

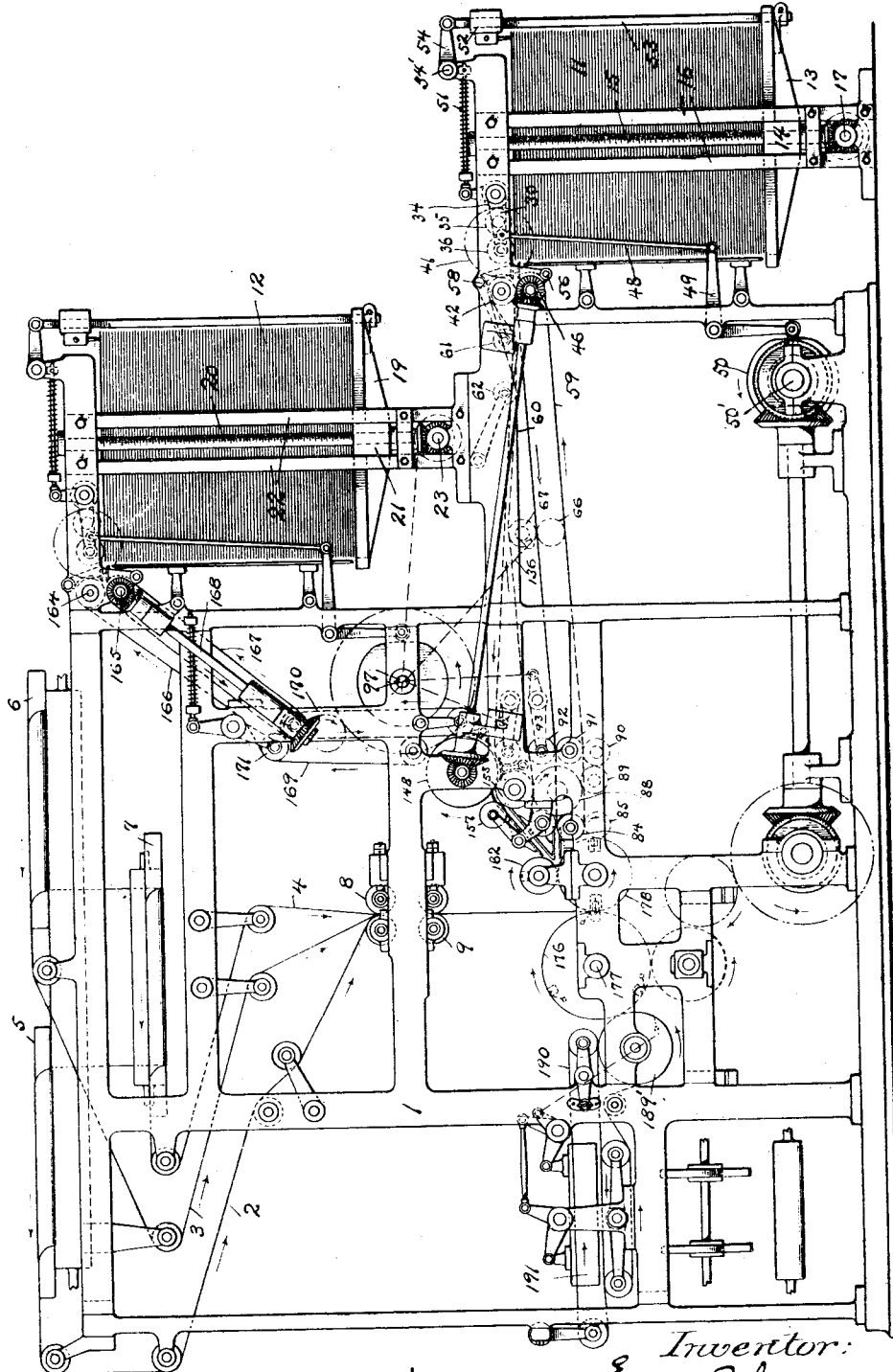
E. P. SHELDON.
PRINTING MACHINE.

APPLICATION FILED MAY 22, 1907.

Patented June 11, 1912.

5 SHEETS-SHEET 1.

1,028,913.



Witnesses:
A. White
A. J. Kearney

Fig. 1

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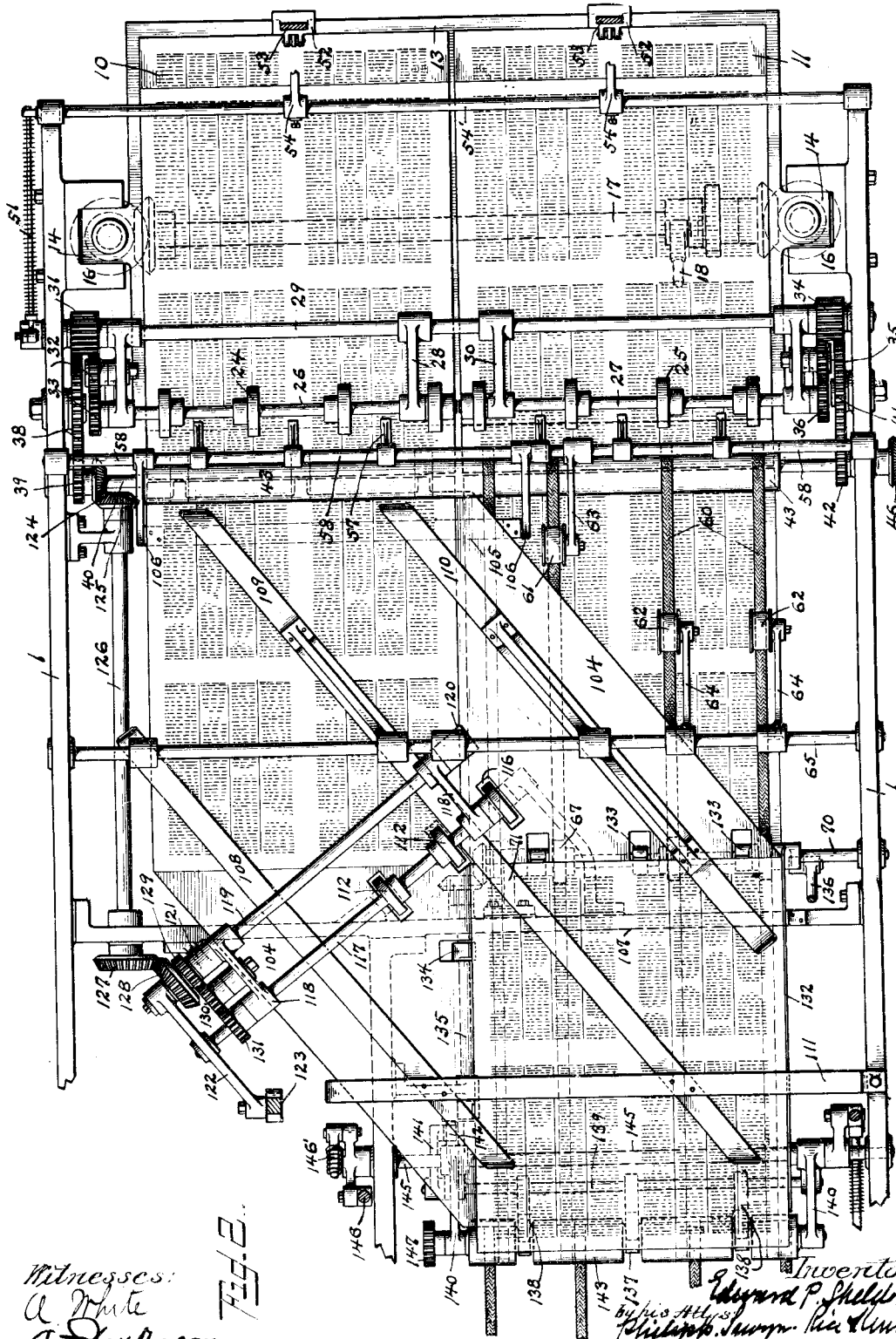
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5 SHEETS-SHEET 2.

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A. Paulneay.

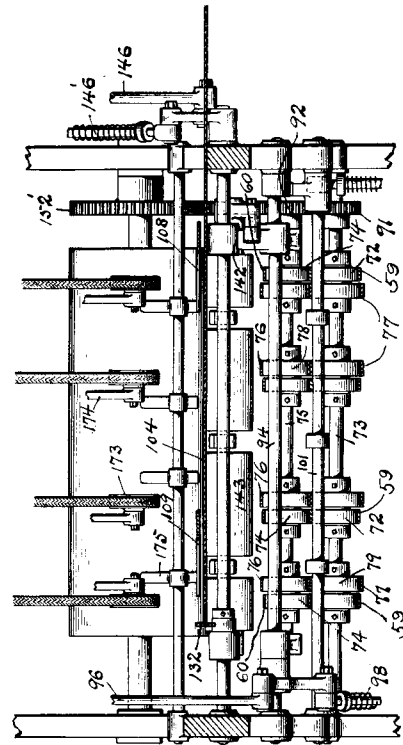
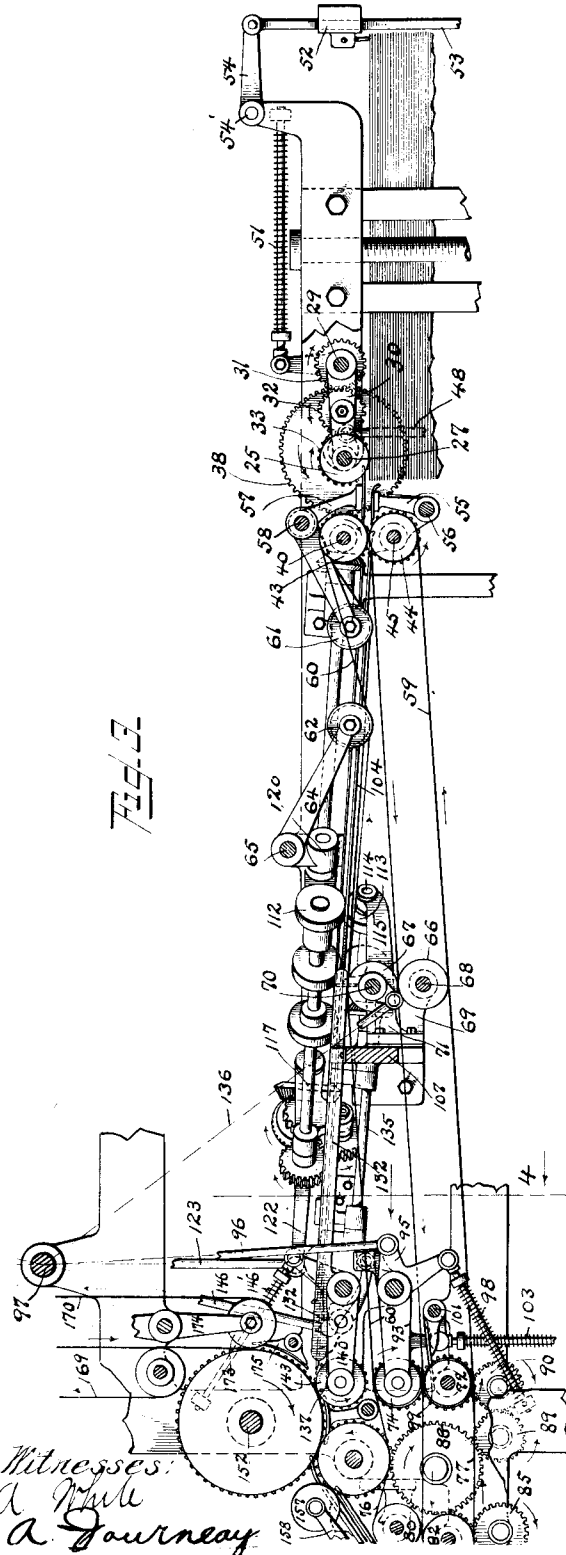
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5 SHEETS—SHEET 3.



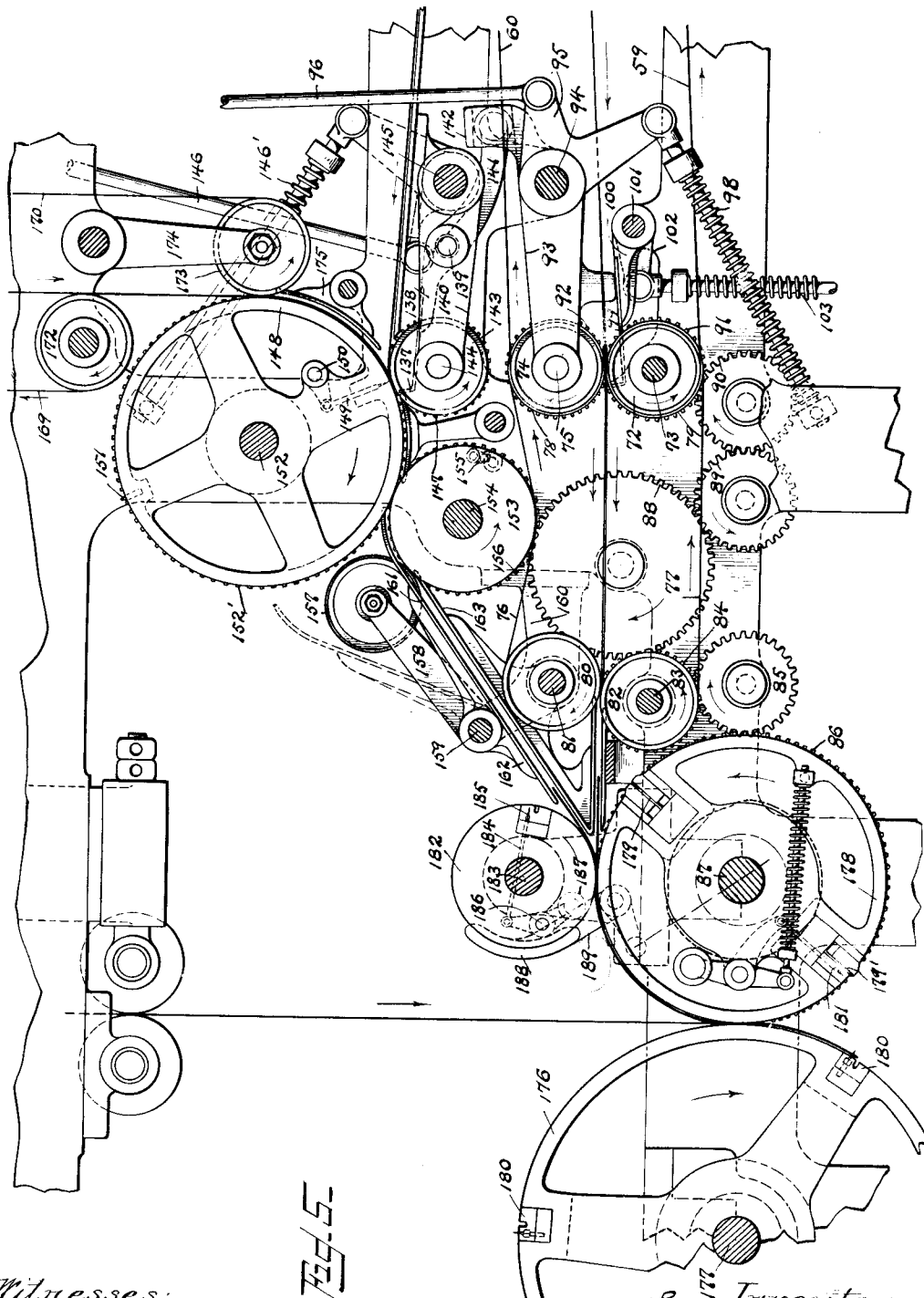
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1,028,913.

E. P. SHELDON.
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5 SHEETS—SHEET 4.



Witnesses:
A. White
a. Journeay.

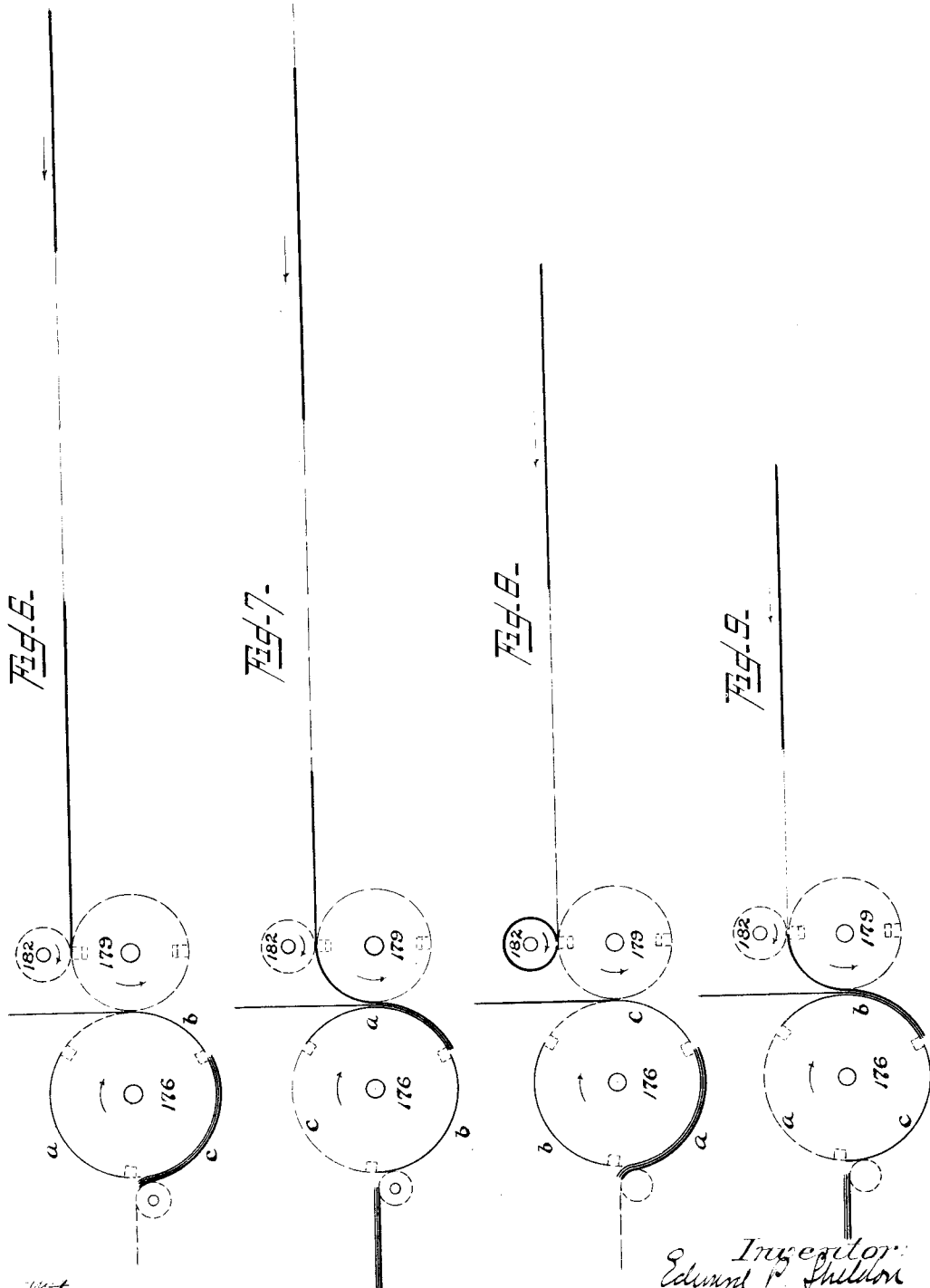
735-5

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1,028,913.

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Patented June 11, 1912.
5 SHEETS—SHEET 5.



Witnesses:
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UNITED STATES PATENT OFFICE.

EDWARD P. SHELDON, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO
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PRINTING-MACHINE.

1,028,913.

Specification of Letters Patent.

Patented June 11, 1912.

Application filed May 22, 1907. Serial No. 375,003.

To all whom it may concern:

Be it known that I, EDWARD P. SHELDON, a citizen of the United States, residing at New York, county of Kings, and State of New York, have invented certain new and useful Improvements in Printing-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 printing machines and more particularly to that class of machines in which products are formed consisting of sheets cut from a printed web and sheets derived from a different source.

In producing certain classes of printed products, such, for instance, as illustrated papers, magazines, catalogues and the like, it is frequently desirable to combine with the product of a high speed web printing machine, sheets of a different character from that printed on the web machine, such as half-tone or colored illustrations, cover-sheets, which sheets may be termed "specially printed sheets." In such products the number of web sheets usually largely exceeds the number of specially printed sheets.

One method of producing such products is to employ, in conjunction with a high speed web machine, a separate machine or a separate set of couples which run at a lower speed than the couples of the high speed machine. The product of this low speed mechanism is converted into sheets and delivered directly to the product of the high speed mechanism to be associated therewith, or sheets from both the high speed mechanism and the low speed mechanism are delivered to a collecting cylinder, this latter construction, which is illustrated in the patent to Sheldon, No. 572,225, dated Dec. 1, 1896, enabling the number of sheets from the high speed mechanism to be increased as desired with respect to the number from the low speed mechanism.

Another method of producing the products referred to which has been employed where the specially printed sheets were required to be of a fine class of printing, such as that effected by lithographic and flat bed color presses, is to feed the specially printed sheets either by hand or by automatic means from piles, the sheets being forwarded to be associated with the product from the high

speed web mechanism. This method is objectionable, however, because of the limitations imposed by sheet feeding. The rate of speed at which sheets can be fed from a pile is, of course, relatively low as compared with the rate of speed at which sheets can be produced from a high speed web mechanism.

It is, of course, apparent that the collecting cylinder construction disclosed in the Sheldon patent referred to solves the problem of producing products consisting of any desired number of web sheets and a single specially printed sheet, whether this sheet be produced from a low speed web mechanism or is otherwise produced and fed from a pile, since no special difficulty is involved in feeding sheets from a pile to the collecting cylinder construction of the Sheldon patent, though when this is done the speed of the web mechanism would necessarily be limited, unless products involving a considerable number of collections were to be produced.

The present invention has for one of its objects to produce a construction by which pile sheets may be associated and thereafter assembled with the product of a high speed web printing mechanism.

A further object of the invention is to provide a construction in which specially printed sheets may be rapidly delivered to be associated with the product of a high speed web printing mechanism.

A further object of the invention is to produce an improved mechanism by which a number of specially printed pile sheets may be rapidly delivered to and associated with the product of a high speed web mechanism, thereby enabling such mechanism to be more rapidly operated than in former constructions.

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

Referring to the accompanying drawings—Figure 1 is a front elevation of a machine constructed in accordance with the invention. Fig. 2 is a plan view of a construction of pile feeding mechanism which may be employed. Fig. 3 is a side elevation of the construction shown in Fig. 2. Fig. 4

is a section on the line 4 of Fig. 3. Fig. 5 is an enlarged detail view of the mechanism which may be employed for forwarding and controlling the pile sheets and their association with the web sheets. Figs. 6, 7, 8 and 9 are diagrams illustrating the operation of certain of the mechanism employed.

In the drawings, which illustrate one embodiment of the invention, 1 indicates the frame of the machine. The web printing mechanism employed for printing the web sheets hereinafter referred to is not shown, as it may be of any usual type. The webs printed by this mechanism are indicated at 2, 3 and 4, these webs being controlled in their movement by the ordinary agencies, such agencies including, in the machine shown, turner bars indicated at 5, 6 and 7. The webs may be associated in any desired way, as, for instance, by means of bending rolls 8 and drawing rolls 9.

While the specially printed sheets which are to be associated with the web product may, as to some features of the invention, be otherwise obtained, in the particular construction illustrated, they are derived from a plurality of piles. In the particular machine illustrated, furthermore, three piles of sheets are employed, though this number may be varied. The particular arrangement of piles may be varied in machines embodying the invention, but in the particular machine illustrated, two lower piles of sheets 10, 11 arranged side by side are used and one upper pile 12. The lower piles of sheets 10, 11 are carried on a pile support 13 which may be of any usual character.

In the construction shown, the pile support 13 is provided with a pair of hubs 14 which are engaged by screw shafts 15, these shafts being located between guides 16 secured to the machine frame. These guides engage the hubs 14 and insure the proper movement of the pile support. The threaded shafts 15 may be driven by bevel gearing, as illustrated, from a shaft 17 located beneath the pile support and operated from one of the cam shafts of the machine by any well known mechanism, as, for instance, a pawl and ratchet device indicated at 18 in Fig. 2, at a speed to raise the pile proportionately to the sheets fed therefrom.

The pile 12 may be carried on a support 19 operated by threaded shafts 20 engaging hubs 21, the hubs working between guides 22 and the shaft being driven by bevel gearing from a shaft 23. This shaft may be driven in any suitable manner.

The sheets may be delivered from the piles by any suitable construction. While the sheets may be delivered from the piles by hand, in the machine shown, automatic feeding devices are employed for that purpose. When automatic feeding devices are employed, in the best constructions at least two

of the piles and the feeding devices will be so arranged and constructed as to superpose or associate sheets. In the particular machine illustrated, the support 13 is of the proper size to support two piles of sheets side by side, as is illustrated in Fig. 2.

The automatic feeding devices may be variously constructed. Referring more particularly to the lower piles 10, 11, the removal of the sheets from the piles is begun by means of rolls, as 24, 25, these rolls being mounted on shafts, as 26, 27. The shaft 26 may be carried on arms 28 supported from a long rock shaft 29, and the shaft 27 may be supported in arms 30 carried on the same shaft 29, this shaft being journaled in suitable bearings in the side frame 1 of the machine. The shaft 26 may be driven through a broad faced pinion 31 loose on the shaft 29, an intermediate 32 and a gear 33 mounted on the shaft 26. Similarly, the shaft 27 may be driven by a broad faced pinion 34, intermediate 35 and a gear 36 mounted on the shaft 27. The gear 31 may be driven through an intermediate 38 from a gear 39 on a shaft 40 to be hereinafter referred to, and the gear 34 may be driven through an intermediate 41, from a gear 42 on the same shaft.

The shaft 40 may carry a forwarding roll 43, and with this forwarding roll may cooperate another forwarding roll 44, this roll being mounted on a shaft 45 which may be driven (see Figs. 1 and 2) from a bevel gear 46. The rolls 43 and 44 may be long rolls, that is, they may have sufficient length to forward sheets from both piles, as illustrated, and the shafts 40 and 45 may be intergeared, as shown. The shafts 26, 27 are the ordinary drop roll shafts common in automatic feeding mechanism of the class illustrated, and these shafts may be given their movements by rods 47, 48 (see Figs. 1 and 3). These rods may be connected to the outer arms of the arms 28, 30, and may be operated by bell-cranks 49 from cams 50. Only one of these bell-cranks and cams are shown (see Fig. 1), this construction being duplicated on the other side of the machine. These cams 50 may be mounted on the main drive shafts 50' of the machine. The drop roll shafts may be held down on the piles by means of a suitable spring rod construction, one of which is indicated at 51. The sheets may be held on the piles by the usual weighted detaining pin construction, indicated at 52, these detaining pins sliding on rods 53 supported on the base 13 and by arms 54 extending from the cross rod 54' suitably supported in the frame of the machine.

As the sheets are impelled forward from the pile by the rolls 24, 25, they may pass between sets of upper and under guides, as is usual. The under guides may be car-

ried by arms 55 mounted on a cross rod 56 and the upper guides may be carried on arms 57 mounted on a cross rod 58.

As has been indicated, the sheets fed from these lower piles may be associated in various ways, but in the particular machine illustrated, the association is effected by moving the sheets from the pile 10 sideways, the sheets from the pile 11 traveling in a substantially right line path. The sheets from the pile 11, after leaving the forwarding rolls 43, 44 travel along a pathway which may be formed by under and upper tapes 59, 60. The under tapes may pass around and be driven by the roll 44 and the upper tapes may pass around and be driven by the roll 43. These upper tapes may be depressed, for a reason which will be hereinafter stated, by rolls 61, 62, the roll 61 being supported on an arm 63 carried on the rod 58, and the rolls 62 being supported on arms 64 mounted on a cross rod 65 supported in the frame of the machine. Intermediate tape and sheet supporting rolls 66, 67 may be employed in connection with the tape pathway, the roll 66 being loosely supported on a rod 68 extending part way across the machine, this rod being carried on brackets 69 secured to a cross bar of the printing machine frame. The roll 67 may be supported on a shaft 70 which will be hereinafter referred to, this shaft being carried in brackets 71 also secured to a cross bar of the machine frame. The tapes 59 may pass around pulleys 72 (see Figs. 3 and 5) loosely mounted on a shaft 73 which will be hereinafter referred to, and the tapes 60 may pass around loose pulleys 74 on a shaft 75 which will also be hereinafter referred to.

The automatic feeding devices, as a rule, will not operate with sufficient rapidity to deliver the sheets to the pathway formed by the tapes 59, 60 at the speed of the web with which these sheets are to be associated, and, therefore, accelerating devices should be employed to bring the sheets up to the speed of the webs. While these accelerating devices may be of any suitable construction, they may include tapes, as 76, 77, (see Fig. 5). The tapes 76 may pass around pulleys 78 fast on the shaft 75 before referred to, and the tapes 77 may pass around pulleys 79 fast on the shaft 73 before referred to. The tapes 76 (see Fig. 5) may also pass around pulleys 80 loose on a rod 81 which will be hereinafter referred to, and the tapes 77 may pass around pulleys 82 fast on a driven shaft 83. The shaft 83 may be provided with a gear 84 which is driven by means of an intermediate 85 from a large gear 86 on a shaft 87 which will be hereinafter referred to. The gear 84 may further serve, through intermediates 88, 89, 90, to drive the shaft 73, this shaft being provided with a gear 91 in mesh with the intermediate 90. The

shaft 75 may be provided with a gear 92 in mesh with the gear 91.

It is desirable to time the sheets coming along the pathway formed by the tapes 59, 60, and this may be done before the sheets are taken by the accelerating tapes, when these are employed. While this may be variously accomplished, in the construction shown the pulleys 78, 79 are normally out of contact, the shaft 75 being given a bodily movement to bring these rolls into and out of contact. To this end, this shaft 75 may be mounted in arms 93 on a rock shaft 94, one of these arms being provided (see Fig. 5) with a rearward extension 95 to which is connected an operating rod 96, this rod being operated from a suitable cam on a shaft as 97 (see Figs. 1 and 3). The usual spring rod construction as 98, may be employed to operate the shaft in opposition to the cam.

A suitable timing stop mechanism may be employed in connection with the rolls 78, 79 before referred to. This may include sheet stopping fingers 99 of usual construction, these fingers being mounted on arms 100 secured to a rock shaft 101. This rock shaft may be provided with an arm 102 to which is connected a spring rod construction of usual type which holds the stop fingers 99 up in the path of the sheet. The operating ends of these fingers may underlie the rolls 78, so that when the rock arms 93 carrying these rolls descend, the fingers will be forced back out of the way, allowing the sheet to pass.

As has been stated, in the particular machine shown, the sheets from the pile 10 are given a sidewise movement, the purpose of which is to enable them to be finally associated with the sheets from the pile 11. While the sidewise movement referred to may be produced in various ways, in the construction shown there is provided a table or plate 104, this table being supported at one end by a bar 105 carried on arms 106, these arms being hung on the rod 58 before referred to. This table is further supported by a cross web 107 connected to the side frame of the machine, this being the web which carries the brackets 69, 71 before referred to. The inner edge of this plate 104 is so located that the sheets are fed onto it by the rolls 43, 44 before referred to, and they may be held thereon by narrow guide strips 108, 109 and 110. The strip 110 may be hung from the rod 65 before referred to and the strips 108, 109 may be hung from this rod and may also be additionally supported, if desired, by a bar 111 secured to the machine frame.

The sidewise shift of the sheets may be effected in various ways but as shown it is accomplished by means of upper rolls 112 which cooperate with lower rolls 113, these rolls being located under the table 104 and

mounted on a shaft 114 supported in brackets 115 extending from the web 107 before referred to. The table 104 may be slotted, as indicated at 116, to permit the

5 rolls to operate through it.

The sheets should be clear of the nip of the rolls 43, 44 before they begin their sidewise movement, that is, the sidewise shifting devices should not come into operation until a straight forward feed produced by the rolls 43, 44 has ceased. In order to effect this, in the particular construction shown, the rolls 112 are mounted on a drop shaft 117, this shaft being supported on

15 arms 118 fast on a rock shaft 119. This shaft may be supported at one end in a bearing 120 dropped from the rod 65 and at its other end in a bearing 121 secured to the frame of the machine. This shaft 119 may be rocked in any suitable manner, as, for instance, by providing an arm 122 to which is connected (see Fig. 3) a cam rod 123, this cam rod deriving its motion from a suitable cam on the shaft 97 before referred to.

25 It will be understood that the rolls 112 should be driven rolls and they may be driven from the shaft 39, this shaft being provided with a bevel gear 124 which meshes with a bevel gear 125 on a way-shaft 126.

30 This shaft 126 may be further provided with a bevel gear 127 which meshes with a bevel gear 128 loose on the shaft 119. Fast to the hub of the gear 128 is a pinion, as 129, which, through an intermediate 130, may drive a pinion 131 on the shaft 117 which carries the roll 112. The shaft 117, when such shifting mechanism as has been described is employed, will be so located that one or more of its rolls 112 will be brought

40 into contact with the sheet after the sheet has completed the forward movement due to the rolls 43, 44. In the particular construction illustrated, the middle one of the rolls 112 will, when the shaft 117 is dropped, strike the corner of the sheet and give it a diagonal movement, the other rolls assisting as they come into contact with the sheet.

Suitable straightening means will be employed to true the sheet up as it comes into

50 position over the path of the sheets from the pile 11. These straightening means may include a side bar 132 which is struck by the sheet as it is advanced by the rolls 112, and the sheet is thus brought into position parallel to the position it had when it left the rolls 43, 44, and also into a position where it may be forwarded to be associated with the sheets from the pile 11.

In addition to the bar 132, when this bar is employed, additional straightening devices may be used, if desired. In the particular construction illustrated, a set of end jogging fingers 133 and side jogging fingers 134 is employed for this purpose. The jogging fingers 133 when the same are em-

ployed, may be mounted on the shaft 70 before referred to, and the jogging fingers 134 may be mounted on a shaft 135, the relative arrangement of these shafts being shown in Fig. 2. These shafts may be intergeared,

70 as indicated in dotted lines in Fig. 2, and the shaft 70 may receive a rocking motion through a cam rod 136, this rod receiving its motion from a suitable cam on the shaft 97 before referred to. By thus rocking the shafts 70 and 135 the jogging fingers are moved out of the way, so as to permit the sheets to pass over them, after which they are brought up and operate to true up the sheet. The sheet may be prevented from being driven too far ahead by the action of the jogger fingers 133 by means of stop fingers 137. These fingers (see Fig. 5) may be mounted (see dotted lines in said figure) on

75 arms 138 fast on a rock shaft 139 journaled in arms 140 which will be hereinafter referred to. This shaft 139 may have a rearwardly extending arm 141 which may carry a roller engaging in a groove in an operating block 142 fast on the shaft 94 before referred to.

80 It will be seen that the construction is such that the fingers 138 and the timing fingers 99 before described are simultaneously brought into the path of the respective sheets from the piles 10 and 11, so as to bring the sheets to a stop at the same time. After the sheet which has just been shifted sidewise is brought to a stop, it will be forwarded by proper mechanism so as to enable it to be associated with the sheet before referred to as coming from the pile 11. While this forwarding mechanism may be varied, it may include a series of rolls 143 mounted on a shaft 144 supported in arms 140.

85 These arms 140 may be mounted on a rock shaft 145, this rock shaft being provided with an operating arm to which is connected a cam rod 146, this cam rod deriving its motion from a suitable cam on the shaft 97 before referred to. The motion of the shaft 145 in opposition to the cam may be produced by a spring rod construction of a usual type, indicated at 146'. The shaft 144 may be provided with a driving gear 147 (see Fig. 2).

The forwarding mechanism may also include a cooperating rotating member which, in the particular construction illustrated, consists of a forwarding cylinder 148. This cylinder, when it is employed, may be provided with the usual sheet taking pins, indicated at 149, mounted in arms extending from a shaft 150, this shaft being operated in any usual manner well understood in the art. The cylinder 148 may also, if desired,

90 be provided with a folding blade, indicated at 151. The rolls 143 are so located with respect to this cylinder 148 that when they are thrown up the sheet will be nipped between the rolls and the cylinder, the cylinder

at the same time operating to force the stop fingers 137 down underneath the sheet. The cylinder 148 may be mounted on a shaft 152 which may be provided with a gear, not shown, which meshes with and drives the gear 147 on the shaft 144. This shaft 152 may further be provided with a driving gear 152'. In the particular machine shown, the forwarding mechanism also includes a roll 153 in coöperate relation with the roll 148 before referred to, this roll 153 being mounted on a shaft 154. When the roll 148 is provided with a folding blade, this roll 153 will be provided with coöperating folding jaws, indicated at 155. The shaft 154 may be provided with a gear 156 which may mesh with and drive the gear 152' and may also mesh with and be driven by the pinion 88 before referred to.

In the particular machine shown, the forwarding mechanism for the sheets from the pile 11 also includes a series of pressure rolls 157 mounted on a shaft carried in arms 158 supported on a shaft 159 carried in bearings formed in brackets 160, these brackets being the brackets which support the rod 81 before referred to. This shaft 159 may support sheet guides 161, 162 and the rod 81 may support coöperating guides 163. These guides 161, 162, 163 may be like those usually employed in sheet feeding constructions, except that the guide 161 may be arranged to be turned out of the way, as indicated in dotted lines in Fig. 5, for a purpose which will be hereinafter referred to.

Machines embodying the invention may, as has been indicated, be provided with means for feeding sheets from an additional pile or piles. If it be desired to feed from two additional piles, the automatic feeding mechanism employed may be a duplicate of that already described in connection with the piles 10, 11. The particular machine illustrated, is provided with means including the support 19 and its operating means before described for supporting a single pile of sheets. The feeding mechanism employed, however, is a duplicate of that already described for feeding the sheets from the pile 11, so far as starting the sheets from the pile and impelling them forward is concerned, and it need not be again described.

After the sheets are started from the pile (see Fig. 1) they are taken by rolls corresponding with the rolls 43, 44, these rolls being mounted on shafts 164, 165, and these rolls deliver the sheets to a pair of tapes 166, 167, these tapes forming a sheet forwarding pathway. The shafts 164, 165 may be driven through bevel gearing from a shaft 168, this shaft deriving its motion from bevel gearing through suitable intermediate gearing from the shaft 97. A pair of speeded tapes 169, 170 take the sheet from the tapes 166, 167, the delivery of the sheet

being effected by a drop roll construction indicated at 171 (see Fig. 1). The tapes 169 run around a roll 172 (see Fig. 5) and the tapes 170 run around rolls 173, these rolls being carried in a shaft mounted on arms 174, these arms being so located that the tapes 170 are brought close to the circumference of the cylinder 148 and operate to deliver the sheets thereto. The sheets are forwarded by the roll 148 and the rolls 173, being held to the roll 148 by means of a curved guide 175 of ordinary construction until they reach the timing fingers 137 before referred to. These timing fingers, therefore, operate to time the sheets from the pile 12 as well as the sheets from the pile 10, the sheets from these two sources being associated at this point.

Machines embodying the invention in its best form will include a collecting cylinder on which the web sheets heretofore referred to and the pile sheets are associated. The collecting cylinder illustrated is of the well-known three part type. This cylinder, which is marked 176, is shown as, mounted on a shaft 177 suitably journaled in the frame. This cylinder is, in the particular construction illustrated, a cutting cylinder as well as a collecting cylinder and has co-operating with it a knife carrying cylinder 178, the knives being marked 179, 179', these knives coöperating with cutting woods 180. The cylinder 178 is mounted on the shaft 87 before referred to and may be provided with the usual forwarding pins, indicated at 181. The construction for operating these pins is illustrated, but is so well known in the art that a detailed description of it is unnecessary.

If the sheets forwarded from the several piles are of the same length as the sheets cut from the web, the mechanism so far described will operate to forward and associate them with the web sheets. Time in feeding can, however, be gained by making the pile sheets a multiple in length of the sheets cut from the web because the time necessary to feed and forward a long sheet is not proportionately greater than the time it takes to feed a short sheet. In the particular construction illustrated, the sheets fed from the piles are twice the length of the web sheets.

When the pile sheets are, as in the machine illustrated, multi-length, devices may be provided for delivering the parts of the multi-length sheets to the collecting cylinder at intervals, thus giving time for the accumulation of web sheets by the collecting cylinder. These devices for thus effecting the delivery of the parts of the multi-length sheets, when the same are used, at intervals may be varied widely in construction. In the particular machine shown, there is provided a cylinder 182 mounted on a shaft 183

and working in coöperative relation with the cylinder 178. This cylinder 182 has a circumference equal in length to one-half the double length pile sheets which the machine illustrated is constructed to feed. This cylinder 182 may be provided with the ordinary sheet taking devices, such, for instance, as pins 184, and with one member, such as the cutting wood 185, of a cutting device. This cutting wood coöperates with knives 179, 179' of the cylinder 178. The pins 184 on the cylinder 182 are operated from a rock shaft 186 provided with an operating arm carrying a roll 187 which may run on the surface of a swinging cam 188 mounted on a rock lever 189 operated from a cam, not shown, on the cylinder 178. This cam 188 holds the pins out of operation and they may be thrown into operation by a spring rod construction, not shown, this construction being a usual one. As the leading ends of the double lengths sheets from the piles pass into the nip of the cylinders 178, 182, the pins 184 will be held in the cylinder by the cam 188 which is rocked forward into the position shown in Fig. 5, so that the sheets will pass on between the cylinders and their leading ends taken by the pins on the collecting cylinder 176, the pile sheets being thus associated with the web sheets. When, however, half the length of the pile sheets has passed between the cylinders 178, 182, the cutting knife 179 will come into register with the cutting wood 185 of the cylinder 182 and sever the pile sheets. Simultaneously with this cutting operation the cam 188 is swung back and the pins 183 are protruded, these pins impaling and carrying the second half of the pile sheets around the detaining cylinder. The operation of this detaining cylinder 182 when used in connection with a three-part collecting cylinder will be well understood by reference to the diagrams Figs. 6 to 9 inclusive. In these diagrams, the three parts of the collecting cylinder are marked *a*, *b* and *c* respectively. Referring to Fig. 6, the part *b* has just taken a web sheet and the heads of the pile sheets are just shown as entering between the cylinders 182, 179. As the cylinder 176 rotates the part *a* which already has had a web sheet laid thereon, comes around, takes a second web sheet and the head of the pile sheets, this position of the parts being shown in Fig. 7. At this time, the cutting blade 179 comes into operation and severs the double length pile sheet. In the continued operation of the parts, the second half of the double length pile sheet which has been severed by the knife 179, is carried around the cylinder 182, as shown in Fig. 8. The part *c* of the collecting cylinder has taken its web sheets and has passed on with them, and the part *a* is delivering the collected web and pile sheets. The intervals, therefore, be-

tween the deliveries of the pile sheets has been sufficient to allow the surface *c* of the collecting cylinder to take its first layer of web sheets. As the parts continue their movement (see Fig. 9) and part *b* which has had one layer of web sheets laid thereon, comes around, takes its second layer of web sheets and at the same time takes the halves of the pile sheets which are now delivered from the detaining cylinder, the collected pile and web sheets being delivered from the part *c*. By the time the part *a*, referring to Fig. 9, has received its second layer of web sheets, it will meet the leading ends of the next succeeding layer of pile sheets, and the operations described will be repeated.

The collected sheets from the cylinder 176 may be taken by an ordinary delivery cylinder 189' and delivered to a set of tapes 190, these tapes carrying them to an ordinary blade folding delivery mechanism, the blade of which is indicated at 191. The construction of this mechanism is well understood in the art and it is not necessary to describe it.

It may be desired to feed short sheets from some of the piles and long sheets from the other piles. The particular construction illustrated is adapted for feeding a short sheet from the pile 11 and a long sheet from either the pile 10 or the pile 12, or from both these piles. When this is to be done, the folding blade 151 on the cylinder 148 is rendered operative and it coöperates with the folding jaws 155 on the cylinder 152. The guide 161 is thrown into the dotted line position shown in Fig. 5, and the pins on the detaining cylinder are thrown out of operation, so that this cylinder operates simply as a forwarding cylinder. With this arrangement of the machine, a folded sixteen page product will pass over the guide 163 and will meet and be associated with an unfolded four page product, the two products passing together into the nip of the rolls 178, 182 and being forwarded by these rolls to be collected with the web sheets on the collecting cylinder.

Changes and variations may be made in the construction by which the invention is carried into effect. The invention is not, therefore, to be restricted to the particular machine hereinbefore described and illustrated.

What is claimed is:—

1. The combination with means for supporting two piles of sheets, of means for forwarding a sheet from each pile and at the same time producing a relative movement between the sheets and sidewise to their direction of movement whereby they are superposed, and means for folding the superposed sheets.

2. The combination with means for for-

warding a web, of web severing means, means for supporting two piles of sheets side by side, means for forwarding a sheet from each pile and at the same time producing a relative sidewise movement between the sheets whereby they are superposed, means for associating the superposed sheets with the web product, and means for folding together the sheets cut from the web and the superposed sheets.

3. The combination with means for forwarding a web, of web severing means, means for supporting two piles of sheets side by side, means for forwarding sheets from the piles and simultaneously producing a relative sidewise movement between the sheets whereby they are superposed, and means for folding together the superposed sheets and sheets cut from the web.

4. The combination with means for forwarding a web, of web severing means, means for supporting a pile of multi-length sheets, a collecting cylinder to which the web sheets are fed, means for forwarding a multi-length pile sheet, and a detaining cylinder operating to produce an interval between the successive pile sheet deliveries.

5. The combination with means for forwarding a web, of web severing means, means for supporting a pile of multi-length sheets, a collecting cylinder to which the web sheets are fed, means for forwarding a multi-length pile sheet, a detaining cylinder operating to produce an interval between the successive pile sheet deliveries, and a cutting cylinder cooperating with the detaining cylinder.

6. The combination with means for forwarding a web, of web severing devices,

means for supporting a pile of double length sheets, a collecting cylinder, means for feeding the web sheets thereto, means for forwarding a double length pile sheet, and a cylinder operating to detain a part of the double length sheet to permit the accumulation of web sheets on the collecting cylinder.

7. The combination with means for forwarding a web, of web severing devices, means for supporting a pile of double length sheets, a collecting cylinder, means for feeding the web sheets thereto, means for forwarding a double length pile sheet, a cylinder operating to detain a part of the double length sheet to permit the accumulation of web sheets on the collecting cylinder, and a cutting cylinder cooperating with the detaining cylinder.

8. The combination with means for forwarding a web, of web severing devices, means for supporting a plurality of piles of sheets of different lengths, means for feeding the sheets from the piles, sheet pathways leading from the piles to a common point, a folding device for operating on the sheets forwarded along one of the pathways, and means for associating the pile sheets with each other and with the web sheets, whereby pile sheets of different lengths may be forwarded and associated with the web sheets.

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

EDWARD P. SHELDON.

Witnesses:

F. W. H. CRANE,
LOUIS ROEHM.