

No. 653,608.

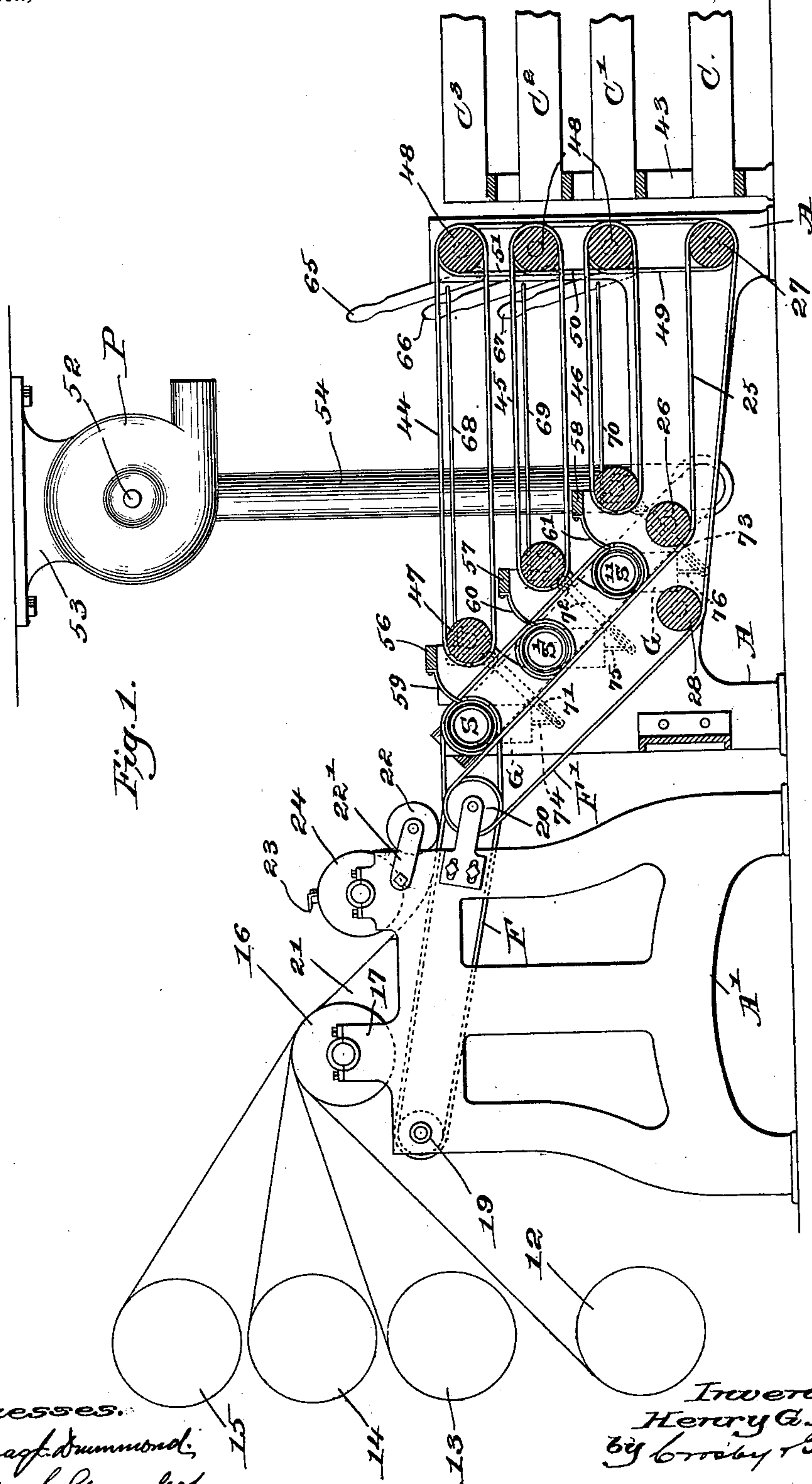
Patented July 10, 1900.

H. G. BARR.
SHEET SEPARATING MACHINE.

(Application filed Dec. 1, 1899.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses.

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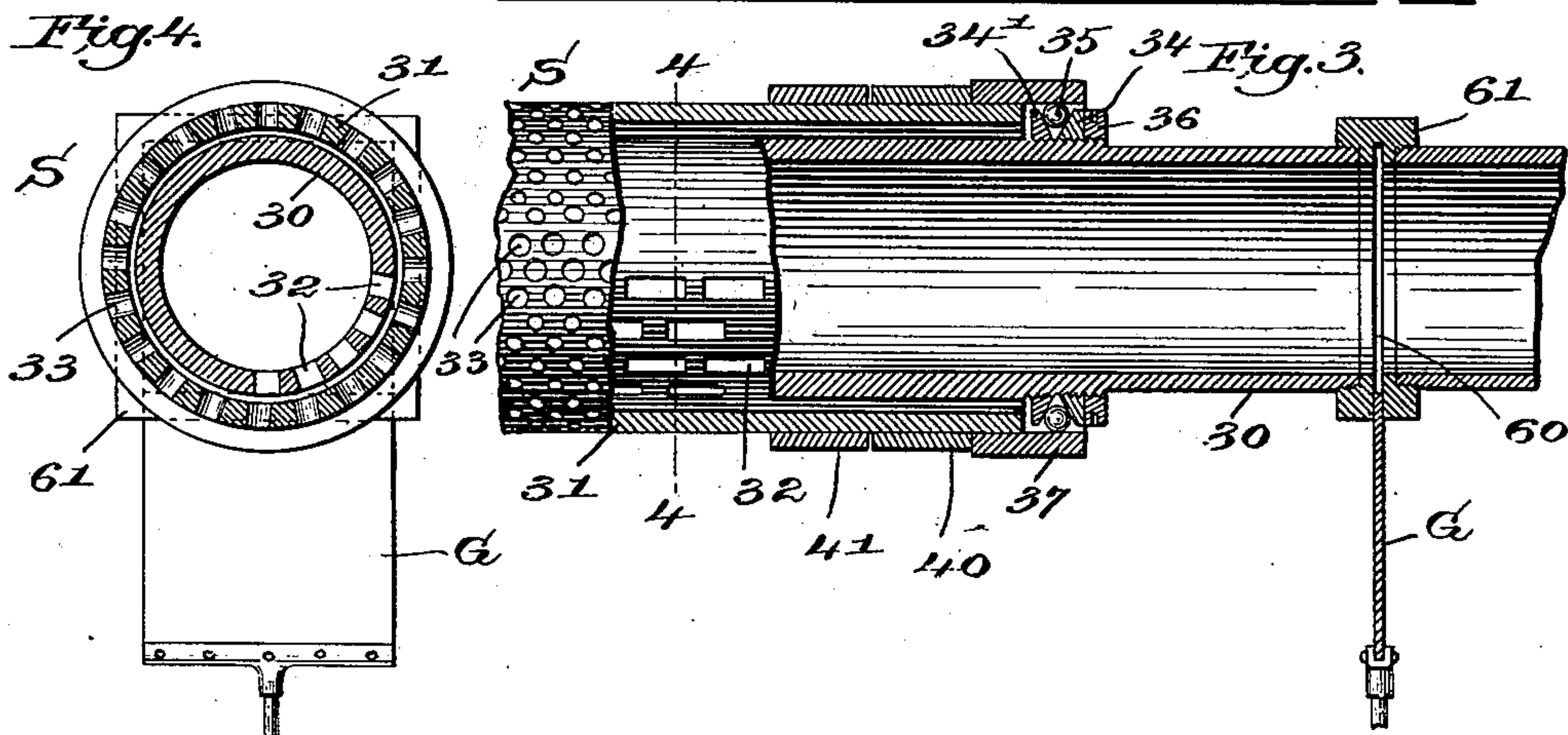
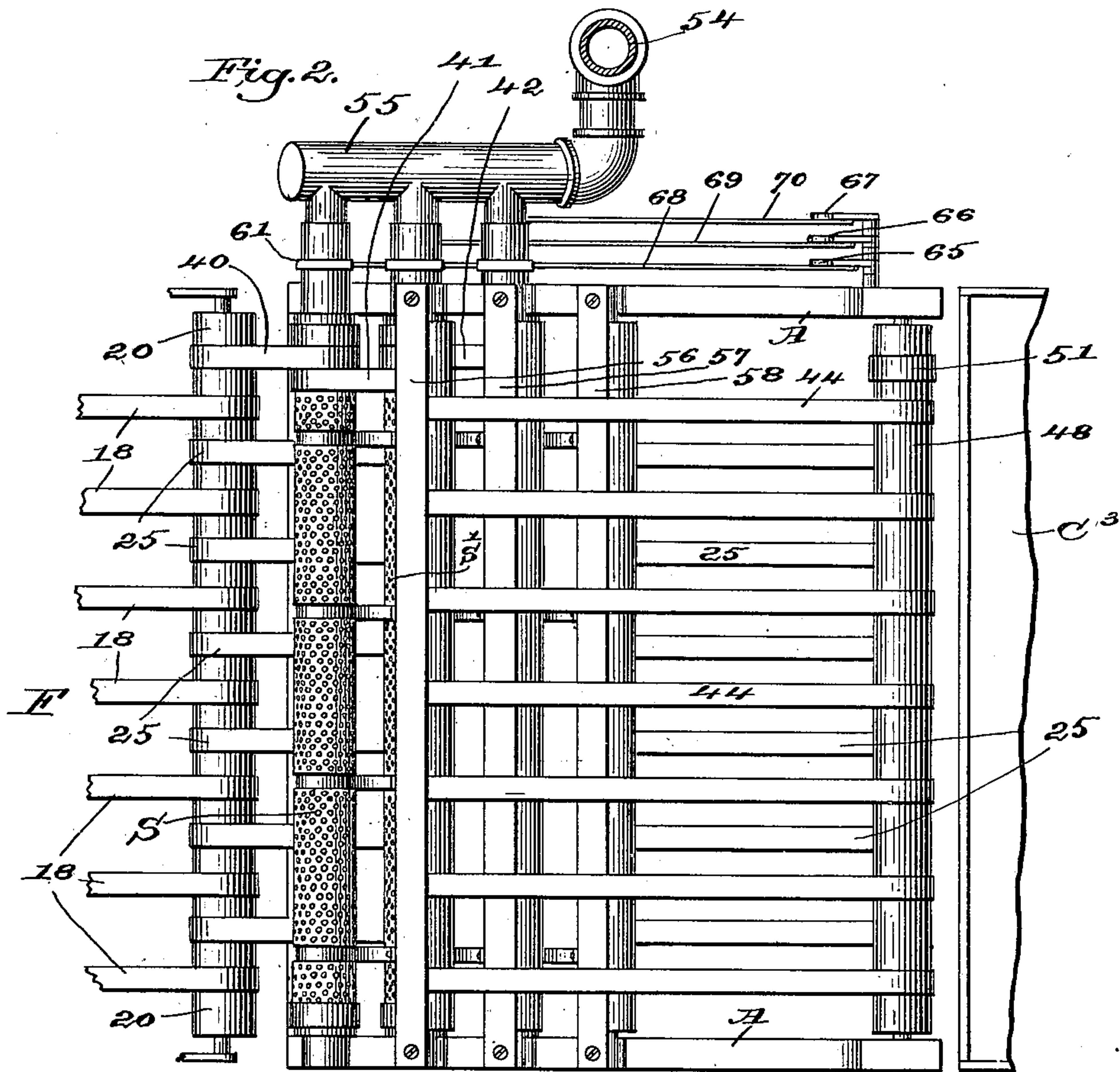
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H. G. BARR.
SHEET SEPARATING MACHINE.

(Application filed Dec. 1, 1899.)

(No Model.)

2 Sheets—Sheet 2.



Witnesses.
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UNITED STATES PATENT OFFICE.

HENRY G. BARR, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO
THEODORE C. BATES, OF SAME PLACE, AND CHARLES M. GAGE,
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SHEET-SEPARATING MACHINE.

SPECIFICATION forming part of Letters Patent No. 653,608, dated July 10, 1900.

Application filed December 1, 1899. Serial No. 738,780. (No model.)

To all whom it may concern:

Be it known that I, HENRY G. BARR, of Worcester, county of Worcester, State of Massachusetts, have invented an Improvement in Sheet-Separating Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

10 This invention relates to a machine for separating sheets of paper, and it is shown and will hereinafter be described in a simple and convenient embodiment.

15 In the drawings, Figure 1 is a sectional side elevation of a machine constructed in accordance with my invention. Fig. 2 is a plan view thereof, only part of the primary feed mechanism being illustrated. Fig. 3 is a longitudinal central section of a sheet-separating medium; and Fig. 4 is a transverse section of the same, taken on the line 4 4, Fig. 3, and looking toward the right.

25 In my improved machine illustrated in the drawings I provide means for supplying a plurality of sheets and means for separating them from each other, and afterward I prefer to deliver the assorted sheets into independent receptacles.

30 To secure the maximum amount of work, the machine may be supplied with a plurality of rolls of paper the webs of which are adapted to be superimposed and to be fed past a cutting device, which severs from the webs sheets of the desired size. These sheets thus cut are of different weights, and they are fed to the separating mechanism, and as they move along the top sheets are successively removed from the pile and are carried to their proper compartments, from which they may be removed as occasion requires. As I provide a plurality of sheet-separators, normally effective as such, it is essential when the feed of a particular web or sheets cut therefrom is to be stopped to throw the coöperating sheet-separator out of action.

45 The sheet-separating mechanism may be of any suitable kind; but for lightness, simplicity, and cheapness I provide pneumatically-controlled instrumentalities to secure the desired operation.

The framing may be of any suitable character. It is shown including the frame A, upon which the sheet-separating means and the instrumentalities for conveying the separated sheets to their independent receptacles 55 are mounted, and the framing A', upon which the web guiding and cutting devices, as well as the sheet-feeder, are supported.

In Fig. 1 I have shown at the left a series of vertically-alined rolls of paper 12, 13, 14, 60 and 15, which may be supported in any convenient manner and which are of different weights, the leading or free ends of the webs being superposed upon the guide-roller 16, the shaft of which is journaled in uprights or bearings 17 upon the framing A'. A feeder is shown at F, and it consists of a plurality of bands or tapes, as 18, disposed in parallelism and passed around the rolls 19 and 20, journaled at the rear and front, respectively, of 70 the framing A'.

The leading ends of the superposed webs of paper pass downward along the inclined surface of the guide-block 21, situated just in advance of the guide-roll 16, and onto the upper run or surface of the feeder F, which advances them forward and under the pressure-roller 22, the carrier 22' of which is suitably sustained at the forward side of the framing A', which pressure-roller holds them in proper 80 place, and between the time the leading ends of the series of webs pass the roll 16 and encounter the roll 22 they are separated into sheets of desired size by a cutter of any convenient kind. 85

The cutter employed usually consists of a fixed blade and a movable blade, and I have deemed it necessary to illustrate simply the movable blade, the same being denoted by 23 and secured to the periphery of the roll 90 24, rotative upon the framing. This roll 24 is continuously rotated, and any convenient means may be employed for so operating the same.

In the present case I feed four sheets past 95 the assorting mechanism, and the first three sheets are positively removed from the feeding mechanism by suitable separators or selectors, while I do not provide such a means for the last sheet, as this of course is not neces- 100

sary. The three sheets thus separated and the last one are conveyed into independent receptacles.

In Figs. 1 and 2 I have represented three sheet-separators, and they are designated, respectively, by S, S', and S'', and they will hereinafter be more particularly described. The sheet-separators are disposed in oblique alinement and are in adjacence with the working run of the feed device F', said feed device being of the endless type and consisting of a plurality of tapes 25, disposed in parallelism. The tapes or bands 25 pass around the roller 20 and also against the guide-roller 26 in alinement with the several separators previously described and also around the roll 27 and under the roll 28.

In Figs. 2 and 4 I have illustrated in detail one of the sheet-separators and will now describe the same, corresponding parts in the others being denoted by similar characters. Said sheet-separator S is of the pneumatic type, it being adapted to remove by suction the uppermost one of a series or pile of sheets, and it is represented as consisting of a stationary cylinder or tube 30 and a rotative cylinder or roll 31, surrounding said stationary cylinder or tube. The effective portions of these separators lie across the upper run of the feeder F' between the rolls 20 and 26, and they are spaced at equal distances apart. The peripheries of the outer rotative cylinders are contiguous to the feed device F'. The inner and stationary cylinder 30 is shown having a multiplicity of slots or perforations 32 extending longitudinally thereof in staggered relation, and the outer roller also has a multiplicity of openings or slots 33, likewise arranged in staggered relation. Only that half of the inner cylinder which is presented toward the feed device need be reticulated; but the outer cylinder should preferably be so formed throughout its entire working surface. The cylinder 30 has at opposite ends thereof bearings, one of which is represented in Fig. 3 as consisting of two substantially-duplicate cones, as 34 and 34', adapted to receive between them a series of balls 35, and said bearings are held in place by the check-nut 36. Sleeves, as 37, fitted over the opposite ends of the rotative cylinders and projecting slightly therefrom, have their inner faces traveling in contact with the balls 35, by which the easy operation of the cylinders 31 is assured. The several cylinders or tubes 30 of the sheet-separators are connected to a common suction apparatus of any suitable kind, and when the suction apparatus is in operation the force of the air exhausted through the two cylinders will be sufficient to cause the upper sheets of the pile as it is moved past the several separators to adhere to the peripheries of the proper cylinders of the respective separators. The upper cylinder 31 can be driven by a belt, as 40, from the roll 20, while the first one drives the second one and the second

one the third one by means of belts; as 41 and 42, respectively.

The roll 26 is driven from the feed device F'. The sheets cut from the leading ends of the series of four webs pass from the feed device F to the feed device F', and the separator S will take up the first sheet, the separator S' the second one, the separator S'' the third one, while the fourth one will move along with the feeder and pass under the roll 26 and will be delivered into the receptacle C', fastened suitably to the standard or upright 43 at the forward side of the frame A. A similar series of receptacles is shown at C', C², and C³, situated vertically above the receptacle C, and all connected to said standard. The first separated sheet is delivered into the receptacle C³, the second into the receptacle C², and the third into the receptacle C'. As the sheets acted upon by the three pneumatically-controlled separators tend to adhere to the peripheries thereof, I provide means for positively removing or taking them therefrom and guiding them to conveyers, as 44, 45, and 46. The conveyers are shown as horizontal and as being of the endless type, their inner ends being supported by a series of rolls, as 47, obliquely disposed and the axes of which are parallel to the axes of the cylinders 31, while the outer ends of said conveyers are carried around the rollers 48. The receiving ends of the conveyers are situated in proximity to the cooperating separators, while their delivery ends are located near the compartments C³, C², C', the sheets being carried by their momentum from the conveyers into the said receptacles. The band or belt 49 connects the roll 27 and the forward roll 48 of the conveyer 46, while the forward rolls 48 of the superposed conveyers 45 and 44 are connected by similar bands or belts 50 and 51, respectively, whereby the parts may be driven in unison. The pneumatic force to separate the sheets may be created by any suitable appliance. It is shown obtained from a rotary pump P, the fan-shaft 52 of which may be operated in some suitable manner. The pump-casing can be supported by a hanger, as 53, secured to a ceiling or other structure in a building. The main pipe 54 extends vertically downward from the pump and is provided with the branch 55, connected with the stationary cylinders 30, as shown in Fig. 2, whereby the air can be exhausted simultaneously from all the separators when the three topmost sheets are being delivered to the machine.

The conveyers 44, 45, and 46 constitute part of the means for supplying the separated sheets to the cooperating compartments located in advance of the same, and I interpose between the respective separators and conveyers devices to detach or disengage the adhering sheets from the several cylinders 31, so that the sheets will not be carried completely around with the same, and constituting the other parts of the several sheet-sup-

plying means. A series of cross-bars is shown at 56, 57, and 58 disposed in different horizontal planes and in oblique alinement with each other and with the three separators.

5 These cross-bars are carried by the frame A, and they are furnished upon the forward sides thereof with sheet-detaching means, shown as curved plates, as 59, 60, and 61, respectively, secured thereto in some suitable manner. The
10 free and lower ends of these curved plates are contiguous to the peripheries of the rotary cylinders 31. When a sheet is removed from the pile by the separator S', its forward end is carried around with the cylinder and comes
15 against the sheet detaching or taking-off device 59, which deflects or guides it onto the conveyer 44, which passes it to the receptacle C³, and the same operation will be repeated by the separators S' and S'' or by the outer
20 rotary cylinders 31 thereof and the taking-off devices 60 and 61, &c. The sheet which is not thus acted upon moves along with the feed device F' and is conducted by the latter into the lower receptacle C.

25 By the apparatus previously set forth I am enabled to simultaneously cut a large number of sheets of different kinds or weights and to separate and to deliver the same into compartments intended to receive all of a uniform
30 kind or size, and the several functions can be performed with facility, rapidity, and precision.

In some cases it is necessary to throw one or more of the separators out of action, and
35 in such an event it or they will not lift a sheet, but will simply serve as a feed device for the pile.

As the separators in the present instance are pneumatically controlled, to throw them
40 out of action it is simply necessary to cut off the exhaust-air therefrom, and this may be conveniently accomplished by a series of gates intersecting the stationary cylinders 30.

Referring now to Fig. 3, the stationary cylinder 30 there shown is equipped with a cut-off gate or valve G, which may be in the form of a flat plate or board vertically slidable in the
45 guideway 60 in the casing 61; connected to the cylinder. The cut-offs or valves for the other stationary cylinders are also denoted by G. (See Fig. 1.)

In Fig. 3 the valve G is shown as wide open, so that air can be exhausted through the two cylinders toward the right. By thrusting the
55 cut-off G upward it will close the cylinder, and consequently arrest the exhaust, so that the separator S will be rendered ineffective, and the same action can be accomplished with respect to the two other separators. The
60 gates G are manually operable. For opening and closing them I have shown a series of levers (denoted, respectively, by 65, 66, and 67) having handles at their free ends and fulcrumed at their lower ends to the frame A.

65 The rods 68, 69, and 70 are jointed to the respective levers in their handles and fulcrums and are likewise connected at their opposite

ends to angle-levers, as 71, 72, and 73, supported for oscillation by the frame A. Said angle-levers are loosely connected to the
70 stems 74, 75, and 76 of the several valves. By manipulating any one of the three levers 65, 66, or 67 the valve or gate G, connected therewith, can be opened or closed, thereby to render a sheet-separator connected therewith ef-
75 fective or ineffective.

The invention is not limited to the construction nor arrangement nor the character of parts previously set forth, for these features may be materially modified within the
80 scope of the accompanying claims, and it is obvious that the machine may be used for separating sheets other than paper.

Having fully described my invention, what I claim, and desire to secure by Letters Pat-
85 ent, is—

1. In a machine of the class specified, means for feeding a pile of sheets, a plurality of pneumatically-controlled devices adapted to successively remove the top sheet of said pile
90 as the latter is fed along, and mechanism for taking the sheets from said pneumatically-controlled devices and for delivering them along different paths.

2. In a machine of the class specified, means
95 for feeding a pile of sheets, a plurality of pneumatically-controlled devices adapted to successively remove the top sheet of said pile as the latter is fed along, mechanism for taking the sheets from said pneumatically-con-
100 trolled devices and for delivering them along different paths, and a plurality of receptacles positioned to receive the respective sheets.

3. In a machine of the class specified, means
105 for feeding and superimposing a plurality of webs of paper, means for cutting the webs into sheets, means for feeding the pile of sheets, a plurality of pneumatically-controlled devices adapted to successively re-
110 move the top sheet of the pile as the same is fed along, and mechanism for taking the sheets from said pneumatically-controlled devices and for delivering them along different paths.

4. In a machine of the class specified, means
115 for feeding a pile of sheets, a plurality of pneumatically-controlled devices adapted to successively remove the top sheet of said pile as the latter is fed along, means coöperative with each of said devices to positively detach
120 the sheets therefrom, and conveyers located to receive the sheets as they are detached from said devices.

5. In a machine of the class specified, a feeder to supply a pile of sheets, a plurality
125 of rollers contiguous to the feeder, the rollers being adapted to successively detach the top-most sheet from the pile, and mechanism for positively detaching the sheets from the rollers and for delivering them along different
130 paths.

6. In a machine of the class specified, means for feeding a pile of sheets, a plurality of hollow, perforated rollers adapted to successively

separate the topmost sheet from the pile as the same is fed thereby, mechanism for detaching the sheets from the rollers, and means to create suction in the respective rollers.

5 7. In a machine of the class specified, means for feeding a pile of sheets, a plurality of hollow, perforated rollers adapted to successively separate the topmost sheet from the pile as the same is fed thereby, mechanism for detaching the sheets from the rollers, means to
10 create suction in the respective rollers, and means to cut off the air-supply to any one or more of the rollers.

8. In a machine of the class specified, means
15 for feeding a plurality of sheets, sheet-separating devices acting successively on the sheets; and means for throwing one or more of the sheet-separating devices out of action.

9. In a machine of the class specified, means
20 for feeding a pile of sheets, a plurality of hollow, perforated rollers adapted to successively remove the topmost sheet of the pile as the latter is fed along, an air-blast apparatus common to all of the rollers, gates controlling the
25 supply of air to the rollers, and means for operating the gates.

10. In a machine of the class specified, a feeder, a plurality of rollers contiguous to the same, the face of one roller being imperforate
30 and the other roller being hollow and perforate, and means for creating a suction in the hollow rollers.

11. In a machine of the class specified, a feeder; means for presenting a plurality of
35 sheets to the feeder; a second feeder adapted to receive the sheets from the first-mentioned feeder; one or more sheet-separators contigu-

ous to the second feeder; a plurality of conveyers coöperative with the sheet-separators; and means adjacent each sheet-separator and
40 serving to detach a sheet therefrom and to deliver it to the coöperating conveyer.

12. In a machine of the class specified, a plurality of webs of paper; a roll over which the superposed webs are adapted to travel; a
45 guide for the leading end of the webs; a feeder in position to receive the webs from the roller and guide; cutting mechanism for severing the sheets of paper from the webs; a second feeder adapted to receive the sheets from the
50 first feeder; and a plurality of sheet-separators situated at equidistant points along the second feeder.

13. In a machine of the class specified, means for feeding a plurality of sheets; sheet-
55 separators; conveyers coöperative with the sheet-separators; means to receive the sheets from the conveyers; and plates contiguous to the sheet-separators and serving to detach the sheets therefrom and to guide the same to the
60 proper conveyers.

14. In a machine of the class specified, means for feeding a pile of sheets, a plurality of conveyers, and mechanism for successively
65 removing the top sheet of said pile as the latter is fed along and for delivering said sheets to said conveyers.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY G. BARR.

Witnesses:

HEATH SUTHERLAND,
LOUISE ROTHSTEIN.