

No. 690,702.

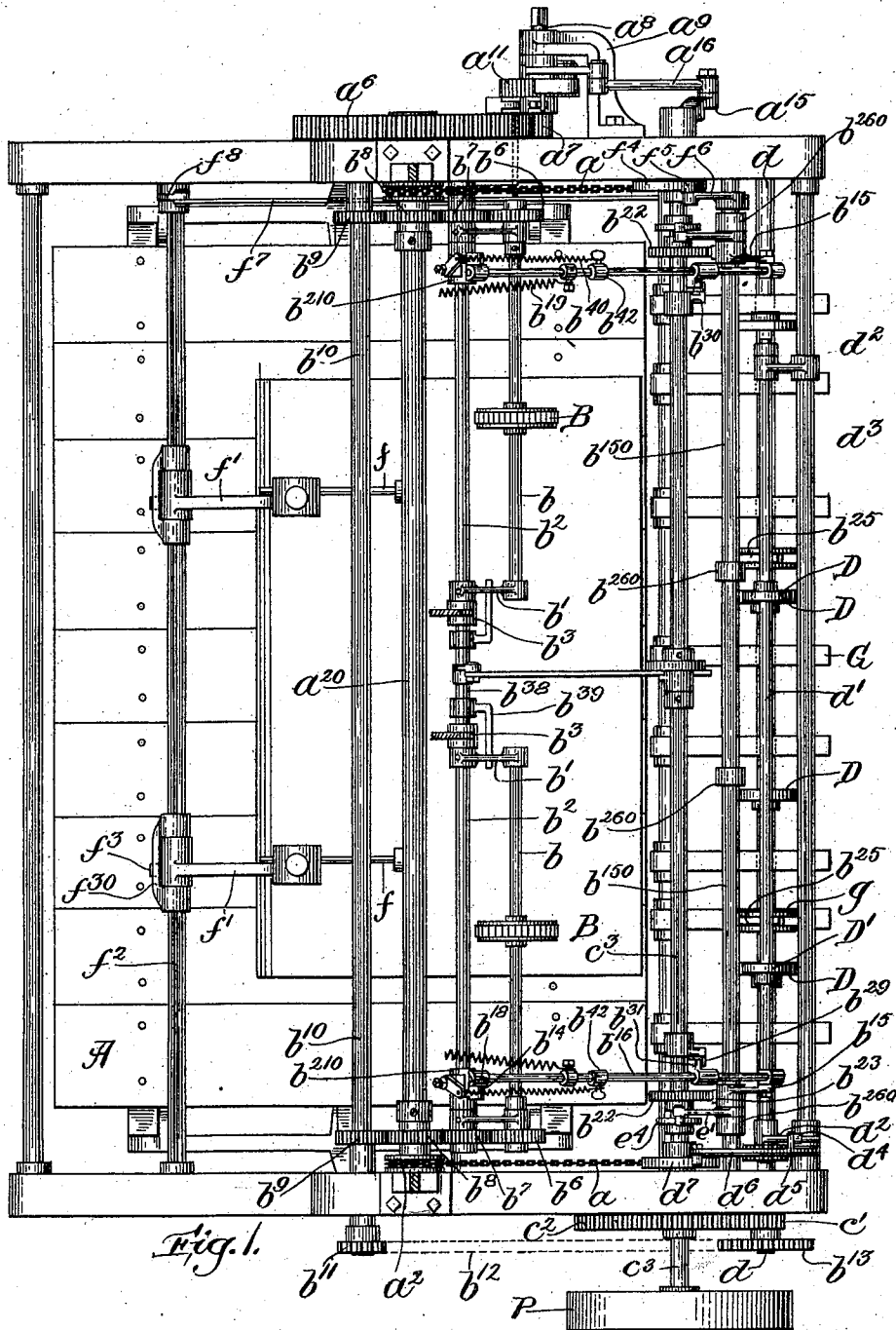
Patented Jan. 7, 1902.

F. L. CROSS.
FEEDING MACHINE.

(Application filed Oct. 22, 1900.)

(No Model.)

5 Sheets—Sheet 1.



Witnesses:
Arthur. Thadall.
J. H. Fish

Inventor:
Frank L. Cross
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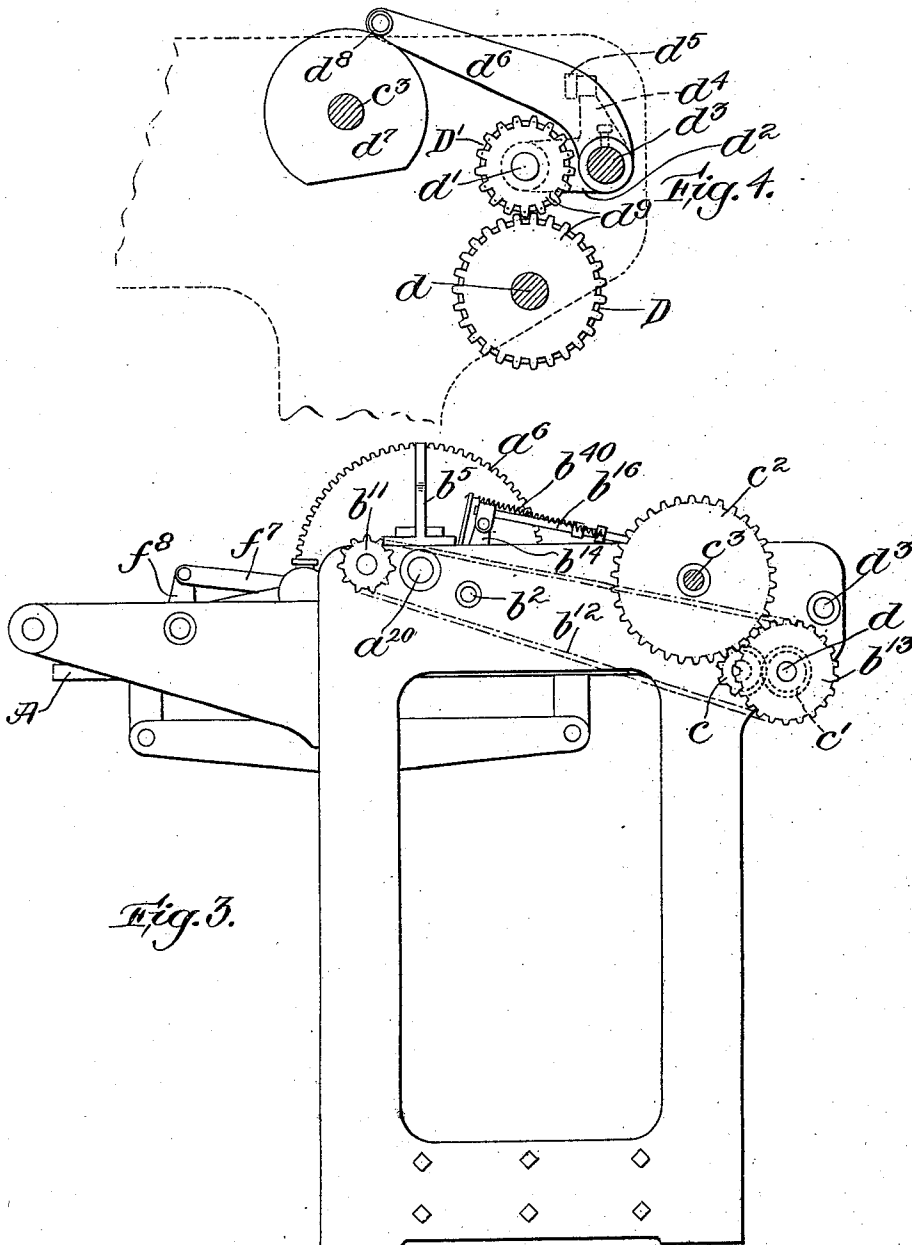
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FEEDING MACHINE.

(Application filed Oct. 22, 1900.)

(No Model.)

5 Sheets—Sheet 3.



Witnesses:

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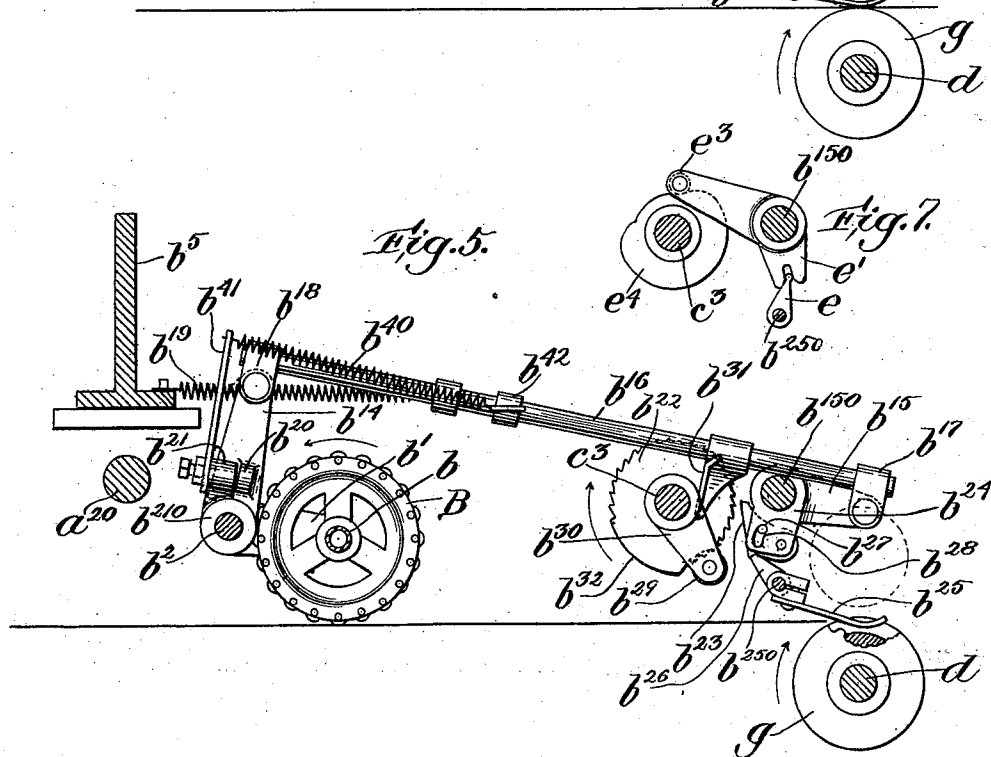
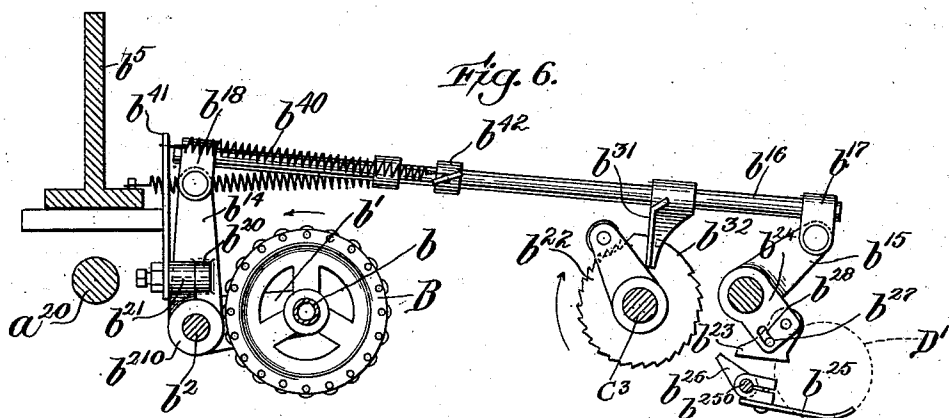
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FEEDING MACHINE.

(Application filed Oct. 22, 1900.)

(No Model.)

5 Sheets—Sheet 4.



Witnesses:
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No. 690,702.

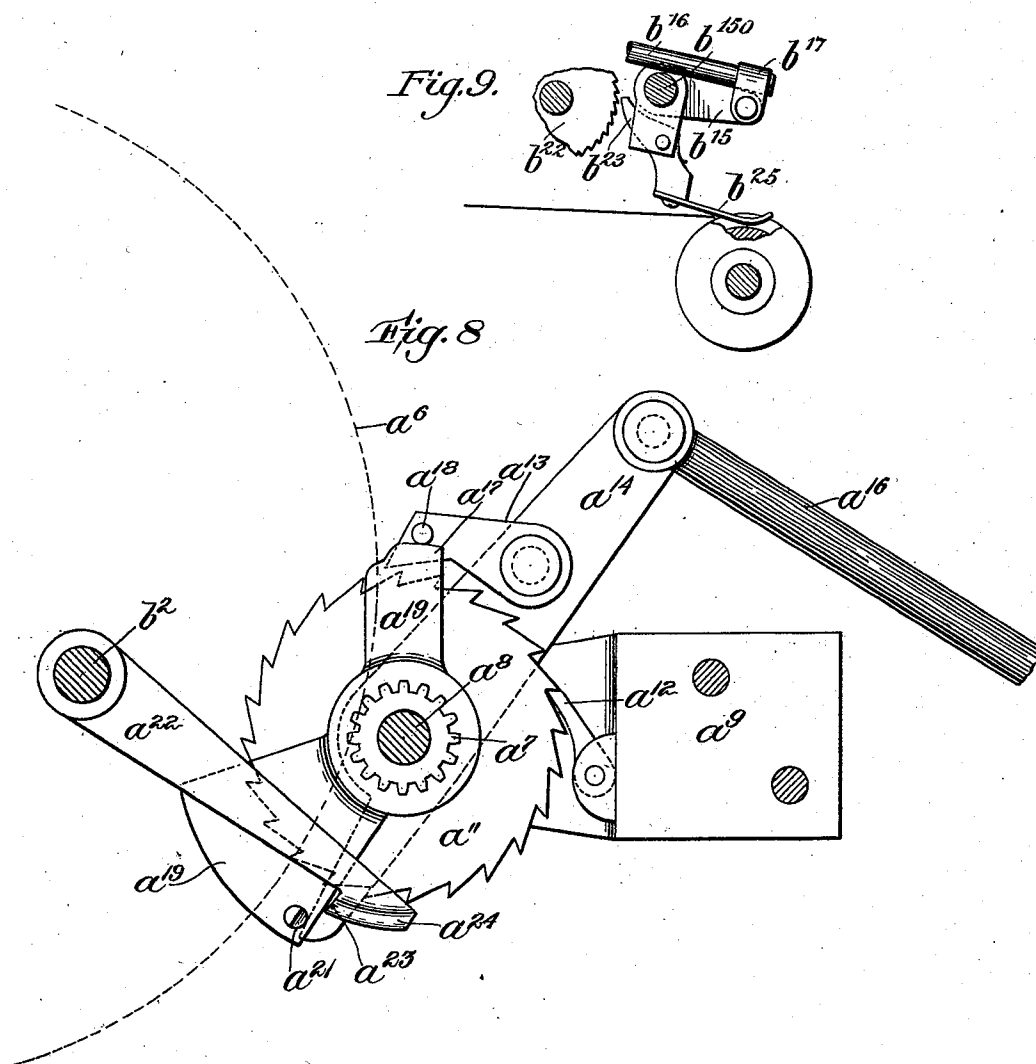
Patented Jan. 7, 1902.

F. L. CROSS.
FEEDING MACHINE.

(Application filed Oct. 22, 1900.)

(No Model.)

5 Sheets—Sheet 5.



Witnesses:

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UNITED STATES PATENT OFFICE.

FRANK L. CROSS, OF MYSTIC, CONNECTICUT, ASSIGNOR TO AMERICAN PAPER FEEDER COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

FEEDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 690,702, dated January 7, 1902.

Application filed October 22, 1900. Serial No. 33,863. (No model.)

To all whom it may concern:

Be it known that I, FRANK L. CROSS, of Mystic, in the county of New London and State of Connecticut, have invented certain
5 new and useful Improvements in Feeding-Machines, of which the following is a specification.

The invention relates to feeding-machines, and is more especially intended for use in
10 connection with sheet-feeders in which individual sheets are separated from a pile or bank of sheets, so that they may be removed from the pile or bank and presented to machines or devices for further manipulating or
15 acting on the sheets, although certain features of the invention may be employed in other forms of sheet-feeders or where it is desired to control the action of certain mechanism through the sheet or other article being acted upon or manipulated.

One object of the invention is to provide simple and efficient mechanism for so controlling a feeding mechanism by the action of the sheet being fed that when the sheet
25 arrives at a certain point the feeding action will cease, and this is accomplished by the use of controlling mechanism which is connected with its driver by the engagement of a sheet-controlled pawl with the driver, the
30 pawl being so controlled by the sheet that when the sheet has been advanced into a certain position by the feeding devices the pawl engages the driver, thus connecting the driver with the devices which control the action of
35 the feeding devices, thereby arresting the feeding action. The feeding devices may be of any suitable construction and form, and the feeding action of said devices may be arrested in various ways, the controlling devices or mechanism being modified to suit
40 the form of feeding devices and the manner in which their action is to be arrested. In any case the sheet is advanced by the action of the feeding devices and causes a pawl to
45 engage a moving driving member, thereby connecting said driving member with the controlling mechanism, so that the controlling mechanism is operated by the driver and arrests the feeding action of the feeding de-

vices. Thus the controlling mechanism is
50 positively and surely operated, while its operation may be accurately controlled by a device sufficiently sensitive to be operated by the edge of a thin sheet of paper. The controlling devices are preferably connected with
55 the feeding devices, so that when operated by the driver they throw the feeding devices out of action, and the pawl is preferably carried by the controlling devices, being normally out of engagement with the driver and
60 being moved or allowed to move into engagement with the driver by the action of the advancing sheet.

The other features of invention will be hereinafter referred to in describing the machine,
65 which is shown and will be more particularly defined in the claims.

For the purpose of illustrating one form of machine in which the features of invention may be employed a machine is shown in which
70 the pile of sheets is supported on a vertically-movable table and is acted upon by combing devices which act to comb or feather out the top sheets, advancing the top sheet to a
75 greater extent than the sheets beneath it, so that said sheet may be acted upon by forwarding devices which deliver it to a machine designed for acting upon individual sheets.

In the drawings, Figure 1 is a plan view
80 of such machine. Fig. 2 is a longitudinal vertical section. Fig. 3 is a side elevation. Fig. 4 is a detail of the mechanism for operating the forwarding-rolls. Fig. 5 is a detail
85 showing the feeding and controlling mechanism during the feeding of the sheet. Fig. 6 is a similar view with the feeding devices out of action. Fig. 7 is a detail of the mechanism for holding the trip out of contact with the sheet during the action of the forwarding
90 devices. Fig. 8 is a detail of the devices for operating the table which supports the pile of sheets. Fig. 9 is a detail of a modification, to be referred to.

In the machine shown the pile of sheets is
95 supported on a vertically-movable table A in position to be acted upon by two combing-rolls B of a well-known construction, which

act to comb or feather out the top sheets, advancing the top sheet to a greater extent than the sheets beneath it. The feeding and separating action of these rolls continues as long as they rotate in contact with the pile of sheets, and, as is well known, their action may be arrested either by stopping the rotation of the rolls or by disengaging the rolls and pile. In the machine shown the rolls are constantly rotated and are thrown out of action by disengaging the rolls and paper, the mechanism for controlling the feeding action being constructed to lift the rolls from the pile. The rolls are arranged to act upon the sides of the upper sheet and each is controlled independently of the other, being thrown out of action when the corresponding side of the sheet has been advanced to a certain point. The mechanisms for rotating and controlling the rolls are duplicates of each other, and the construction and operation of only one set of devices will therefore be described.

The roll B is secured to a transverse shaft b , journaled in arms b' , which are secured to a rock-shaft b^2 , one end of which is supported in a bracket b^3 , the other end being supported in the frame. The bracket b^3 is secured to a bar b^5 , extending transversely above the table and secured to the side frames of the machine. The shaft b is driven constantly through a gear b^6 , secured thereto and connected through intermediate gears b^7 b^8 with a gear b^9 , which is secured to a transverse shaft b^{10} , mounted in bearings in the side frames. The gear b^7 is loosely mounted on the shaft b^3 , and gear b^8 is loosely mounted on a shaft a^{20} , to be hereinafter referred to. A sprocket-wheel b^{11} is secured to the end of shaft b^{10} and is connected by a chain b^{12} with a sprocket-wheel b^{13} , secured to a shaft d , which is driven through gears c c' from a gear c^2 , secured to the main driving-shaft c^3 . By this gearing the roll B is constantly rotated without interfering with the vertical movement of the roll, since the gear b^7 is concentric with the axis about which the shaft b is moved when the roll B is raised.

The devices for raising the roll B from the pile, and thereby arresting the combing action, comprise an arm b^{14} , mounted on the shaft b and connected with a second arm or lever b^{15} , loosely mounted on a transverse rod b^{150} by means of a rod b^{16} , the forward end of which is secured in a block b^{17} , pivoted to the end of lever b^{15} , and the rear end of which is secured in a block b^{18} , pivoted to the end of arm b^{14} . When the arm or lever b^{15} is swung upward, as shown in Fig. 6, the arm b^{14} is actuated to raise the combing-roll from the pile of sheets. The arm b^{14} may be connected with the combing-roll in any suitable manner, and the combing-roll may be lowered as well as raised by arms b^{14} and b^{15} and the rod b^{16} ; but it is preferred to employ this controlling mechanism to raise the roll only and to provide other means for lowering the roll upon the pile. The arm b^{14} is therefore in the construc-

tion shown mounted loosely upon the shaft b and is provided with a lug b^{20} , arranged to engage a lug b^{21} on a collar b^{210} , secured to the shaft b . With this connection between the combing-roll and arm b^{14} the arm may be moved forward without affecting the combing-roll, but will lift said roll on its backward movement, the roll having been lowered upon the pile by other mechanism. The mechanism for operating the controlling mechanism to arrest the feeding action consists of a driver in the form of a disk b^{22} , secured to the shaft c^3 , and a pawl b^{23} , arranged to engage teeth or shoulders on the driver, and thus connect the driver and controlling mechanism. The pawl b^{23} is connected with the controlling mechanism by being mounted in an arm or block b^{24} , connected or formed integral with the arm b^{15} . The pawl is normally or during the feeding action of the combing-roll out of the path of the teeth on the driving-disk, but is so controlled by the sheet that when the front edge of the sheet reaches a certain position the pawl moves into position to engage a tooth of the driver. It is preferred to thus control the pawl by a trip-lever b^{25} , arranged in the path of the sheet and connected with a catch or pawl b^{26} , which holds the pawl out of the path of the teeth on the driver until the front edge of the sheet operates the lever b^{25} , when the pawl b^{26} releases pawl b^{23} , causing said pawl to engage the driver. The lever b^{25} and the pawl b^{26} are secured to a rock-shaft b^{250} , journaled in arms b^{260} , which are secured to the rod b^{150} . Instead of controlling pawl b^{23} through a second pawl it is obvious that the sheet-operated trip could be connected directly with the pawl for engaging the driver, as shown in Fig. 9, in which case the action of the sheet would move the pawl into engagement with the driver. The pawl b^{23} is pivoted in the block b^{24} , and its movement about the pivot is limited by a pin b^{27} , working in a slot b^{28} . When the pawl b^{23} engages the driver, it is thrown downward, rocking the arm b^{15} upward, and at the same time the block b^{24} swings away from the driver. The end of the pawl, however, continues in engagement with the driver until the combing-roll has been lifted, when the pawl is disengaged by its movement about the rod b^{150} . After the combing-roll has been thrown out of action it is held out until the sheet has been removed, and then the controlling mechanism is reset or moved into position to be again operated by the driver, after which the combing-roll is again thrown into action. The means for holding the combing-roll out of action employed in the construction shown consists of a spring b^{19} , having one end secured to the rod b^{16} and the other end secured to the bar b^5 . With this form of means for holding the combing-roll out of action the resetting of the controlling means puts the spring b^{19} under tension, and the parts are therefore so arranged that when the mechanism is reset the pivot of block b^{17} is in or below the line passing through the

centers of the pivot of block b^{18} and rod b^{150} , and thus the spring will not affect the position of the controlling mechanism until it has been operated by the driver. With the pawl 5 controlled in the manner shown it is obvious that the controlling mechanism would be held in position by the engagement of the pawl b^{23} with the pawl b^{26} , even if the parts were not brought into the position described; but 10 it is preferred to relieve the pawls of any holding action, so that the only work done by pawl b^{26} is to support the pawl b^{23} , as with this arrangement the tripping devices are rendered more sensitive and may be more 15 accurately and readily operated by very thin sheets.

The means shown for resetting the controlling mechanism consists of a roll b^{29} , carried on an arm b^{30} , secured to the shaft c^3 , and a 20 plate b^{31} , secured to the rod b^{16} and arranged to lie in the path of the roll b^{29} when the controlling mechanism has been operated to arrest the feeding action. After the sheet which caused the combing-roll to be thrown 25 out of action has been removed the rotation of shaft c^3 brings the roll b^{29} into engagement with the plate b^{31} , thereby forcing said plate and the bar b^{16} forward until the controlling mechanism is in the position shown in Fig. 5, 30 when the roll passes over the top of said plate. During the action of the roll b^{29} on the plate b^{31} the block b^{24} and pawl b^{23} are carried toward the shaft c^3 , and the end of pawl b^{23} strikes against an abutment b^{32} , carried by 35 shaft c^3 , and said pawl is rocked on its pivot into position to be supported by the pawl b^{26} , with its end out of the path of the teeth on the driver. The abutment is preferably formed on the disk b^{22} , and after the pawl b^{26} 40 engages the pawl b^{23} said abutment passes out of engagement with pawl b^{23} , leaving said pawl free to engage the driver when released by the action of the sheet.

The preferred means for lowering the combing-roll onto the pile consists of a cam b^{33} , secured to the shaft c^3 and acting on a roll b^{34} , carried by a rod b^{35} , one end of which is mounted to slide in a block b^{36} , hung loosely on the shaft c^3 , and the other end of which is 50 pivoted to an arm b^{37} , secured to a short shaft b^{38} , journaled in the brackets b^3 in line with shaft b . The shaft b^{38} carries arms b^{39} , which underlie the arms b' , which carry the combing-rolls, and control the downward movement of said arms b' and rolls, but do not 55 interfere with their upward movement under the action of the controlling mechanism. The cam is so timed that the combing-roll is held away from the pile until the controlling 60 mechanism has been reset and the abutment moved into a position which allows the pawl to engage the driver, even if it should be immediately tripped when the combing-roll strikes the pile. Thus the proper action of 65 the controlling mechanism is insured even if the sheet which is next to be fed is very nearly in engagement with the lever b^{25} when the

combing-roll is lowered. This condition of the sheets may occur under some conditions and in case the combing-roll were lowered by 70 the controlling mechanism might result in an operation of the trip before the parts were in position to act properly, thereby reducing the efficiency of the machine.

The combing-roll may merely rest with its 75 own weight upon the pile, or means may be employed for varying the pressure of the roll to suit varying conditions. The means shown for varying the pressure of the roll consists of a spring b^{40} , one end of which is connected 80 to an arm b^{41} , secured to the collar b^{310} , and the other end of which is secured to a collar b^{42} , which may be adjusted on rod b^{16} to vary the tension of the spring, and thus vary the pressure of the roll on the pile. 85

The combing-rolls are lowered upon the pile simultaneously, and each continues to act until the front edge of the top sheet at the corresponding side of the sheet acts upon trip 90 b^{25} at that side, when the action of that combing-roll is arrested, the other roll continuing to advance the other side of the sheet until it is in proper position to arrest the action of said roll. Thus the front edges of successive sheets are brought into the same line and into 95 position to be removed and delivered to other machines. In the machine shown the front edge of the sheet is advanced by the feeding devices into position between forwarding-rolls 100 $D D'$, the rolls D being secured to the continuously-driven shaft d , which is mounted in fixed bearings below the plane of the sheets, and the rolls D' being secured to a vertically-movable shaft d' , which is lowered to engage 105 the rolls D' with the sheet after the combing-rolls have ceased to act and is raised after the sheet has been delivered to machine in which it is to be further manipulated. The shaft d' is mounted in arms d^2 , secured to a shaft d^3 , to which is also secured an arm d^4 , 110 Fig. 4, arranged to engage a lug d^5 , which projects from a lever d^6 , loosely mounted on shaft d^3 . The lever d^6 is operated to raise and lower the rolls D' by a cam d^7 , secured to shaft c^3 and engaging a roll d^8 on the end of 115 lever d^6 , Fig. 4. The shaft d' is connected with shaft d by gears d^9 , and the movement of shaft d' is such that these gears always remain in mesh, so that rolls D' are constantly rotated. The rolls D' are lowered into en- 120 gagement with the sheet or the rolls D at a definite time after the combing-rolls have been lowered and are raised at a definite time, the cam d^7 being so constructed that the rolls D' remain in action a sufficient time to remove 125 the sheet or to deliver it into the control of the machine to which the sheets are being fed. In order that the sheets shall be properly fed, the combing-rolls should advance the sheet into position to operate the trips b^{25} 130 before the rolls $D D'$ are engaged, as otherwise the delivery of the sheet will not be properly timed with relation to the operation of the machine to which the sheets are being

fed. To avoid any danger of sheets being thus delivered out of time, the action of the combing-rolls is arrested prior to the lowering of rolls D' even should the sheet not have
 5 been advanced by the combing-rolls at that time into the proper position to act on the trips and be acted on by the rolls D D'. This is preferably accomplished by so forming the cam b^{33} that it will lift the combing-rolls prior
 10 to the lowering of rolls D', provided they have not already been lifted by the controlling mechanism.

The levers b^{25} may rest on the sheet as it is being delivered; but for some classes of work
 15 it is desirable that said levers should not thus engage the sheet, and the machine is accordingly provided with means for holding said levers out of the path of the sheet being delivered. This means consists of an arm
 20 e , secured to shaft b^{250} and having its end engaging a recess in one end of a lever e' , mounted loosely on rod b^{150} , and carrying a roll e^3 at its other end, which engages a cam e^4 , secured to shaft c^3 . This cam is so shaped
 25 that it rocks the lever e' in a direction to lift the trip-lever b^{25} when the roll D' is lowered and in a direction to lower the trip-lever b^{25} after the sheet has been delivered.

While the sheet is being removed by the
 30 rolls D D' or by the devices of the machine to which the sheets are being fed the remaining sheets of the pile are held from displacement by fingers f , which rest upon the top of the pile back of the top sheet. These fingers
 35 are adjustably secured in the ends of weighted arms f' , loosely mounted on a rock-shaft f^2 . The arms are provided with rearwardly-projecting lugs f^3 , which underlie yokes f^{30} , secured to the shaft f^2 . The shaft f^2 is rocked
 40 to raise and lower the fingers f by a cam f^4 , secured to the shaft c^3 , and engaging a roll f^5 on the end of a lever f^6 , which is loosely mounted on rod b^{150} and has its lower end connected with an end of a rod f^7 , the other end
 45 of which is pivoted to an arm f^8 , secured to shaft f^2 . The cam f^4 is so formed that the fingers are lowered upon the pile just prior to the lowering of rolls D' and are raised before the combing-rolls are lowered.

As the sheets are removed from the pile
 50 the table A should be raised to keep the top of the pile in proper relation to the combing-rolls, and this is preferably done automatically, so that the machine will not require at-
 55 tention until the pile of sheets is exhausted. After the pile has been exhausted the table must be lowered to receive a fresh supply of sheets, and the efficiency of the machine is in-
 60 creased by so constructing the means for operating the table that the table may be quickly and conveniently lowered and the loss of time in resupplying the machine with sheets thus reduced to a minimum. The
 65 mechanism shown for operating the table effects these results and embodies certain features of invention. As shown, each side of the table is supported in a loop of a chain a ,

one end of which is secured to the frame at a' . Each chain a extends from the point a' down under a roller a^{10} on the table A, then up
 70 over a sprocket-wheel a^2 , secured to a shaft a^{20} , thence over a roller a^3 , around a roller a^4 on the end of a counterweight a^5 , and is secured to the frame. This counterweight a^5 is substantially the same weight as the table
 75 when unloaded, and the table may therefore be manually manipulated when empty with little exertion. Moreover, by supporting the table in loops of chains or bands a heavy load of sheets may be lifted or fed upward with-
 80 out undue strain on the operating mechanism. The shaft a^{20} carries a gear a^6 on the outer end, which is engaged by a pinion a^7 , secured to a short shaft a^8 , journaled in the frame and in a bracket a^9 , secured thereto.
 85 A ratchet-wheel a^{11} is secured to the shaft a^8 and is engaged by a stop-pawl a^{12} , so that the downward movement of the table A is prevented so long as the pawl a^{12} engages the ratchet-wheel a^{11} . The outer end of the shaft
 90 a^7 is squared to receive a crank-handle by which the table may be readily raised or lowered manually, the pawl a^{12} being disengaged when it is desired to lower the table. The mechanism for automatically raising the ta-
 95 ble comprises a pawl a^{13} normally out of engagement with the ratchet a^{11} , but thrown into action when the top of the pile of sheets is below a certain level. The pawl a^{13} is piv-
 100 oted on a carrying-arm a^{14} , loosely mounted on the shaft a^8 and continuously oscillated by a crank-arm a^{15} , secured to the shaft c^3 and connected with the arm a^{14} by a rod a^{16} . When the top of the pile of sheets is above
 105 a certain level, the pawl rides idly over the ratchet by reason of a guard a^{17} , which underlies a pin a^{18} on the pawl and is controlled by the position of the top of the pile on the table. The guard a^{17} is formed on the end of a lever a^{19} , pivoted on the shaft a^8 and having its lower
 110 end weighted and provided with a pin a^{21} , which rests against the lower end of the pawl-carrying arm a^{14} . The weight of the lever a^{19} keeps the pin against the pawl-carrying arm, and the guard a^{17} therefore moves with the
 115 pawl and holds it out of engagement. When the top of the pile is below a certain level, however, the movement of the lever a^{19} is arrested and then the pin a^{21} passes off the guard a^{17} , and the pawl a^{13} engages the ratchet-wheel
 120 a^{11} and feeds the same forward, thus raising the table A. The means for arresting the movement of the lever a^{19} comprises an arm or pawl a^{22} , provided with a shoulder a^{23} , which is moved into the path of the pin a^{21} , which
 125 projects from the lever a^{19} on the opposite side from the arm a^{14} . The arm a^{22} is connected with a device which engages the top of the pile of sheets, and as the top of the pile is lowered the arm a^{22} is lowered until the
 130 shoulder a^{23} comes into the path of the pin a^{21} . The end of the arm a^{22} is provided with a cam-surface a^{24} , under which the pin a^{21} may ride during the back stroke of pawl-carrying arm,

the arm a^{22} being so mounted that it may be lifted by the action of the pin on the back stroke, but will fall after the pin has passed the shoulder a^{23} , thus bringing the shoulder 5 in front of the pin on the forward stroke. In the machine shown the combing-rolls are arranged to follow the top of the pile within certain limits, and they are connected with the arm a^{22} and form the device for engaging the 10 top of the pile. The arm a^{22} is therefore supported on the shaft b^2 and follows the movement of said shaft as the combing-rolls are lowered onto the pile. The mechanism described is a simple and efficient mechanism 15 for automatically operating and controlling the table A and does not interfere with or require any manipulation when the table is to be lowered for a fresh supply of sheets.

The front edges of the sheets which are advanced by the action of the combing-rolls may be supported by guide-bars G, which extend horizontally from the front of the table, being horizontal extensions of the vertical bars G' at the front of the table. The edge 25 of the top sheet may be, and preferably is, supported against the trip-levers by rolls g, mounted on the shaft d and provided with grooves in which the trip-levers lie when in position to be operated by the sheet.

The machine may be connected with the machine to which the sheets are to be fed by proper gearing to time the feeding of the sheets properly, or said machine may be operated through a pulley P, secured to shaft c^3 .

35 What I claim, and desire to secure by Letters Patent, is—

1. The combination with feeding mechanism, of mechanism for arresting the action of the same comprising, a driver and a pawl 40 which is engaged with the driver by the action of the sheet.

2. The combination with feeding mechanism, of mechanism for controlling the same, a driver for operating said controlling mechanism and a pawl controlled by the article 45 fed for connecting said controlling mechanism and driver.

3. The combination with feeding mechanism, of mechanism for disengaging said feeding mechanism and the sheets, a driver for operating said disengaging mechanism, and a sheet-controlled pawl for connecting said driver and disengaging mechanism. 50

4. The combination with a feeding device, of mechanism for raising said device from the sheets, a driver for operating said raising mechanism, and a pawl carried by said raising mechanism and engaged with said driver by the action of the sheet. 55

5. The combination with a feeding device, of mechanism for arresting the action of the same, a driver for operating said arresting mechanism, a pawl for connecting said driver and arresting mechanism engaged with said 60 driver by the action of the sheet, and mechanism for resetting the arresting mechanism and pawl.

6. The combination with a feeding device, of mechanism for arresting the action of the same, a driver for operating said arresting 70 mechanism, a pawl for connecting said driver and arresting mechanism engaged with said driver by action of the sheet, mechanism for resetting the arresting mechanism and pawl, and mechanism for throwing the feeding de- 75 vice into action.

7. The combination with a feeding device, of mechanism for arresting the action of the same, a driver for operating said arresting mechanism, a pawl for connecting said driver 80 and arresting mechanism engaged with said driver by the action of the sheets, mechanism for holding said feeding device out of action and returning the same into action, and mechanism for resetting the arresting mechanism 85 and pawl.

8. The combination with a feeding device, of an oscillating block connected therewith, a rotating disk having teeth, a pawl carried by said block and normally out of the path 90 of said teeth, and a trip for causing the engagement of said pawl with said teeth.

9. The combination of a rotary disk having teeth, a mechanism operated by said disk, a pawl carried by said mechanism and normally 95 out of the path of said teeth, and a trip for causing said pawl to engage said teeth and connect said disk and mechanism.

10. The combination of a rotary disk having teeth, an oscillating block, a pawl mounted 100 on said block and normally out of the path of said disk, and means for engaging said pawl with said teeth.

11. The combination with a feeding device, of an oscillating block connected therewith, 105 a rotary disk having teeth, a pawl carried by said block and engaged with said teeth by the action of the sheet.

12. The combination with a feeding device, of an oscillating block connected therewith, 110 a rotary disk having teeth, a pawl carried by said block and engaged with said teeth by the action of the sheet, and means for returning the block and pawl to position to be again connected with said disk. 115

13. The combination with a feeding device, of an oscillating block connected therewith, a rotary disk having teeth, a pawl carried by said block, and a trip-lever for holding said pawl out of engagement with said teeth. 120

14. The combination with a feeding device, of an oscillating block connected therewith, a rotary disk having teeth, a pawl carried by said block and engaged with said teeth by the action of the sheet, means for returning said 25 block, and a moving abutment engaged by said pawl on the return of said block.

15. The combination with a feeding device, of an oscillating block connected therewith, a rotary disk having teeth, a pawl carried by 130 said block and engaged with said teeth by the action of the sheet, a plate connected with said block, and a crank-roll engaging said plate to return said block.

16. The combination with a combing-roll, of an arm connected to lift the same, a rod pivoted to said arm, an oscillating arm pivoted to said rod, a pawl connected with said oscillating arm, a rotary disk having teeth, and a trip in the path of the sheet for causing the engagement of said pawl with said teeth.

17. The combination with devices for acting on a pile of sheets, of a table for carrying the pile of sheets, a chain having a loop in which said table is supported, a sprocket-wheel over which said chain passes, a counterweight acting on said chain, a ratchet-wheel connected with said sprocket-wheel, and a stop-pawl engaging said ratchet to prevent the descent of the table.

18. The combination with devices for acting on a pile of sheets, of a table for carrying the pile, a chain having a loop in which said table is supported, a counterweight acting on said chain, a sprocket-wheel over which said chain passes, a shaft connected with said sprocket-wheel to operate the same, a ratchet-wheel secured to said shaft, a stop-pawl engaging said ratchet-wheel, means whereby said shaft may be manually operated, and a pawl controlled by the level of the top of the

pile on the table for operating said ratchet-wheel.

19. The combination with devices for operating on a pile of sheets, of a table for carrying said pile, a ratchet-wheel connected to raise said table when rotated, a reciprocating pawl, a guard reciprocating therewith for preventing the engagement of the pawl with said ratchet-wheel, and means controlled by the level of the pile for arresting the movement of the guard.

20. The combination with devices for operating on a pile of sheets, of a table for carrying said pile, a ratchet-wheel connected to raise said table when rotated, a reciprocating pawl, a guard reciprocating therewith for preventing engagement of said pawl with said ratchet-wheel, an arm having a shoulder for engaging said guard and arresting the same, and a device engaging the top of the pile connected with said arm.

In testimony whereof I have affixed my signature in presence of two witnesses.

FRANK L. CROSS.

Witnesses:

IRA L. FISH,

CHARLES E. HAYWOOD.