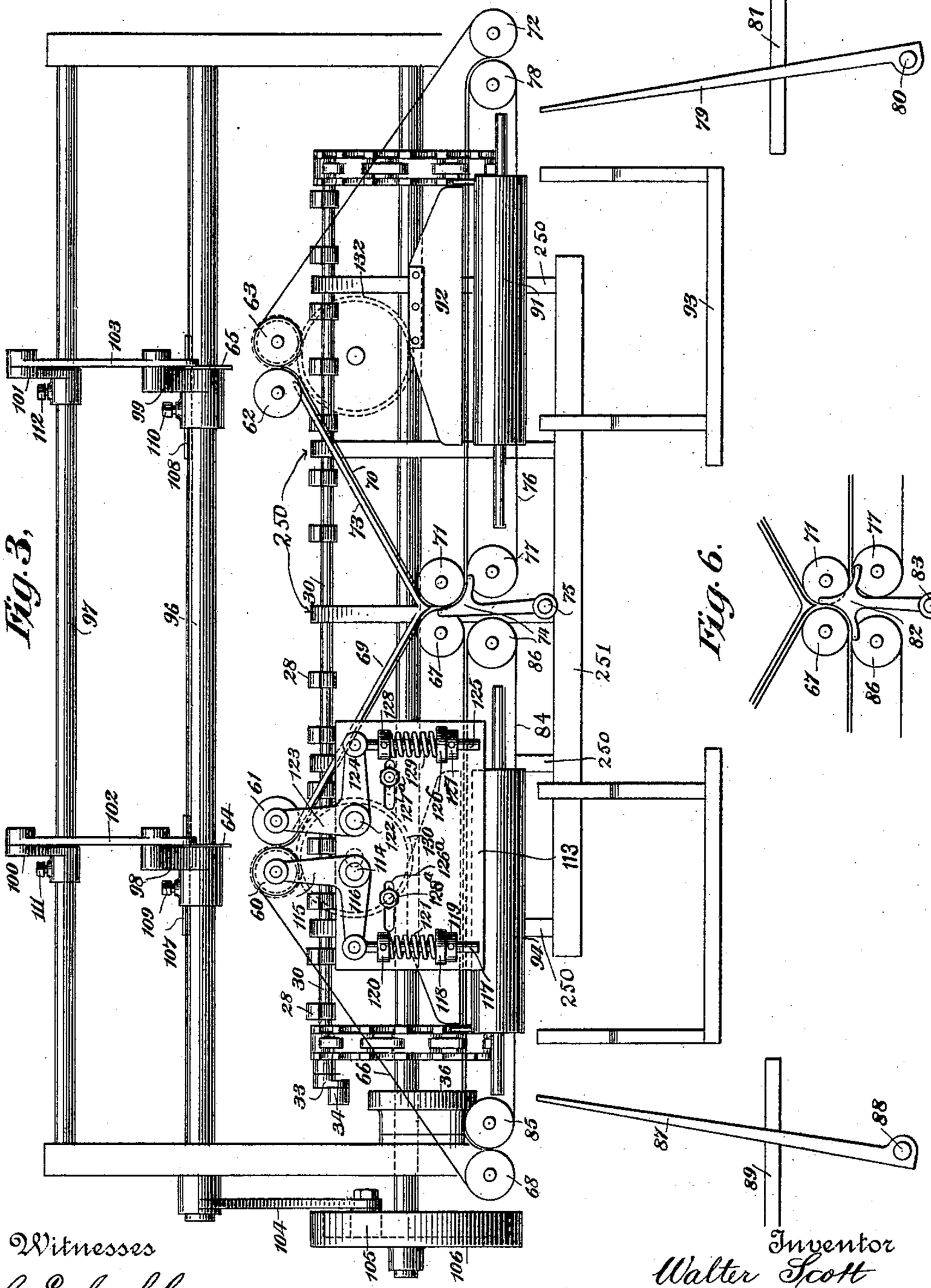

Fig. 6.

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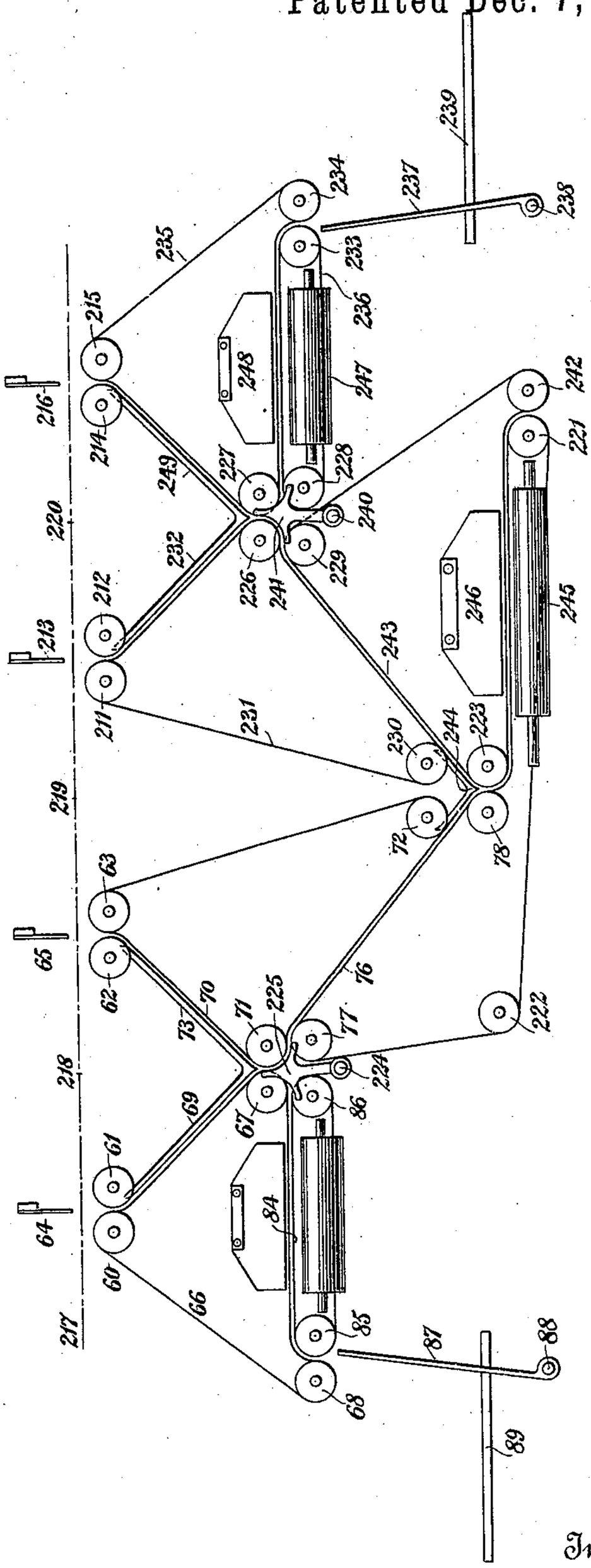
(No Model.) 4 Sheets—Sheet 4.

W. SCOTT.

PRINTING MACHINE.

No. 594,909. Patented Dec. 7, 1897.

Fig. 4,



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

Inventor
Walter Scott,
By his Attorneys
Wilcox & Barkley

UNITED STATES PATENT OFFICE.

WALTER SCOTT, OF PLAINFIELD, NEW JERSEY.

PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 594,909, dated December 7, 1897.

Application filed March 31, 1892. Serial No. 427,163. (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 Printing-Machines, of which the following is a specification.

The preferred form of my present invention is shown in the accompanying drawings, wherein—

Figure 1 is a side elevation of the printing, cutting, and folding mechanisms. Fig. 2 is an enlarged side view of the cutting and folding mechanisms. Fig. 3 is an end view of the mechanism shown in Fig. 2, certain parts being omitted for clearness. Fig. 4 is a view of a modification. Fig. 5 shows a half-sheet folded on the outside of the full sheet. Figs. 6 and 7 illustrate details.

The printing mechanisms shown are of the rotary type, and consist of two main printing-machines (marked A and B, respectively) and a supplemental printing-machine (marked C) between the main machines. The first and second type or plate cylinders of each printing-machine are marked "1st T. C." and "2nd T. C.," respectively, while the first and second impression-cylinders of each are marked "1st I. C." and "2nd I. C.," respectively. The plate-cylinders may be inked in any suitable way. The inking apparatus need not be described, since it may be of any usual form.

The rolls of paper for each machine are to be supported in any usual manner (not shown) and the webs are to be led to the respective machines in any suitable way. Thus the webs W X Y for the machines A B C, respectively, may be led to and between the first plate and impression cylinders thereof over suitable guide-rollers 1 2 3, respectively. From the first impression-cylinders the webs are led to and over the second impression-cylinders, between the latter and the second plate-cylinders, and thence under rollers 4 5 6, respectively.

In the present invention I employ two folding mechanisms, one for each main machine, with a cutting mechanism for the web of each main machine intermediate said main machines, and folding mechanism for severing sheets of a given length from the main webs. I also employ a mechanism for severing half-length sheets from the supplemental web and for directing said half-sheets to and associating them with each of the main webs alternately. Any suitable mechanism may be used for this latter purpose.

The folding mechanism shown in connection with the machine marked A will now be described.

The web W is led between cutting-cylinders 7 8, the male cylinder 7 being provided with a cutting-blade 9 and a creasing-blade 10 and the female cylinder 8 with grooves 11 12, respectively, for coöperation with said blades and with sheet-retainers, as pins 13, adjacent groove 11, to retain the end of the web and carry it upward. The cylinders 7 8 are geared together in the usual manner by gears indicated by the dotted or broken line circles 14 15, respectively, and may be driven at the speed of web W by any suitable means, as by a set of gears 16 17 18, connecting gear 15 with the gear of the ink-distributing cylinder 19 of machine A. Said distributing-cylinder is driven from the second plate-cylinder of machine A by a gear 20, it being understood that the plate and impression cylinders of all the machines are geared together in the usual way.

Adjacent the cylinder 8 I place a circular rotatable carrier. Separated from said carrier by a space I place another and similar carrier. About said carriers I place a wrapping connector or connectors, and on said connector I place sheet-retainers, preferably grippers. These retainers are placed in a line or lines transverse of said connector, the number of lines depending upon the length of the sheets, distance apart of the carriers, size of same, &c. Within said connector or between the carriers thereof I place a creasing-blade to carry the sheets to and between folding-rollers placed without said connector. I prefer to mount the said creaser so that it will have a compound motion aside from its vibrating motion or motion to and from the rollers. By this compound motion the blade is enabled to travel along with the sheets at the speed thereof at the same time that it carries them toward said rollers. In case the connector consists of a broad belt the creaser should not be continuous, but should have transverse notches or be made in separated

sections, and the connector should have slots for the sections to pass through, said slots being of a length sufficient to allow the free motion of the creaser to and fro. The same thing is true of the creaser where the connector consists of ligaments or belts or chains. I will now describe the preferred way of carrying this part of my invention into effect.

I place a shaft 21, carrying sprocket-wheels 22 and gear 23, adjacent the cylinder 8, with gear 23 in mesh with gear 15. At a distance horizontally from the shaft 21 I place another shaft 24, carrying sprocket-wheels 25. The distance apart of said shafts 21 24 is such that the length of the connectors or sprocket-chains 26 is equal to twice the length of the full-length sheets severed from the web W. Said chains 26 carry two sets of sheet-retainers, as grippers 27 28, separated by a distance equal to the said full length. Said grippers are borne by shafts 29 30, respectively, which are journaled in certain of the links of the chains. Shaft 29 is provided with an arm 31, by which it is operated to open the grippers 27 at the desired times, said arm having a roller 32, as usual. Shaft 30 is likewise provided with an arm 33, having a roller 34 for the same purpose. Suitably-placed springs (not shown) return or close the said grippers 27 28 after they are opened. A cam 35 on the framework, near the cylinder 8, serves to open the grippers 27 28 to take sheets from the pins 13, while cam 36 on the framework, near the shaft 24, serves to open said grippers 27 28 to release the sheets, as hereinafter described. The sprocket chains and wheels may be of any suitable construction. The chains shown consist of plain flat links 37, having lugs 38, of semicircular form, for coaction with similarly-shaped kerfs in the wheels 22 25, said kerfs being between the teeth 39.

The creaser-blade 40 is pivotally supported by the arms 41 of rock-shaft 42, journaled in the framework on the side of the folding-rolls 43 44 from which the sheets are carried by the grippers 27 28. At a suitable distance below the shaft 42 I place a stud or shaft 45, having an arm 46 of the length of arms 41. Said arm 46 has pivotally connected to it one end of link or rod 47, which at its other end is pivotally connected to one of said arms 41 and has the blade 40 secured to it. Or the shaft 45 may have two arms 46, to each of which a link 47 is pivoted, the other ends of said links being pivoted each to an arm 41, the blade 40 being secured to said links. In either case the creaser-blade 40 always remains parallel to itself in moving to and from the rolls 43 44. The creaser may be moved by any suitable means acting on either of shafts 42 45 or the arms thereof. The means shown consist of a cam 48, mounted on stud or shaft 49 in the framework, said cam acting on a roller 50 on one of the links 47. Said links are shown as being curved, as at 51, to move clear of stud 49. It is understood, of course, that arms 41 46 and links 47 are outside the chains 26, and that the blade 40 is notched at the points where it is opposite the chains. Cam 48 may be driven by any suitable means so as to operate the blade 40 at the proper times, as by a gear 52 meshing with gear 23.

The sheets folded by the rolls 43 44 are carried off by the tapes 53 54, the tapes 53 being on rollers 44 and 55 and extending horizontally. Tapes 54 are on rollers 43 56 (the latter adjacent roller 55) and 57 somewhat above rollers 43 44, for a purpose hereinafter explained. The tapes 53 54 form nipping-tapes as they pass over roll 44. The tapes 53 54 may deliver the folded sheets in any suitable way, but I prefer to again fold the sheets, and will now describe a mechanism for that purpose that I prefer to use.

It is best to here state that the printing-machines shown are adapted to perfect webs of single, double, or greater width; that the cutting and folding mechanisms thus far described are adapted to sever sheets of a given length from said webs and fold the same transversely; that when webs of more than single width are used they may be in longitudinal sections or be split into such sections either before or after printing. I show splitters 58 on shaft 59, and driven by any suitable means, adjacent roller 44 for the purpose of dividing the sheets into sections as they are run out by tapes 53 54. These sheet-sections are run to separate folding mechanisms.

Referring to Figs. 2 and 3, the tapes 53 54 run the two folded sheets over folding-rolls 60 61 and 62 63, respectively. A creaser 64 coacts with rolls 60 61, and creaser 65 with rolls 62 63, to fold the two said sheets. In case it is desired to associate the sheets folded by said rollers 60 61 and 62 63, and thus deliver them, it may be done as follows: A set of tapes 66, (on rollers 60 and pulleys 67 68, the said pulleys 67 being below and about midway of rollers 61 62,) coacting with the guides 69, carry the sheets folded by rollers 60 61 downward to said roller 67. A set of tapes 70, (on rollers 63 and pulleys 71 72, said pulleys being adjacent roller 67,) coacting with guides 73, carry the sheets folded by rollers 62 63 downward to pulleys 67 71, where they are associated with the sheets folded by rollers 60 61. At this point suitable guides, as 74, carried by a removable shaft 75, direct the associated sheets to the tapes 70 76, which carry them to a folder or to a delivery, as may be desired. Tapes 76 are on rollers or pulleys 77 78, said pulley 77 being below pulleys 71, and pulleys 78 at the side of pulleys 72. Tapes 70 bear against pulleys 78 and, with tapes 76, run the folded copies in front of the vibrating packer 79, pivoted, as at 80, below the receiver 81. The just-described method of delivery applies whether the sheets folded by the two mechanisms have the same or different matter.

Instead of delivering as described the guides

74 may be removed and guides 82, borne by shaft 83 above or below the pulleys 67 71, be placed in position, the said guides 82 being concave on each outer side to extend around the pulleys 67 71 to direct the sheets in opposite directions, the sheets coming from rollers 62 63 being carried off by tapes 70 76 and the sheets from rollers 60 61 being taken off by the tapes 66 and 84. Tapes 84 are on pulleys 85 86, pulleys 86 being adjacent the pulleys 67 77 and pulley 85 being by the side of pulleys 68. Said pulleys 68 85 and tapes 66 84 run the sheets downward in front of packer 87 on shaft 88, journaled in the framework below the receiver 89.

Instead of running the sheets to separate packers they may be associated (by the use of guides 74) and folded by the rollers 90 91 and vibrating creaser 92 and delivered in the receiving-trough 93; or the guides 82 may be used to direct the sheets as above described and one set be folded by the rollers 90 91 and creaser 92 and the other set be folded by the rollers 94 and creaser 95.

The creaser-blades 64 65 are preferably mounted in the manner now to be described. Parallel transverse rock-shafts 96 97 are placed above the sheet-carrying parts of tapes 53 54. Shaft 96 has arms 98 99 thereon and shaft 97 has arms 100 101 thereon, respectively over arms 98 99. Pivotally attached to arms 98 100 is the bar 102, which extends somewhat below arm 98 and carries the creasing-blade 64 at right angles to shaft 96. A similar bar 103 is carried by arms 99 101 and itself carries creaser 65. These parts may be moved at the proper times by any suitable means. I show for this purpose an arm 104 on shaft 96 on the side opposite arm 98 and at the end of the shaft, said arm 104 having a roller 105, which is engaged by the cam 106 on the shaft 24.

The folders just described are adapted to fold sheets of different widths. This is secured by making arms 98 99 100 101 adjustable along their respective shafts. Arms 98 99 are shown as splined to shaft 96 by splines 107 108, respectively, set-screw bolts 109 110, passing through sleeves of arms 98 99, being used to secure them in their adjusted positions. Arms 100 101 are held in their adjusted positions by set-screw bolts 111 112, passing through their sleeved portions. The rollers 60 61 and 62 63 may be adjusted in any suitable way to keep them in proper relation to the blades 64 65. The means that I prefer to use for this purpose consists of plates, as 113, adjustable on the framework, rock-shafts, as 114 122, journaled in said plates, rock-shafts having arms 115 and 123, in which rollers 60 61 are journaled, and arms controlled by springs to hold rollers 60 61 together. Rock-shaft 114 has arms 115, in which roller 60 is journaled, and an arm 116, to which rod 117 is pivoted. Rod 117 passes loosely through a lug 118 on plate 113 and has a collar 119 fast to it below the lug. Rod 117 also has a collar 120 fast thereon some distance above the lug and is surrounded by a helical spring 121, which abuts against lug 118 and collar 120, pushing arm 116 upward. Rock-shaft 122 has arms 123, in which roller 61 is journaled, and an arm 124, to which a rod 125 is pivotally attached. The rod 125, lug 126, collars 127 128, and spring 129 are arranged relatively to each other in the same manner as rod 117, lug 118, collars 119 120, and spring 121, above described and for a like purpose. Arms 116 and 124 point in opposite directions, and rollers 60 61 are kept in contact. Plates 113 have slots 126^a 127^a, through which bolts 128^a 129, respectively, pass, said bolts being fast to the framework and having screw-nuts thereon to retain the plates in their adjusted positions. A precisely similar arrangement may be used at the other end of the rollers 60 61 or the arms 116 124 and springs, &c., may be there omitted. Rollers 62 63 are adjustable by like means. An advantage of having both rollers 60 61 controlled by springs is that if there should be a "choke" between the rollers both of them yield as the creaser comes between them and the latter is not bent.

The rollers 60 61 are driven from a gear 130 on the stationary framework. The rollers may be geared together, and one of them is geared to gear 130. Roller 60 has a gear 131, that meshes with gear 130. The above-described construction permits of the constant mesh of gears 130 131, whatever the positions (within certain limits) of the rollers 60 61.

Rollers 62 63 may be geared together, and one of them, as 63, is geared to the gear 132 on the framework.

Thus far has been described the mechanism for taking care of the products of machine A. The same may be used with machine B.

I will now proceed to describe the devices shown in Fig. 1 in connection with machine B and will then describe those shown for associating the half-sheets cut from the web X with the webs W Y.

Web Y is cut into full-length sheets by the cylinders 133 134, of which 133 is the male cylinder, having the cutter 135 and creaser 136 at opposite points, while cylinder 134 has grooves 137 138 for coaction therewith and pins 139 adjacent and following groove 137; also, it has circumferential grooves 140, (indicated only by the broken line to show the bottom thereof.) Adjacent the cylinder 134 is the take-off cylinder 141, having suitable sheet-retainers, as pins 142. Cylinders 133, 134, and 141 are geared together. Extending over the cylinder 141 are guides 143, curved about the same and entering grooves 140 of cylinder 134. A set of tapes 144 run on cylinder 141 and a roller 145. Above said tapes 144 are folding-rollers 146 147. Coacting with said rollers is the creaser 148, mounted in the same way as creaser 40, above described, on rods 149, pivotally attached to arms 150 151 of rock-shafts 152 153, respectively journaled

in the framework. Said creaser is operated at the proper times by cam 154 on a stud 155, which engages a roller 156 on one of the rods 149. Said cam is or may be driven from the cylinder 141 by suitable gearing and is or may be shaped like cam 106, above described. The operation of the creaser 148 is similar to that of creaser 40. Cylinder 134 is driven by any suitable means, as by gears 157 158 159, connecting it with the gear of the ink-distributing cylinder 160, which is geared to the second plate-cylinder of machine B by gear 161.

The sheets folded by rollers 146 147 may be folded further by means similar to those above described in connection with machine A. Such means are not shown, as it would be but a repetition of that already shown and described. The sheets are taken away from rollers 146 147 by tapes 162 163, the first of which runs on rollers 147 and 164, the second on rollers 146 165 166. Splitters 167 may be used to divide the sheets or copies in the manner above described.

The webs W Y may have transverse lines of paste applied thereto on their under and upper sides, respectively, by revolving paste-blades. Thus web W gets lines of paste from blade 168, carried by shaft 169 and taking paste from the fountain 170. Shaft 169 has a gear 171, which is driven by any suitable means.

Blade 172 on shaft 173 takes paste from fountain 174 and applies it to web Y. Gear 158 is on shaft 173, and its pitch is the same as that of the type-cylinders.

The web X of the supplemental machine passes to cutting-cylinders 175 176, which are of a size to cut it into half-length sheets. Cylinder 175 has the knife 177, and cylinder 176 the groove 178 for coaction therewith. The half-sheets severed from the supplemental web may be carried to and associated with webs W Y by any suitable means. That shown consists of swinging tapes and carrying-tapes on the stationary framework.

The swing-tapes 179 run on rollers or pulleys 180 181, of which roller 180 is journaled in the framework, and rollers 181 are journaled in arms 182, pivoted to the shaft of roller 180. Swing-tapes 183 run on rollers 184 185, of which roller 184 is journaled in the framework and roller 185 is journaled in arms 186, which are pivoted to the shaft of roller 184 and are parallel to arms 182. A link 187 is pivotally connected to arms 182 186. Arms 186 are connected to a wrist or pin 188 on gear 157 by a link 189, which is pivotally connected to both. Gear 157 is of the size of gear 158.

Guides 190, extending into grooves 191 in cylinder 176, bridge over the space between cylinder 176 and rollers or pulleys 184. The cylinders 175 176 are driven at the required speed by any suitable means. (Not shown.) Cylinder 175 drives roller 180 by means of the gear 192, and cylinder 176 drives rollers or pulleys 184 through the gear 193. The half-sheets are taken to the webs W Y from the swing-tapes by suitably-arranged tapes. Those for taking them to the web W are marked 194 195 and run on rollers 196 197, respectively. A pair of said rollers 196 197 form nipping-rollers in conjunction with the tapes. The space between the rollers or pulleys 197 which is just under the path of web W and cylinder 7 is nearly bridged over by the guides 198. One of the rollers 196 is placed a short distance below the path of web W and near the upper roller 197. A set of suitably-shaped guides 199 direct the half-sheets over said roller 197 and guides 198. Tapes 194 195 are driven by a gear 200, connecting gear 14 with the upper of rollers 197.

The tapes for carrying the half-sheets to web Y are marked 201 202. Tapes 201 are on rollers 203 204, and tapes 202 are on rollers 205 206 207. Rollers 203 206 are in a vertical plane under rollers 196 197 adjacent the rollers 181 185 and, with the tapes, form nipping-rolls. Roller 204 is adjacent the cylinder 134 below the central horizontal plane thereof, so that tapes 201 bear against said cylinder to feed the half-sheets after they pass below roller 207 above the cylinder 134.

Tapes 201 202 are driven by a gear 208, connecting roller 207 with cylinder 134.

Assuming that the printing-machines perfect double-width webs, that they each have unlike matter on the ends of their plate-cylinders, and that the guides are used, the operation of the parts is as follows: The webs W Y are led to their respective cutting mechanisms in the manner described and cut into full-length sheets in the manner described. Web X is cut into half-sheets, which by the swing frame and tapes are directed alternately to the tapes 194 195 and 201 202 and by them are taken to and associated with the webs W Y. In the position of the parts shown the swing-frame is moving downward after having delivered a half-sheet to tapes 194 195. The tapes 179 182 are not accelerating ones, but the half-sheets are, nevertheless, separated by the down or up motion of the frames, since after delivering the sheets to the tapes the frame moves away from said tapes, as 194 195, and in so doing the sheet is pulled out from between tapes 179 183 at a faster rate of speed than that of said tapes. As rollers 181 185 approach rollers 203 206 the half-sheet is protruded therefrom and is caught by said rollers 203 206 in a well-known manner and is stripped from tapes 179 183 on the rise of the frame. The next half-sheet is delivered to tapes 194 195 in like manner. The half-sheets taken by tapes 201 202 are caught by pins 139 and are thus brought in contact with web Y, with their leading edges preferably slightly behind the end of the web, so that the rear ends will be creased over the full-length sheets by the creaser 136. Guides 143 strip the sheets from the pins 139, or the latter may be withdrawn in usual ways as the sheets approach

strippers 143. Creaser 148 comes in contact with the sheets along the creased lines and carries them to the rollers 146 147, by which the sheets are folded along said lines. The sheets are divided by splitter 167 as they pass the roller 147. The sheets are folded and delivered in the manner now to be described in connection with machine A. It will be noted that the half-sheets are thus folded on the outside of the full sheets by rollers 146 147 and the subsequent folders. The web W is led to its cutting-cylinders 7 8. The half-sheets from web X are associated with web W, with their leading ends preferably slightly behind the leading ends of the full-length sheets cut therefrom. By this it results that their following ends are creased with the full-length sheets by creaser 10, while their leading ends are caught by pins 13 and are taken therefrom by grippers 27 28. The creaser 40 acts in manner like that of creaser 148, above described. The sheets are cut in two as they pass splitter 58. The half-sheets associated with web W are folded on the inside of the full sheets. The two parts of the sheets after leaving rollers 43 44 are run under blades 64 65, respectively, and are each folded again. After this folding, the two parts are carried to the rollers 67 71, and are associated, and are directed by guides to the tapes 70 76, which carry it either to the receiver 81 or to the folders 91 92, as may be desired.

By the use of guides 82 the two sheets may be kept separate and directed to different receivers or folders, as above set forth.

If desired, the machines A C may be used alone. In such case the web X is led from cylinder 175 in suitable manner, as around rollers 209 210, to the web W and is associated therewith. The knife 177 must be rendered inoperative in this case in some way, as by removal.

The machines A B C may perfect webs of treble or greater width, the same be split into sections as above described, and the products be all brought together or be brought together two by two and thus delivered. An arrangement of the folders in such case is shown in Fig. 4. In this figure folding-rollers 211 212 and 214 215, with their coacting blades 213 216, are shown in addition to those already described. The line 217 indicates the sheets side by side as they are fed forward toward the observer by tapes 53 54. Said folders are spaced apart at equal distances. The marks 218 219 220 indicate the lines of severance between the sheets. The parts 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, 73, 77, 84, 85, 86, 87, 88, and 89 are or may be arranged as above described—that is, with rollers 67 71 midway of and below the folders 60 61 62 63. Rollers or pulleys 72 are placed lower down and nearly midway of folders 63 and 211. On said rollers 63 71 72 are tapes 70. Tapes 76 are placed on pulleys or rollers 77, 78, (the latter below pulleys 72,) 221, and 222 and bearing on roller 223 adjacent and at the side of roller 78. On rollers 223 229 242 I place tapes 243, said rollers being at the side of roller 221. I place guides 244 from rollers 72 230 to near rollers 78 223.

Adjacent the pulleys 67 71 77 86 I place a shaft, as 224, on which are mounted spear-headed guides, as 225, with concave faces to coact with either roller 67 or 71 to direct the sheets brought by tapes 66 70 either to the left or right, the said shaft being adjustable.

Midway of and below the folders 211 212 and 214 215 are four rollers or sets of pulleys 226 227 228 229. Adjacent pulleys 72 223 are the pulleys 230. A set of tapes 231 are carried by rollers 211 226 230. Extending from roller 212, near and between rollers 226 227, are guides 232. At a distance to the right of pulleys 228 are a pair of pulleys 233 234, side by side horizontally. Rollers 215, 227, and 234 carry a set of tapes 235, which bear on roller 233. Coacting with tapes 235 are guides 249. A set of tapes 236 is carried by rollers 228 233. Below rollers 233 234 is a vibrating packer 237 on shaft 238 and above the shaft is the receiver 239.

Adjacent the rollers 226 227 228 229 I place shaft 240, having spear-headed guides 241, similar in construction and function to guides 225, described above.

Under the sheet-carrying parts of tapes 76 243 I place folding-rollers 245 (only one shown) and coacting therewith the vibrating creaser 246.

Under the carrying parts of tapes 235 236 I place folding-rollers 247 (but one is shown) and the coacting creaser 248.

When the parts are in the position shown, the guides 225 241 direct the sheets associated by the sets of tapes 66 70 and 231 235 to the tapes 70 76 and 231 243, which associate them at the rollers 78 223, after which the sheets may be delivered by rollers 221 242 or be further folded by rollers 245 and creaser 246. By setting one or both of guides 225 241 in its other position the sheets may be delivered at two places.

By means of the mechanisms hereinbefore described and by various combinations thereof copies of four, six, eight, ten, twelve, sixteen, twenty, twenty-four, and thirty-two pages or multiples thereof may be produced and delivered.

I prefer to use two sprocket-chains 26 to support the gripper-shafts 29 30 and to support the sheets by rails 250 while they are caught by the grippers. These guide or supporting rails are suitably supported in the machine, as on bars 251 251, and curve partly around the shafts 21 24, with their outer surfaces at the same distance therefrom as the outer surfaces of the chains 26—that is to say, the rails 250 are for the greater part of their length in the plane of the paths of chains 26, whose gripper-shafts 29 30 and bar 28^a are within or under the rails and the points of whose grippers pass beyond the rails in taking and in releasing sheets. Thus it may be

said that the rails or guides are outside the sheet-retainers. These rails bridge over the space between the points where sheets are taken and where they are released by the grippers. These rails may be of flat bars of steel. The number of such rails 250 is not essential. The blade 40 is notched where it is opposite the said rails, so as to avoid contact therewith. The bars 251 251 are on the same side of the path of the sheets as shafts 21 24.

In Fig. 5 a half-sheet *a* is shown with one edge slightly inside the edge of the full-length sheet *b* and with one margin overlapping the central fold of the full-length sheet, so as to be folded with the same. The short lines crossing the sheets *a* and *b* indicate the limits of the printed matter.

In Fig. 7 is shown the bar 28^a, carried by the links 28^b, following and pivoted to the links 30^a, that carry the gripper-shaft 30. Bar 28^a supports the leading margins of sheets and coacts with grippers 28 for the purpose of retaining the same.

Rocking or movable pins may replace the grippers hereinbefore described.

What I claim is—

1. The combination of a vibrating creaser, means for adjusting it in a direction parallel to its axis of motion at right angles to its own length, folding-rollers coacting with said creaser, adjustable plates supporting said rollers, and means for adjusting said plates in the direction in which said creaser may be adjusted whereby the folding mechanism may be adjusted as and for the purposes described.

2. The combination of a vibrating creaser, means for adjusting its position relatively to its supports, folding-rollers, adjustable plates, rock-shafts journaled in said plates having arms in which said rollers are journaled, yielding means for moving said shafts in opposite directions, thereby maintaining said rollers in contact and means for adjusting said plates in the direction in which said creaser may be adjusted, substantially as and for the purposes described.

3. The combination of an adjustable creaser-blade, folding-rollers, plates for supporting said rollers, means for adjusting said plates on the framework, a driving-gear on said framework, and a gear on one of said rollers, whereby said rollers may be adjusted relatively to said driver and be driven thereby, substantially as described.

4. The combination of an adjustable creaser-blade, folding-rollers, adjustable plates on the framework for supporting said rollers, means for maintaining said rollers in yielding contact with each other, a driving-gear on the framework, and a gear on one of said rollers, whereby said roller may be adjusted relatively to said driver and be driven thereby, substantially as and for the purposes described.

5. The combination of an adjustable creaser-blade, folding-rollers, adjustable plates on the framework, rock-shafts journaled in said plates, arms on said shafts in which said rollers are journaled, springs controlling said shafts to move them in opposite directions, a driving-gear on the framework, and a gear on one of said rollers, whereby said rollers may be adjusted relatively to said driver and be driven thereby, substantially as and for the purposes described.

6. The combination of printing machinery for perfecting a web, web-cutting mechanism, four sets of folding-rolls (as 60, 61; 62, 63; 211 212; 214 215), means coacting with said rolls to fold sheets, guides for associating the folded products from pairs of said sets of rolls to form two packages, guides for associating said two packages to form one product, and folding mechanism for folding said product, substantially as described.

7. The combination of four sets of folding-rolls 60 61, 62 63, 211 212, 214 215; means for coaction therewith to fold sheets; guides 66 69, 70 73, 231 232, 235 249, for associating the folded sheets by pairs; sets of pairs of rollers 67, 86, 71 77, and 227, 228, 226 229; switches 225 241 for directing the associated folded sheets between either pair of said sets; three folders; and guiding means for directing the sheets to said three folders, according as said switches are set, substantially as described.

8. The combination of three web-presses placed one above another, independent mechanisms to which the upper and lower webs are led without turning—there being one mechanism for each of said webs—for severing said webs into full-length sheets, mechanism for severing half-length sheets from the inner web and associating the same with the upper and the lower webs alternately, and two paste-applying blades one under the upper web and the other over the lower web and both between the presses and said web-severing mechanisms for said webs for applying transverse lines of paste thereto, substantially as described.

9. The combination of parallel shafts, as 96, 97, an arm on each adjustable thereon, as 98 and 100, a bar, as 102, pivotally attached to said arms, a creaser-blade, as 64, borne by said bar, folding-rollers adjustable in the direction of the length of said shafts, means permitting of said adjustments of said parts, and means for operating one of said shafts, substantially as described.

Signed at New York, in the county of New York and State of New York, this 25th day of March, A. D. 1892.

WALTER SCOTT.

Witnesses:
PAUL WILCOX,
RICHARD W. BARKLEY.