No. 691,933. Patented Jan. 28, 1902.

T. C. DEXTER.

COLLATING MACHINE.

(Application filed Mar. 27, 1901.)

(No Model.) 5 Sheets—Sheet 1.

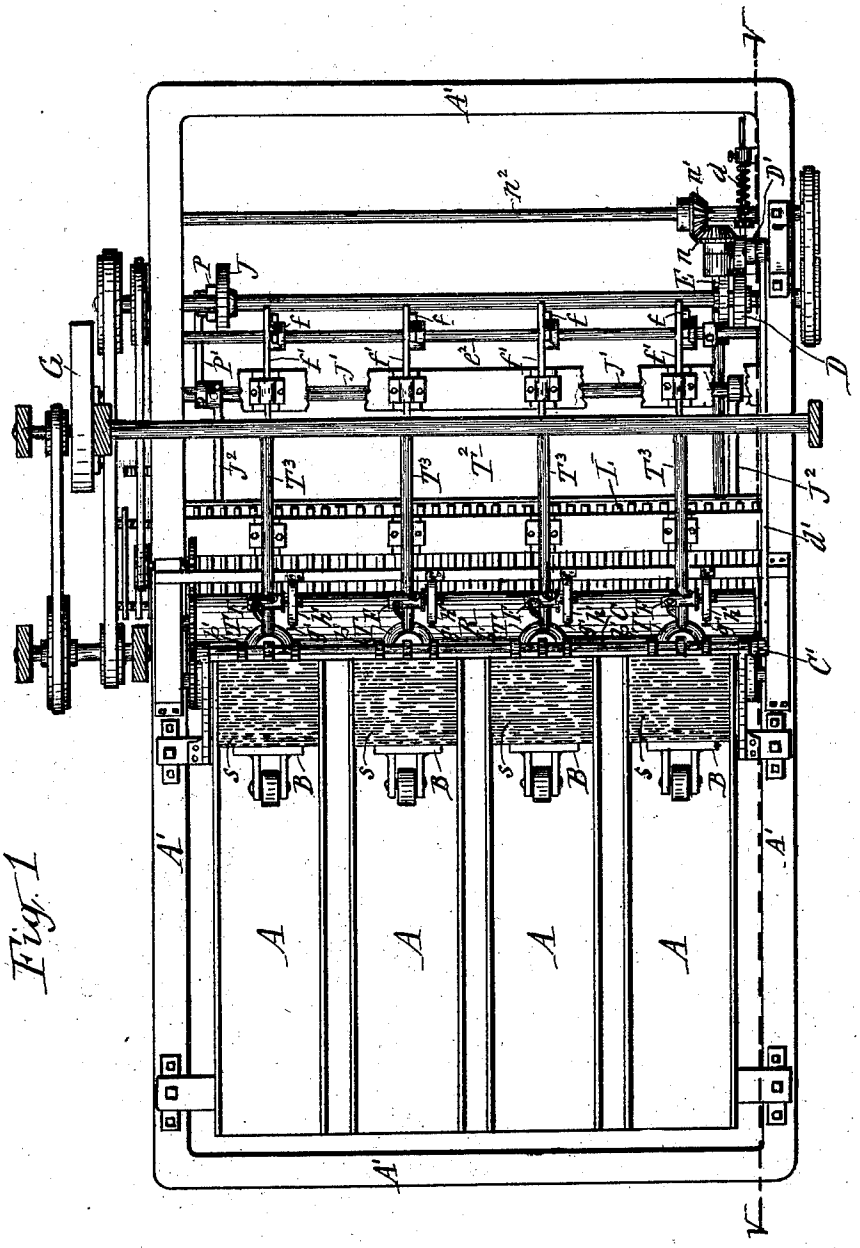


Fig. 1

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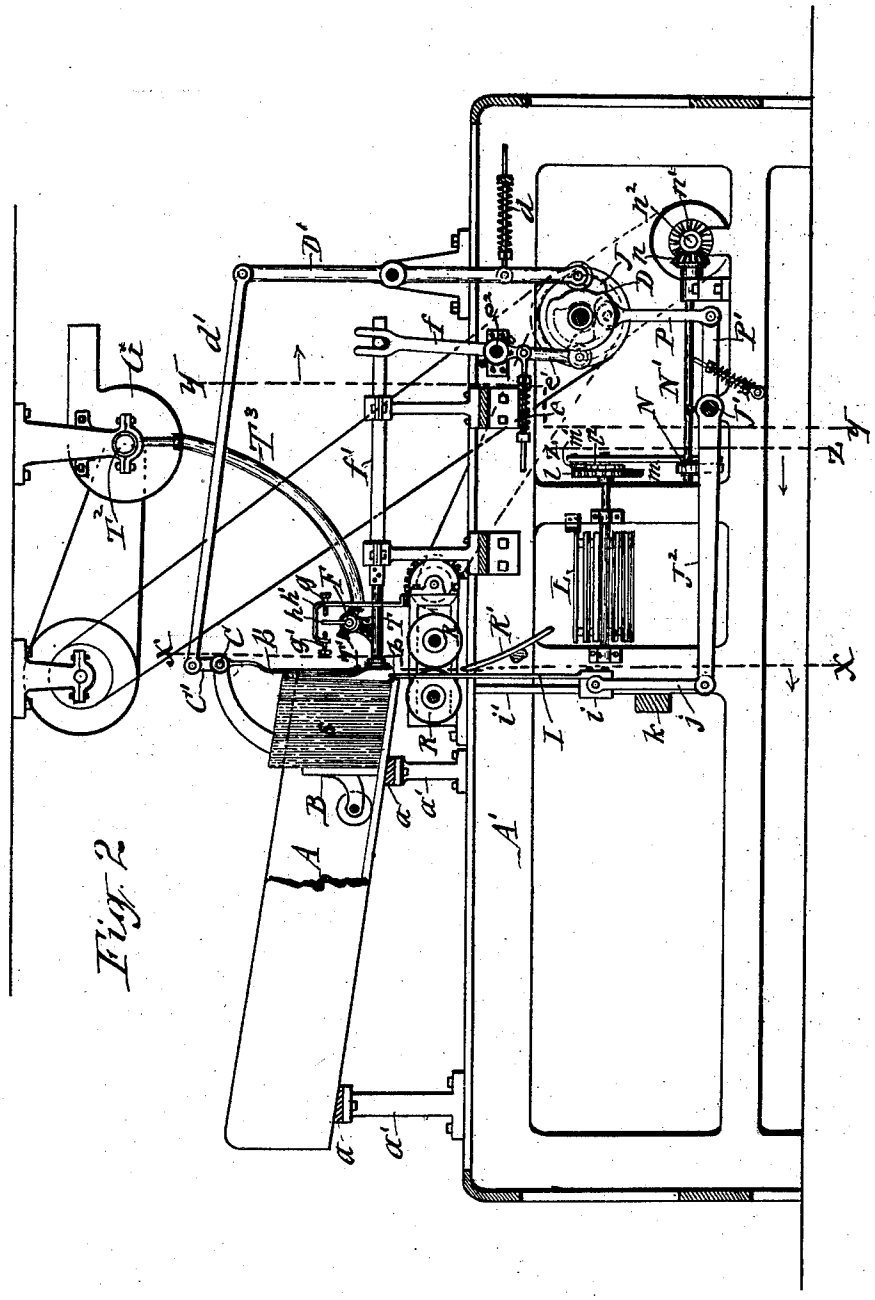


Fig. 2.

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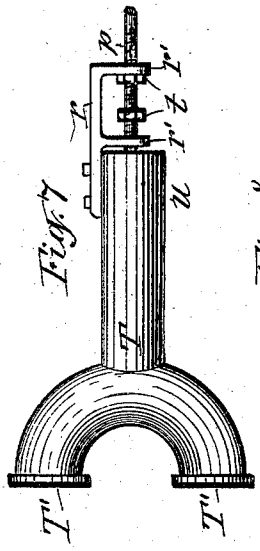
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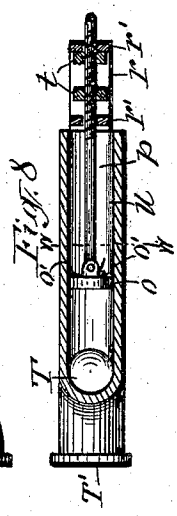
T. C. DEXTER.

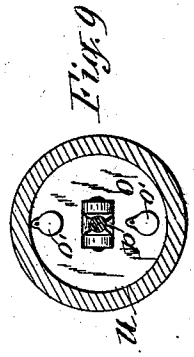
COLLATING MACHINE.

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(Application filed Mar. 27, 1901.)

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Fig. 5

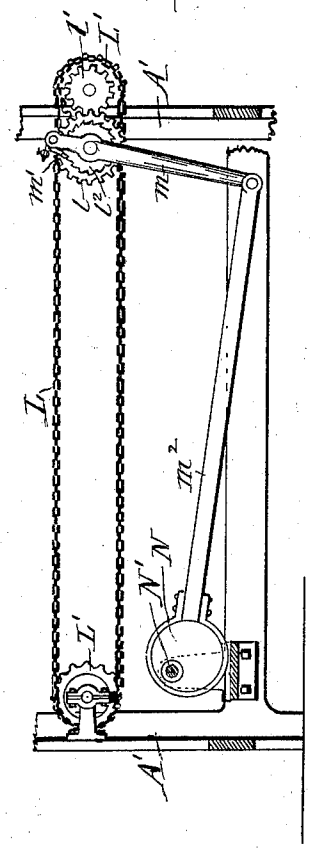
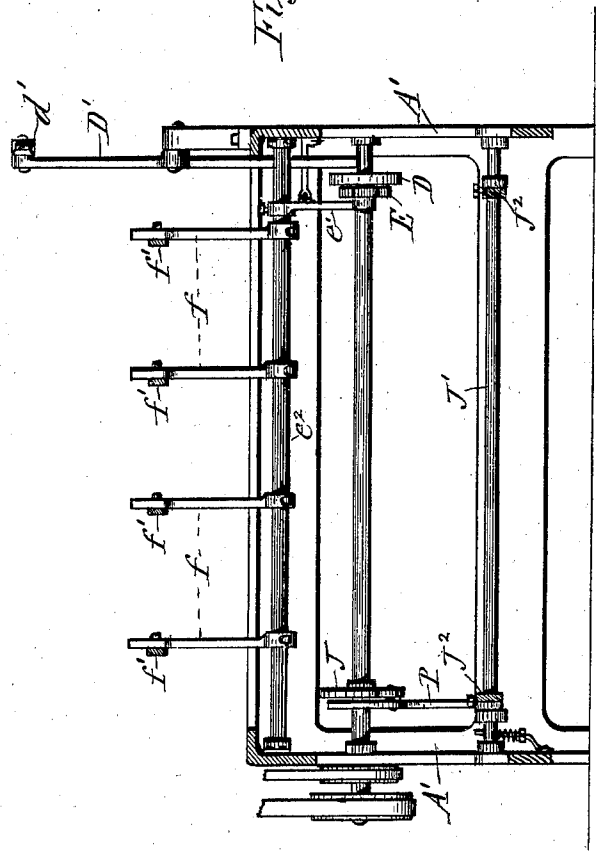


Fig. 4



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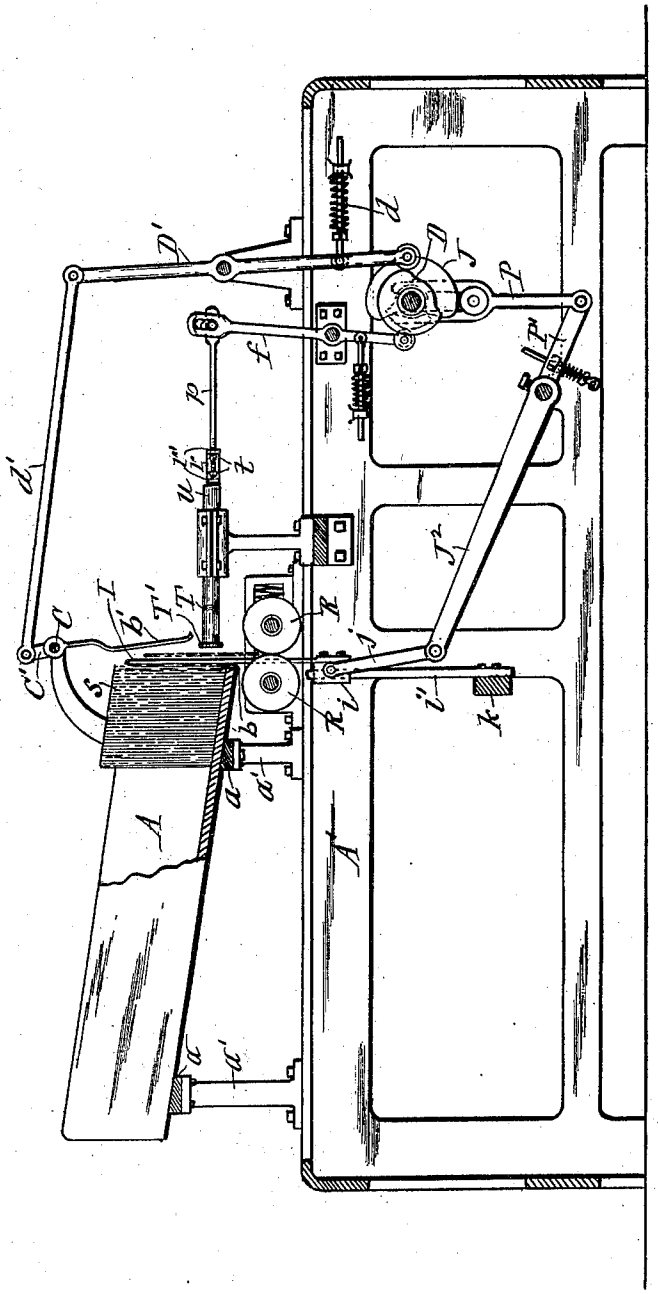
T. C. DEXTER.

COLLATING MACHINE.

(Application filed Mar. 27, 1901.)

(No Model.) 5 Sheets—Sheet 5.

Fig. 6.



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UNITED STATES PATENT OFFICE.

TALBOT C. DEXTER, OF PEARL RIVER, NEW YORK.

COLLATING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 691,933, dated January 28, 1902.

Application filed March 27, 1901. Serial No. 53,048. (No model.)

To all whom it may concern:

Be it known that I, TALBOT C. DEXTER, a citizen of the United States, and a resident of Pearl River, in the county of Rockland, in the State of New York, have invented new and useful Improvements in Collating-Machines, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to the class of machines in which a series of signature-containing hoppers are arranged in a row over a traveling gatherer and provided with means for automatically delivering the signatures from the successive hoppers to the carrier in proper consecutive order to deposit the signatures thereon in piles suitable for binding them in book form.

The chief object of my present invention is to insure more positively the separation of the front signature from the succeeding signature in the hopper preparatory to delivering said front signature to the gatherer; and to that end the invention consists, essentially, in the combination, with the signature-hopper, of means for yieldingly confining the signatures in said hopper; means for primarily separating the bottom portion of the front signature from the succeeding signature in the hopper, a succeeding complete separator entering between said signatures; means for withdrawing the signature from the front of said complete separator, and a gatherer disposed to receive the withdrawn signatures, as hereinafter more fully described, and set forth in the claims.

The annexed drawings show my present invention embodied in a machine which in many respects resembles that which is shown in my Letters Patent No. 588,635, dated August 24, 1897.

In said drawings, Figure 1 is a plan view of my improved collating-machine. Fig. 2 is a vertical longitudinal section on line V V in Fig. 1. Figs. 3, 4, and 5 are vertical transverse sections on lines X, Y Y, and Z Z in Fig. 2 viewed in the directions of the arrows. Fig. 6 is a vertical longitudinal section of a modification of my invention. Fig. 7 is an enlarged plan of the modified means for actuating the suction-tube. Fig. 8 is a vertical longitudinal section of the same, and Fig. 9 is a further enlarged transverse section on line W W in Fig. 8.

Similar letters of reference indicate corresponding parts.

A A A designate the series of hoppers, which are arranged side by side in a row extending across the machine and are supported on cross-bars a a, mounted at their ends on suitable posts a' a', secured to the top of the main supporting-frame A'. Each of these hoppers is employed to carry a plurality of corresponding signatures s, each of which constitutes part of a book or pamphlet formed by the collection of one signature at a time from each of the successive hoppers and in a manner to gather them in a pile suitable to be bound.

B denotes a suitable device for pushing the signatures toward the front or delivery end of the hopper, which end is provided on its bottom with a slightly upward projecting flange b to retain the bottom of the front signature in the hopper. The upper portion of said signature is confined yieldingly in the hopper by means of a suitable detent b', preferably formed of fingers attached in a pendent position to a rock-shaft C, extending across the entire row of hoppers above the front end thereof. The lower portions of the aforesaid detaining-fingers b' are shaped to bear on the front of the signature and are terminated a suitable distance above the ledge b to allow the lower portion of the signature to be withdrawn from the hopper, while the aforesaid fingers press the upper portion of said signature toward the hopper, as represented in Fig. 2 of the drawings. The rock-shaft C may be actuated by any suitable mechanism which will cause the detent b' to be swung outward from the end of the hopper and completely release the front signature during its final withdrawal from the hopper, as shown in Fig. 6 of the drawings. For this purpose a suitably-shaped rotary cam D, in conjunction with an oppositely-operating spring, may be employed to oscillate a lever D', which is connected by a rod d' to an arm C', attached to the end of the rock-shaft C.

For primarily separating the front signatures s from the succeeding signatures in the hoppers I employ pneumatic suction-tubes T, which are in range with the hoppers and have

their mouths T′ facing the front signatures below the detents b', preferably near the bottoms of the hoppers, as shown in Fig. 2 of the drawings. The said tubes are guided rectilinearly and receive intermittent reciprocating motion by means of a rotary cam E (shown in Fig. 1 of the drawings) and spring e, oscillating an arm e', attached to the end of a transverse shaft e^2, to which are fastened a plurality of levers f, one for each hopper. Each of the levers f is suitably connected by a rod f' to one of the tubes T, and thus imparts the required reciprocating motion to the tube and causes the mouth T′ thereof to periodically impact the front signature s in the hopper and subsequently suck the bottom portion of said signature out of the hopper. The aforesaid suction of the tube T may be produced by means of a fan G, to the induction-port of which is attached the end of a tube T^2, having beneath tubes T^3, each of which is connected at its opposite end to a three-way cock F, communicating by one of its ways with the tube T to create a suction therein in the manner shown in Figs. 1 and 2 of the drawings and similar to that shown in my Letters Patent No. 588,635, dated August 24, 1897, and No. 591,094, dated October 5, 1897. Said three-way cock is controlled automatically to cause the tube T to suck the signature from the hopper and subsequently release the withdrawn signature at the proper time. Said control of the three-way cock is obtained by means of suitable trippers g g', arranged to engage alternately opposite sides of a lever h, attached to the valve-stem of the three-way cock F. I preferably form said trippers of screws adjustably secured to a standard h', mounted on a cross-bar h^2, which is suitably supported at its ends upon the sides of the machine. In the approach of the tube T to the front signature in the hopper A the tripper g' turns the valve of the three-way cock F to a position which causes the mouth of the tube T to suck the signature firmly to it and obtain sufficient hold on the signature to withdraw said signature from the hopper during the succeeding retrograde movement of the said suction-tube. During this latter movement the lever h of the three-way cock F comes in contact with the tripper g, which turns the valve to a position to destroy the suction at the mouth T′ of the tube, and thus liberates the signature therefrom.

The chief purpose of my present invention is to facilitate the withdrawal of the front signature from the hopper and at the same time securely retain the succeeding signature in proper position in the hopper during the aforesaid operation of the suction-tube T. For this purpose I employ the oscillatory detents b', pressing intermittently the upper portion of the signature toward the hopper, while the tube T draws the bottom of the signature from the hopper, and thus primarily and partly separates said front signature from the next succeeding signature, in combination with a secondary separator entering between the upper portions of the said signatures to complete the separation of the front signature preparatory to its delivery to the gatherer.

I represents the aforesaid secondary separator, which I preferably form of vertical fingers projecting upward from a plate I′, fastened to a bar K, extending across the machine beneath the delivery ends of the hopper and attached at its ends to boxes i, loosely embracing vertical guides i', which are rigidly sustained in their position by any suitable means, which in this instance are shown to consist of a transverse bar k, fastened to the main supporting-frame A′. The separator I is disposed to enter in an upward direction between the outwardly-drawn bottom portion of the front signature and next succeeding signature in the hopper and is preferably of sufficient height to reach nearly or quite to the top of the hopper when said separator is thrust to its extreme elevated position during its vertical reciprocating motion, which is imparted to it by means of a rotary cam J, actuating a transverse rock-shaft J′, to the ends of which are fastened levers J^2, which in turn are connected by rods j to the boxes i, which are fastened to the ends of the transverse bar k. The motion is transmitted to the rock-shaft J′ by means of a pitman P, receiving reciprocating motion from the cam J and connected to an arm P′, fastened to the rock-shaft.

The operation of the aforesaid means for removing the signatures successively from the hopper is as follows, to wit: The upper detent b' presses on the front of the first signature in the hopper while the separator I is in its lowermost and withdrawn position, and the suction-tube T impinges the lower portion of the front signature in the hopper. Said tube then sucks said portion of the signature tightly to the mouth T′ of the tube and obtains a sufficient hold on the signature to withdraw it from the hopper during succeeding retreat of the tube. As soon as the bottom portion of the front signature is thus withdrawn from the hopper, and thus primarily separated from the succeeding signature, the separator I receives an upward thrust and is thereby caused to enter between said two signatures nearly or quite throughout the heights thereof. The upper detent b' then swings from the front signatures and at the same time the suction of the tube T is cut off, so that the signature becomes liberated therefrom and is allowed to drop to a suitable conveyer for delivering it to the automatic gatherer. During the aforesaid operation of removing the front signature from the hopper the separator I remains in its elevated position to confine the remaining signatures in proper position in the hopper. As soon as the front signature has been completely withdrawn from the hopper the separator I descends and the detents b' swing to-

ward the hopper to confine therein the remaining signatures. It will thus be observed that the separator I and detent b' operate alternately to perform their aforesaid functions.

L represents the signature-gatherer, which consists of an endless apron arranged across the lower portion of the machine on a line parallel with the discharge ends of the hoppers A A, said apron receiving intermittent longitudinal movement by any suitable mechanism, which in this case is shown as constructed and operated in the manner illustrated in my Letters Patent hereinbefore referred to. Said mechanism consists, essentially, of a gear-wheel l, meshing with a pinion l', attached to the shaft of one of the wheels L', which carry the gathering-apron L. To the shaft of the gear-wheel l is fastened a ratchet-wheel l^2, and to a lever m, fulcrumed on said shaft, is pivoted a pawl m', which engages the ratchet-wheel l^2. The lever m receives oscillatory motion by means of a rod m^2, connected at one end to the long end of said lever and at the opposite end to the eccentric-strap, embracing an eccentric N, fastened to a rotary shaft N', which derives motion by a miter-gear n, attached to said shaft and meshing with a corresponding gear n' on another rotary shaft n^2, driven by any suitable mechanism on the machine readily devised by any mechanic familiar with this class of machines. To convey the signature to said gatherer, I employ gripping-rollers R R, arranged in position to receive between them the signature liberated from the suction-tube T, as hereinbefore described, and to deliver said signature to guides R', which conduct them to the gatherer. Said gatherer is timed in its movement to allow each succeeding delivered signature to be deposited upon the top of the preceding signature on the gatherer and gather the signatures from the successive hoppers in piles suitable to be bound in book form.

I do not limit myself to the use of the suction-fan G for producing the suction in the tube T, as the same result may be obtained by means of a cylinder U, disposed in line with the tube T and attached thereto so as to communicate therewith, as represented in Fig. 6 of the drawings. Said cylinder is provided with a piston o, provided with valves o' and attached to a rod p, which receives reciprocating motion from the oscillating lever f, hereinbefore described. A yoke r, attached to the end of the cylinder U, is provided with lugs r' r', through which the rod p passes. To the portion of said rod between the lugs are adjustably secured two stops or nuts t t, which are arranged to alternately contact with the adjacent lugs during the longitudinal movement of the rod p and impart the necessary intermittent reciprocating motion to the cylinder U. There is sufficient lost motion between the rod p and cylinder U to cause the valves o' to automatically open in the approach of the tube T to the hopper and to cause said valves to automatically close before the retrograde movement of the tube T.

What I claim as my invention is—

1. In combination with the signature-hopper and signature-gatherer, means for yieldingly sustaining the signatures in the hopper, means for primarily separating the bottom portion of the front signature from the next succeeding signature, a reciprocating secondary separator entering between the upper portions of said signatures to complete the separation preparatory to the delivery of the front signature to the gatherer.

2. In combination with the signature-hopper and signature-gatherer, an oscillating detent pressing the upper portion of the front signature toward the hopper, means for primarily separating the bottom portion of the front signature from the succeeding signature in the hopper, a secondary separator entering between the upper portions of said signatures to complete the separation, and means for conveying the separated signature to the gatherer.

3. In combination with the signature-hopper and signature-gatherer, a movable detent pressing the upper portion of the front signature toward the hopper, mechanism actuating said detent, means for separating the lower portion of the front signature from the succeeding signature in the hopper and a secondary separator entering between the said signatures from the bottom to the upper portions thereof and completing the separation preparatory to the delivery of said front signature to the gatherer.

4. In combination with the signature-hopper and signature-gatherer, a detent yieldingly sustaining the upper portion of the front signature in the hopper, means for primarily separating the bottom portion of said signature from the succeeding signature, a secondary separator entering between said signatures from the bottom to the upper portions thereof to complete the separation, mechanism imparting reciprocating motion to said secondary separator, means for liberating the separated front signature, and means for delivering said signature to the gatherer.

5. In combination with the signature-hopper, an oscillating detent intermittently sustaining the front signature in the hopper, mechanism actuating said detent, means for primarily separating the bottom portion of the front signature from the succeeding signature in the hopper, a secondary separator entering between the upper portions of said signatures to complete the separation, mechanism operating said secondary separator, means for liberating the front signature, gripping-rollers disposed to receive between them the liberated signature, and a gatherer disposed to receive the signature from said rollers as set forth.

6. In combination with the signature-hopper, a detent yieldingly sustaining the front

signature in said hopper, means for primarily separating the bottom portion of the front signature from the succeeding signature, a vertically-movable bar disposed transversely beneath the delivery ends of the hoppers, fingers projecting upward from said bar, mechanism moving said bar to thrust said fingers between the aforesaid primarily-separated signatures, means for liberating the front signature, and a gatherer disposed to receive the liberated signature.

7. In combination with the signature-hopper, a detent yieldingly confining the signatures in the hopper, a tube supported movably to and from the front of the hopper and provided with an open mouth facing the front signature, means for intermittently exhausting the air from said tube to cause the signature to adhere to the tube in its retreat from the hopper, a secondary separator entering between the upper portions of the front signature and succeeding signature to complete the separation, means for admitting air into the tube to liberate the signature, and a gatherer disposed to receive the liberated signature as set forth.

8. In combination with the signature-hopper, an oscillatory detent intermittently pressing the upper part of the front signature toward the hopper, mechanism operating said detent, a rectilinearly-reciprocating suction-tube disposed in range with the hopper beneath the aforesaid detent, mechanism forcing said suction-tube to periodically impact the front signature and withdraw the lower portion thereof from the hopper, a reciprocating separator entering between said signature and succeeding signature in the hopper, means for liberating the signature from the suction-tube, gripping-rollers receiving the liberated signature, and a gatherer disposed to receive the signature from said rollers as set forth.

9. In combination with a series of signature-hoppers disposed side by side in a row, a rock-shaft extending across the said row above the front thereof, pendent fingers attached to said shaft and terminating with bearings for pressing the upper portions of the front signatures toward the hoppers, mechanism actuating said rock-shaft, reciprocating suction-tubes movable to impact the lower portions of the front signatures in the hoppers and withdraw said portions from said hopper, mechanisms actuating said tubes, vertically-reciprocating separators entering between the two front signatures in the respective hoppers, mechanisms operating said separators, means for liberating the signatures from the suction-tubes, gripping-rollers disposed to receive the liberated signatures, a longitudinally-movable gatherer under said rollers, and mechanism imparting intermittent motion to said gatherer as set forth.

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