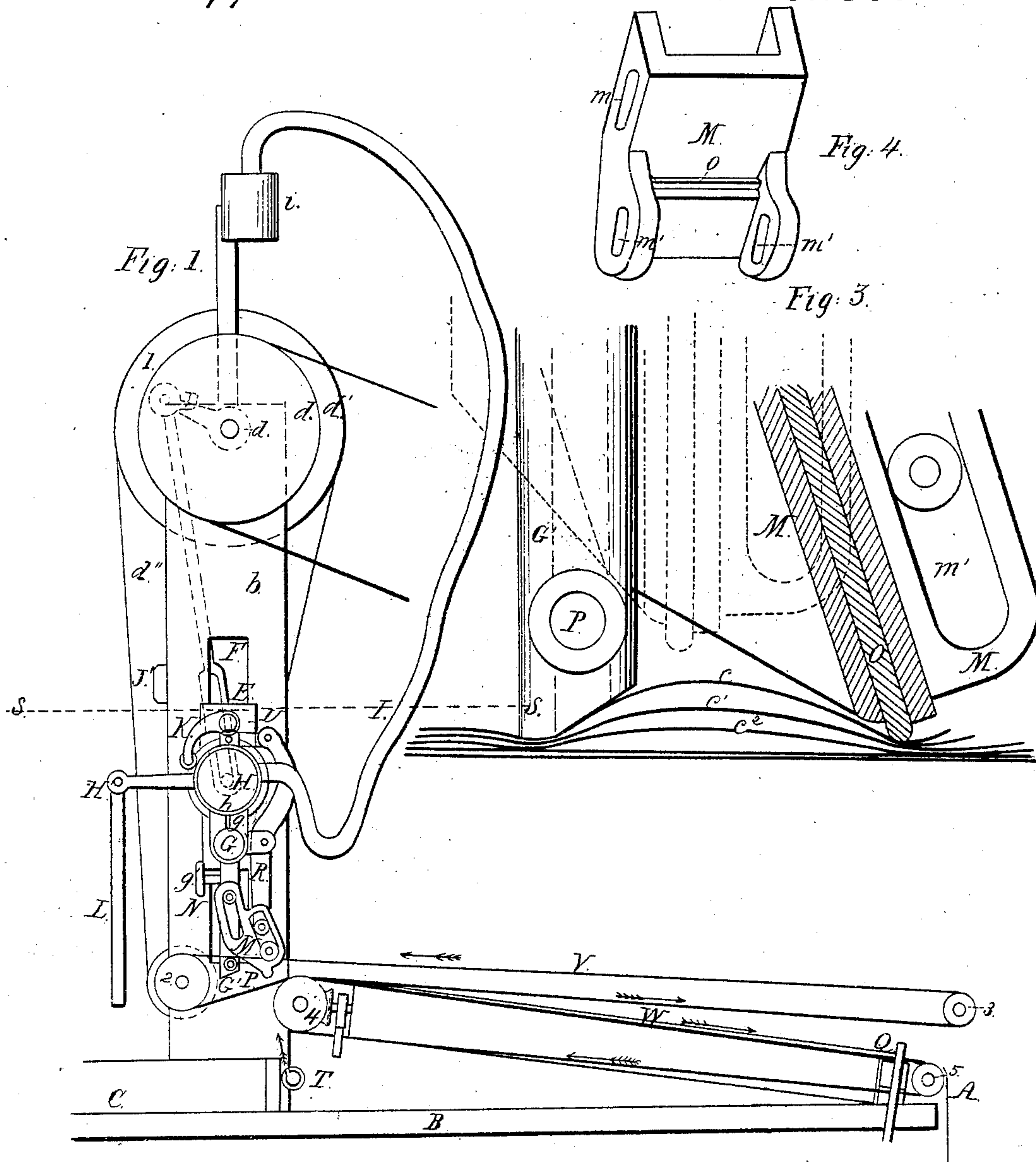


R. Larter Jr. Sheet 1. 2, Sheets.
Printing Press Feeder.
N^o 26772. Patented Jan. 10. 1860.



Witnesses.

My Thomas G. Watson.
Chas. Hempstead

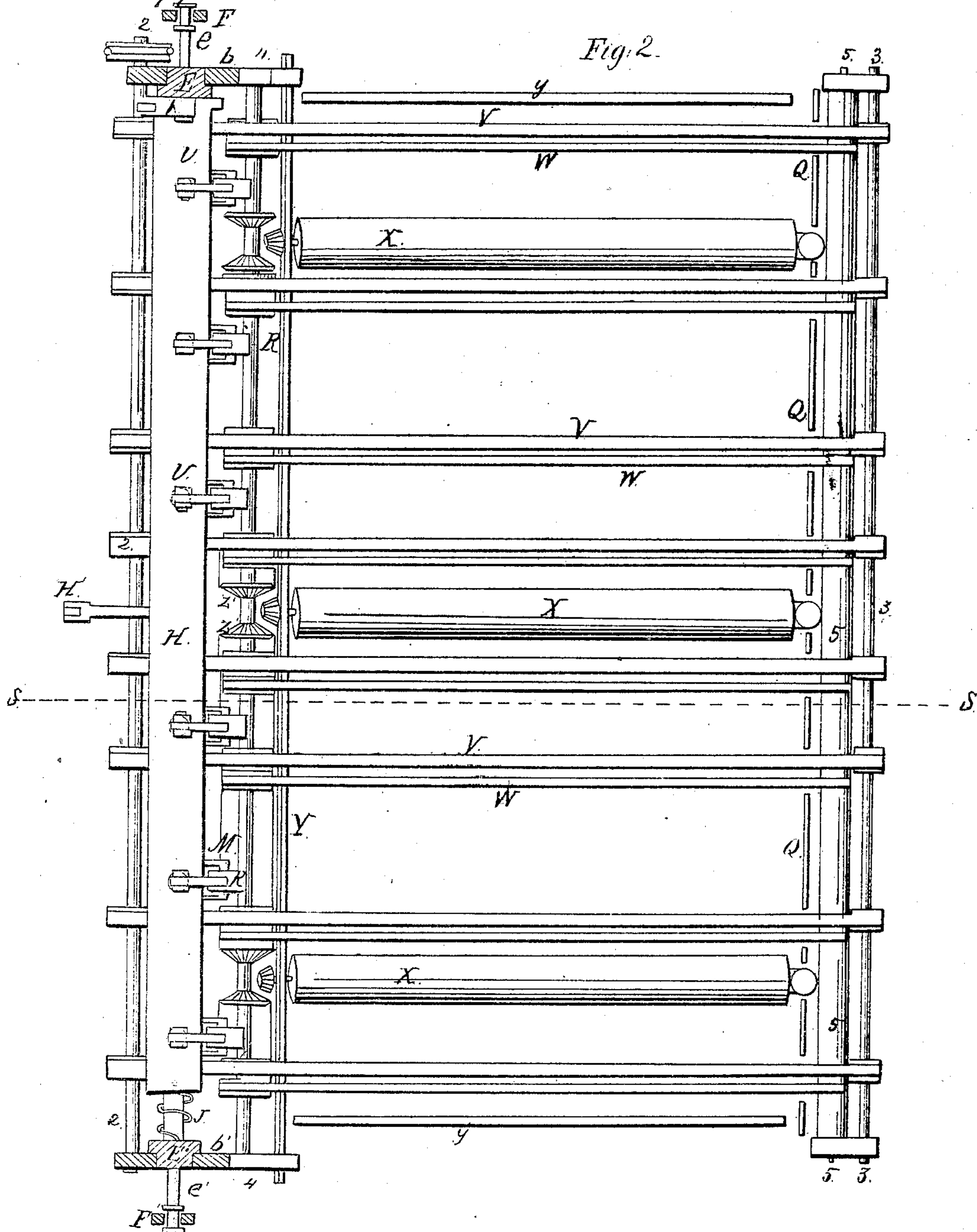
Inventor.

Robt. Lanier Junr

R. Larter Jr. Sheet 2. 2 Sheets.
Printing Press Feeder.

N^o 26772.

Patented Jan. 10. 1860.



Witnesses:

Wm Thomas G. Stetson.
Chas. H. Henshaw

Inventor:

Robt Larter Jr.

UNITED STATES PATENT OFFICE.

ROBERT LARTER, JR., OF NEWARK, NEW JERSEY.

FEEDING PAPER TO PRINTING-PRESSES.

Specification of Letters Patent No. 26,772, dated January 10, 1860.

To all whom it may concern:

Be it known that I, ROBERT LARTER, JR., of Newark, in the county of Essex and State of New Jersey, have invented a certain new and improved machine for feeding paper to printing presses and analogous uses by which sheets are supplied singly certainly and in accurate positions; and I do hereby declare that the following is a full and exact description of the construction and operation of the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1, is a vertical longitudinal section of the entire machine. Fig. 2, is a horizontal section on the line S, S. Fig. 3, is a section of a portion on a larger scale showing its operation on the sheets. Fig. 4, is a perspective view of a portion detached from its connections.

Similar characters of reference indicate like parts in all the drawings.

Many machines have within a few years been devised with a view to separate sheets of paper from a pile and to supply them singly to other machines, but none have perfectly succeeded. Among the means adopted therein has been the employment of a rubbing surface to act by friction upon the pile, also of a series of suction tubes to seize the top sheet by the pressure of the atmosphere, also of an intermittent action in the suction tubes to release the sheets from the lifters and also of a direct blast of air to move the sheet or a portion thereof. These several expedients are employed in my invention in a novel manner, and so as to produce novel effects and other features are introduced which are of great importance to the success of the operation.

The nature of my invention consists in simultaneously moving inward a series of friction pieces from near the edge of the pile while a corresponding series of legs are pressed upon the pile at points nearer the center thereof, so as to cause a portion of the sheet at the top of the pile to rise in the space between the friction pieces and the legs and be thereby separated from the rest by a little space. Also in connection with making these feet hollow and vacuous in beveling the lower edges thereof to correspond with the position assumed by the upper sheet

under the action of the rubbers. Also in controlling an aperture between the legs and a vacuous space and operating the rubbers by a partial rotation of a single hollow trunk extending across the machine directly above said legs. Also in allowing for variation in the height of the pile of paper, by providing slots or equivalent "lost motion," in the connection and determining the time of the rubbing action, and the time of producing the vacuum in the feet by the contact of the separating apparatus with the pile of paper. Also in elevating the front edge of the sheet, and forcing it against the tapes above by driving a current of air upward under the sheet while the points in contact with the feet are being lifted whereby the sheet is applied fairly and gently to the tapes, and is by the motion thereof carried rapidly forward so soon as the vacuum in the legs is destroyed. Also in connection therewith in effecting the complete separation of the upper sheet from the remainder of the pile by deflection backward of the same air which has thus acted on the front edge of the sheet. Also in securing a correct position of the front edge of the sheet by carrying forward the sheet in advance of the time it is required to be delivered to the press, and in sliding forward the tapes or other supports beneath it while stops are presented for its front edge, thereby causing it to turn itself if askew and apply its edge accurately to the stops. Also in securing a correct position of an edge at one side of the machine by the employment of rollers or equivalent moving supports giving a lateral movement to the sheet. Also in means of reversing the lateral movement of the sheet, so as to register by either edge at pleasure.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation by the aid of the drawings, and of the letters of reference denoted thereon.

A, is the printing press or other machine which my machine is to feed. It may be of any kind, and does not require special description or delineation.

B, is the bed or platform of my machine. It may be attached to A, or may be supported independently thereof, and may be horizontal or inclined as may be preferred.

The pile of sheets to be operated on is denoted by C. It is placed in the position represented by the hands of an attendant.

Two standards or side frames b, b' , are fixed on B, as represented. In these frames are the bearings in which is supported the driving shaft d , which receives a continuous rotary motion by means of the pulley d' , and belt d'' , or any other convenient agency.

On each extremity of the shaft d , is a crank D, represented in dotted outline in Fig. 1. In each of the side frames b, b' , is a slot as represented, and in each is fitted a suitable carriage E, E', each having an arm e, e' , projecting outward. A slotted connection F, extends from D, to e , and a similar connection F', extends from the corresponding crank to e' . The carriages E, E', support between them apparatus which is thus alternately lifted and depressed by the rotation of the shaft d , through the agency of the two cranks D, connections F, F', and the slides E, E'. Through this apparatus, and a partial vacuum produced therein, the important function of seizing and lifting the upper sheet is performed without disturbing the remainder of the pile. I term this apparatus entire, "the separating apparatus." It comprises a cross pipe G, with a series of hollow legs G', extending therefrom downward another pipe or trunk H, capable of partially revolving in its bearings, and certain mechanism which may be divided into two classes, viz., first that which actuates and controls the partially rotating motion of H, and second that which is actuated and controlled thereby. This separating apparatus will now be described in detail. The hollow trunk H, is connected by means of the flexible pipe I, with an air pump or equivalent exhausting device i , so that a partial vacuum is constantly maintained in its interior. A long and narrow aperture h , or a series of such is provided in the lower side of H, which is tightly covered by the metal of G, as represented, so as to exclude the external air. By a partial rotation of H, the aperture h , can be made to coincide with the aperture g , which is in the upper side of G, and when this is effected, a partial vacuum is rapidly formed in G, so as to suck any material presented to the lower and open ends of the legs G'. A coiled spring J, or equivalent is provided which tends to revolve H, into this position whenever it is free to turn.

On one end of H, or on a collar fixed thereon, is a notch or depression adapted to receive a pawl K, which is hinged to the carriage E. The pawl K, is held down by a spring not represented, its acting extremity is provided with a roller to diminish the friction, and the sides of the corresponding

depression in H, are so inclined that the pawl is capable of holding against the tension of the spring J, but will fly out of the depression and release H, when any considerable force is added to that of J.

On one side of H, is fixed an arm H', from which is suspended a "feeler" L, as represented. When by the lowering of the carriage E, E', the extremity of L, touches and presses upon the pile of paper, the force thereof releases the pawl K, and by the action of the spring J, the trunk H, rapidly performs a partial revolution which brings h , to coincide with g , and induces a suction at the mouths of the vertical legs G', which are at that period in contact with the surface of the pile of paper C. The lower extremities of these legs are beveled so that while their mouths are inclined and in effect elevated above the pile (see Fig. 3) one edge rests firmly on and confines the sheets. The upper sheet C, is presented alone to the beveled face of the extremity by means which will be presently explained, and when by the elevation of the carriages E, E', the separating apparatus is lifted the top sheet alone adheres to G', and is thereby separated from C. When the cranks D, are near their highest points, the arm H', or an equivalent one extending from H, comes in contact with a stop J', fixed on the side frame b , and compels H, to rotate back into the position represented when the pawl J, again drops into place and confines it until L, again touches the surface of the paper.

The height of the surface of the pile C, is variable, becoming less with the removal of each sheet. This variation is allowed for by the slots in the connections between e, e' , and the cranks D. When by the revolution of d , the cranks D, move toward their lowest positions the legs are lowered until they rest upon C. The lowering of the detaching apparatus is thereby stopped but the cranks continue to sink until they pass their lowest position, the slots in F, F', allowing them freely to do so, and on the return movement they rise freely or unloaded until the bottoms of the slots in F, F', are sufficiently elevated to lift e, e' . The length of F and F', is so graduated that when the pile is lowest or the last sheet is being removed the slots will traverse on e and e' , and the detaching apparatus will remain a little time quietly resting on C, and that when the pile C, is higher the extent of such traverse and the time of resting on C, will be proportionally prolonged, but no inconvenience will result therefrom.

I will now explain the mechanism by which the upper sheet is separated from the next and bent at the right moment to correspond with the beveled ends of the legs G'. Levers R, having their fulcra at r , are con-

5 nected by the aid of links to H, at points U,
directly opposite the several feet G'. Fric-
tion pieces constructed in the form shown by
M, are loosely attached to each of the feet
10 G', by small pins and rollers N, which are
mounted on the sides of G', and stand in
slots *m*, in the piece M. Below N, are pins
and rollers P. India rubber pieces *o*, in any
convenient shape are secured on M, by any
15 convenient means, so as to project a little
below its base. The side of M, toward the
leg G', is beveled, as represented.

The lower end of the lever R, is connected
to M, by pins and rollers which stand in
15 slots *m'*. At each of the partial revolutions
of H, all the levers R, and consequently all
the friction pieces M, are operated. When
at the end of its upward motion the trunk
H, assumes the position shown in Fig. 1, the
20 piece M, moves away from G', and during
the descent of the apparatus remains in the
position represented, so that it strikes the
paper C, near the edge, and presses with
such force at that point as to slightly com-
25 press the pile and induce the upper sheets
to rise to a slight extent between it and the
corresponding branch pipe G. At this in-
stant, and while the separating apparatus is
resting its weight quietly upon the pile C,
30 the trunk H, turns itself rapidly as above
described causing M, to rub along the sur-
face of C, for a little space with the effect
shown in Fig. 3, and then to mount upon the
roller P, by means of its beveled face.
35 While this movement is progressing the
vacuum is suddenly felt in G, and air is vig-
orously "inhaled" by the beveled faces of
all the legs G'. The air in the space be-
tween the upper sheets of paper *c*, and the
40 next as also that between several of the
sheets immediately below which may be sep-
arated by the rubbing motion (see Fig. 3)
partakes of the general inclination toward
these various pipes but the first sheet *c*, soon
45 applies itself tightly, and the current of air
is stopped almost as soon as formed allowing
the remaining sheets *c'*, *cc''*, &c., to remain
free from G', and return by their elasticity
and gravity to their original positions or
50 very nearly so, so soon as M, is lifted by con-
tact with P, the slight bend which they re-
tain being only so much as to facilitate the
operation of removing the next sheet by a
similar process on the next descent of the
55 separating apparatus.

The upper sheet remains firmly held by
the vacuum against the ends of the legs G',
until the rotation of the cranks D, lifts them
and the sheet is compelled to accompany
60 them. The legs G', do not hold the paper
by the edge but by points at a consider-
able distance inward toward the center of
the sheet, the extreme edge is consequently
liable to hang down, but so soon as the sheet

is lifted a few inches above the pile its edge 65
is struck by a blast of air issuing through
the orifices in the top of the cross pipe T,
and lifted with considerable force, the pipe
T, being supplied with air by means of a
bellows, not represented. The air from 70
these orifices after striking the sheet escapes
in all directions, and a part flows along
backward under the sheet and completes the
separation thereof from the pile.

I will now describe the means by which 75
the sheet is subsequently disposed of. On
the continuously revolving shaft *d*, is a pul-
ley 1, which by means of the belt and cor-
responding pulley represented conveys mo-
tion to the shaft and pulleys 2. The pul- 80
leys 2, give motion to endless tapes *v*, which
connect with a shaft and pulleys 3, pressing
tightly over and being deflected upward by
shaft and pulleys 4, as represented. An-
other series of tapes W, connect shaft and 85
pulleys 4, with shaft and pulleys 5, the
linear motion thereof being precisely equal
to that of the series of tapes V, and in the
direction indicated by the arrows. The
series of legs G', rise at each movement to a 90
point a little above the tapes V, and the
paper attached is by the blast from T, held
against the steadily moving tapes. As the
separating apparatus completes its lifting
movement the communication between H 95
and G, is closed by the partial rotation of H,
and the leakage of air rapidly fills the very
little vacuous space in G and G', and the
sheet is released and is immediately moved
forward by the friction of the tapes V, and 100
drawn between V and W, while the separat-
ing apparatus descends to obtain a succeed-
ing sheet.

The tapes V, and W, diverge after passing
pulleys 4, the extent of the divergence being 105
shown somewhat exaggerated in the figures,
and the sheet supported loosely upon W,
continues to move forward, until its front
edge meets a series of stops Q, which are
operated by the mechanism of A, in the 110
manner common in printing presses. Here
the sheet is compelled to wait until the stops
Q, are depressed or otherwise removed, and
as the tapes W, are steadily moving forward
beneath the sheet it is turned by the friction 115
so as to apply its edge accurately to Q, Q,
even if it was received from the separating
apparatus in a skewed position.

Between the tapes W, I mount cylinders
in the manner represented by X, X, with a 120
beveled gear wheel at the extremity of each.
One of the bearings of these is movable and
may be moved by the rod Y, at pleasure, so
that X, may be made to revolve in either
direction by locking into the bevel gear 125
wheel Z or Z', as may be preferred. The up-
per surface of X, is in or near the plane of
the tapes W, and acts on the sheets as they

are presented thereto, forcing them to either side at pleasure.

By properly placing a gage board y , the edge of each sheet is by the action of X , presented very accurately thereto, so that when by the removal of Q , a sheet is allowed to enter A , the front edge and either of the side edges is correct or in what is termed very perfect "register."

To allow for the use of my machine for paper of various widths, and without any considerable delay in preparation cocks g' , are provided in the legs G' . In working the widest paper all the cocks are opened in working narrower only such are opened as are in a position to act on the sheet. The exterior legs being stopped in the latter case are of no effect.

The advantages due to the several principal features of my invention may be briefly and separately enumerated as follows: By the employment of rubber to act on the sheet in lieu of other substances a high degree of adhesion is obtained, and the proper effect on the upper sheet is insured, producing a considerable air space between the upper sheet and the next at that part. By the beveling of the lower edges of the vacuous legs G' , I insure the seizure of the upper sheet after it is sufficiently lifted by the rubbers without a liability to seize any other sheets. The employment of hollow and vacuous tubes to seize paper is not my invention, but is common in many previous devices for feeding presses, but the beveling of such is novel and contributes greatly to the success of my machine as is shown by Fig. 3. By opening and closing the communication between the feet G' , and the vacuum and also operating all the friction pieces M , by a simple partial revolution of H , alternately in opposite directions, great simplicity in the machine is obtained and the space in the legs and their connections which are filled and emptied of air at every movement is reduced to a very small amount. By my manner of providing for the varying height of the pile of paper and initiating the rubbing and exhausting action, the operation is certain to be rightly tuned and complex devices for raising the pile as the sheets are removed and rendered unnecessary. By my manner of blowing the sheet c , against the tapes W , and the subsequent passage of a portion of the same air between c and C , I insure a rapid forward movement of the sheet so soon as it is released from the legs G' , and also effect a complete separation of the sheet C , from the pile, so that its sudden removal will not disturb the remaining sheets. By giving the tapes W , a more rapid travel than is required to deliver the sheet at the proper time to A , and allowing it to wait a little

period in contact with Q , Q , a tolerably perfect register of the front edge is secured. By the lateral motion due to the action of X , the register of another edge is effected. By reversing the motion of X , the same edge may be kept in register when the sheet is turned over for printing its opposite side.

Having now fully described my invention what I claim as new therein and desire to secure by Letters Patent, is—

1. I claim simultaneously moving inward a series of friction pieces from near the edge of the pile of paper while a corresponding series of legs are pressed upon the pile at points nearer the center thereof, so as to cause the surface of one or more of the sheets at or near the top of the pile to rise in the space between the rubber and the legs the upper one being raised more than the rest and being thereby separated therefrom by a considerable stratum of air.

2. I claim in connection with hollow and vacuous legs G' , used in the manner substantially as herein shown, beveling the bases of the legs to correspond with the inclined position assumed by the upper sheet c , under the action of the friction pieces M .

3. I claim controlling the apertures between the hollow legs G' , or their equivalents, and a vacuous space, and also operating all the friction pieces M , or their equivalents, by a partial rotation of a trunk H , arranged substantially as and so as to produce the effects herein set forth.

4. I claim allowing for variation in the height of the pile of the paper by providing slots or equivalent "lost motion," in the connections F , F' , or their equivalents, and determining the time of the rubbing action, and also the time of producing the vacuum in the legs G' , or their equivalents by the contact of L , or of an equivalent portion of the separating apparatus, with the pile of paper.

5. I claim elevating the front edge of the sheet after its separation from the pile, and pressing the same against a series of tapes V , by a blast of air arranged substantially in the manner herein shown, for the purpose of insuring the forward motion of the sheet so soon as the vacuum in the legs G' , is destroyed. I also claim in connection therewith effecting the complete separation of the upper sheet from the remainder of the pile by the deflection backward of a portion of the same air after its action on the front edge of the sheet, substantially as and for the purposes herein set forth.

6. I claim securing a correct position of the front edge of the sheet by carrying it forward in advance of the time it is required to be delivered to the press and by sliding forward the tapes or equivalent supports beneath it, while stops Q , Q , or their

equivalents are presented to its front edge for the purpose of turning it into a correct position if askew.

7. I claim giving a side motion to the sheet to secure a correct position of one of its edges by a continuous movement of the rollers X, or their equivalents, as herein set forth.

8. I claim reversing the side movement

of the sheet, so as to register by either edge at pleasure, substantially in the manner herein shown.

In witness whereof I have hereunto set my name.

ROBT. LARTER, Jr.

Witnesses:

THOMAS D. STETSON,

CHAS. HUMPAGE.