

965,375.

Witnesses

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# UNITED STATES PATENT OFFICE.

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## SHEET-DELIVERY MECHANISM.

965,375.

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*To all whom it may concern:*

Be it known that I, EDMUND W. DEAN, residing at Dover, in the county of Strafford and State of New Hampshire, have invented certain new and useful Improvements in Sheet-Delivery Mechanism, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to the handling by machinery of sheets of paper and the like, and with regard to the more specific features thereof to the accumulation and delivery of sheets from printing machinery.

One of the objects is to provide simple and efficient means of the above general type.

Another object is to provide practical and positively-acting means of the above type adapted for efficient use at the highest speeds.

Another object is to provide means of the type last-mentioned of simple, compact and inexpensive construction.

Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the embodiment thereof hereinafter described, the scope of the application of which will be indicated in the following claims.

The accompanying drawing is a diagrammatic view of one of various possible embodiments of my invention.

In order that this invention may be readily and completely grasped it may here be noted that in connection with printing or other sheet-handling machinery, and particularly printing machinery adapted for use in conjunction with small sheets, it is essential on account of the considerable cost of labor and apparatus and the small selling-price of the individual product that the highest speeds be attained. If it be attempted to accomplish this result without a positive action of all parts and a high degree of certainty in the co-action thereof or if fine adjustment be depended upon, a series of delays involving a considerable loss in time, labor and material will necessarily result from the speeding up of the apparatus. The above and other defects are remedied and many positive advantages obtained in

constructions of the nature of that herein- after described.

Referring now to the accompanying drawing, there is shown a cylinder 1, provided with a cutter-blade 2 adapted to co-act with the stationary blade 3 and sever a web 4 fed thereto by the rolls 5 and 6. This feeding mechanism may be of any desired construction, but preferably comprises a pair of rolls, one of which is positively driven and the other of which rests idly upon the web and holds it in operative relation to that first-mentioned.

The web is received from the cutting apparatus by a sheet-path, comprising tapes 7 and 8, driven in any desired manner as by the gearing diagrammatically indicated at 8<sup>a</sup>. It may be noted that these tapes converge in a direction away from the cutting mechanism, thus forming a bell-mouthed path, and that the upper tape 7 extends beyond the tape 8, as clearly shown in the drawing. The last-mentioned tape, moreover, is held by its guide-pulley in such position as to throw the upper tape slightly out of alinement, as shown at 9, for a purpose hereinafter described.

The sheets are thrown downwardly from the sheet-path by swinging members or fingers 10, and rest upon a support or table 11 as shown at 12, being guided into exactly superimposed relation as by a series of stationary guides 13 and swinging guides 14. The latter parts are pivoted as at 15 and are adapted to swing laterally to permit the removal of the accumulated sheets 12 in the manner hereinafter described.

Projecting through the table 11 are a series of fingers or abutments 16 mounted upon the shaft or spindle 17, which is connected as the link 18 with a lever 19 pivoted at 20. The latter member is swung in the direction indicated by the arrow by a spring 21, mounted upon the rod 22 pivoted to the lever and compressed between same and an abutment 23. This spring is alternately compressed and released as by a snail cam 24, driven through suitable gearing, diagrammatically indicated at 24<sup>a</sup> from a shaft 25, rotated as by a ratchet 26 and pawl 27 in accordance with the movement of the fingers 10. It will thus be seen that as the latter members oscillate about the shaft 28, the cam 24 is turned through a predeter-



mined fraction of a revolution with each oscillation, and, upon a predetermined number of sheets being thrown upon the table, the cam reaches such position as to release the roller 29 upon the lever 19 and to permit the above-described parts to throw the abutments 16 in a direction to remove the sheets 12 from the table and place them upon a support 30. Upon this action taking place, the guide 14 merely swings so as to permit the passage of the sheets and automatically falls into the depending position shown, an anti-friction roller 31 being journaled in its lower end in order to avoid interference with the passage of the sheets.

Upon the abutments 16 being retracted, it is of course desirable that the same be depressed so as to avoid interference with the sheets which accumulate upon the table during this action. This is preferably brought about by a slide 32, which during the operative movement of the abutments 16 engages the lower edge of the table or other cam or guide surface, being held in position by a spring 33 mounted upon a rod 34 pivoted to the link 18 and slightly compressed between same and abutment 35 upon the lever 19. Upon the lever reaching its extreme position in the direction indicated by the arrow, however, the spring 33 is out of engagement with the abutment 35, as shown at 36, and permits the slide or block 32 to fall into a position below a guide 37.

The swinging members 10 may be actuated in any desired manner as by a cam 38 driven as indicated by the arrow and coacting with an arm 39 affixed to the shaft upon which the parts 10 are mounted. There is also provided a retracting spring 40 adapted to hold the ratchet arm against a stop 41, and thus normally maintain the parts 10 in proper raised position. At each rotation of the cam 38, however, the arm 39 is raised, thus swinging downwardly the members 10, which are quickly snapped into raised position again by spring 40 upon arm 39 being released. It is to be understood that this mechanism is merely diagrammatic and illustrative of the various types which might be employed, and it may be noted that the entire illustration of this invention is of a diagrammatic character, the frame work of the machine and various supports and bearings being omitted in order to avoid encumbering the drawings with irrelevant and immaterial matter.

It may here be noted that the term "tapes" is used throughout this description and the following claims in the broadest sense, as the specific members commonly known by this expression are in this case merely illustrative of a large class of equivalents. It may also be noted that by the term "curl" is meant any bending or distortion of the sheet or web.

The operation of the above-described embodiment of my invention is as follows:— Assuming the web to be fed as by the rolls 5 and 6, the same passes beyond the blade or abutment 3 and within the "bite" of the sheet-path. The tapes of the latter apparatus are driven at a higher speed than that of the feeding rolls, and, hence, immediately upon engaging the advancing free end of the web, put the same under tension. While in this condition, the cutting-blade 2 severs the web and the freed sheet immediately travels forward at a higher rate of speed within the sheet-path. On account of the disposition of the tapes of this path, the free edge of the sheet or web is slightly curled or inclined toward the tapes 7, thus causing the same to hug these upper tapes even though driven at a high rate of speed. It will thus be seen that the severed sheets are properly spaced upon arriving at the farther end of the path, inasmuch as, on account of the relatively high speed of the tapes, the uncut portion of the web is readily distanced. The oscillating or swinging fingers 10 throw the sheets from the path into the position shown in the drawing as above-described and, on account of the spaced relation thereof, an interval is provided between the entry of each sheet beneath the fingers of such duration as to permit the fingers to rise after depression to operative position. The accumulated sheets are removed from the table 11 as above-described upon a predetermined number having been thrown thereon, and the moving or ejecting apparatus drawn by the cam 24 into the operative position shown in full lines in the drawing, the spring 33, upon the angle between the lever 19 and link 18 becoming more acute, being compressed in such manner as, upon the block or slide 32 reaching the end of the guide 37, to throw the same upwardly into engagement with the lower cam or guiding surface of the upper guide or table 11.

It will thus be seen that I have provided apparatus well adapted to accomplish the several features of my invention and that the same is of the simplest, most inexpensive and efficient construction. It will also be noted that the entire action is positive and in no way dependent upon accurate adjustment of parts. The several elements are individually simple and each is compactly and efficiently disposed with reference to the others, and they collectively constitute a practical machine adapted to reach and maintain the highest speeds of working.

As many changes could be made in the above construction and many apparently widely different embodiments of my invention could be made without departing from the scope thereof, I intend that all matter contained in the above description or shown



in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I desire it also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention, which, as a matter of language, might be said to fall there-between.

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

1. In mechanism of the class described, in combination, severing means, means adapted to feed a web to said severing means at a certain rate of speed, and a sheet path comprising tapes traveling at a higher rate of speed adapted to draw severed sheets from said severing means simultaneously with the severing of said sheets, the tapes of said sheet path being disposed in converging relation in their direction of travel.

2. In mechanism of the class described, in combination, cutting means, means adapted to feed a web to said cutting means at a certain rate of speed, a sheet path comprising tapes traveling at a higher rate of speed adapted to grip and draw severed sheets from said cutting means simultaneously with the cutting of said sheets, and a swinging member adapted to throw said sheets out of said sheet path.

3. In mechanism of the class described, in combination, cutting means, means adapted to feed a web to said cutting means at a certain rate of speed, a sheet path comprising tapes traveling at a higher rate of speed adapted to draw severed sheets from said cutting means, the tapes upon one side of said sheet path being extended beyond those upon the other side, and a swinging member adapted to throw the sheets away from said extended tapes.

4. In mechanism of the class described, in combination, a sheet path comprising a plurality of tapes, the tapes upon one side of the path being extended beyond those upon the other side thereof, and means adapted to curl the forward edge of the sheets toward said extended tapes.

5. In mechanism of the class described, a sheet path comprising a plurality of tapes, those upon one side of the path being extended beyond those upon the other, and said tapes so disposed as to curl the forward edge of the sheet toward the extended side of the path.

6. In mechanism of the class described, a sheet path comprising a plurality of tapes, those upon one side of the path being extended beyond those upon the other, said tapes being so disposed as to curl the sheet toward the extended side of the path, and a movable member adapted to throw the

sheets away from the extended side of the path.

7. In mechanism of the class described, in combination, supporting means, means adapted to throw a series of sheets upon said supporting means, and a movable guide depending beneath the upper surface of said supporting means adapted to co-act with said sheets, said guide being mounted to remain stationary during the accumulation of said sheets.

8. In mechanism of the class described, in combination, supporting means, means adapted to throw a series of sheets upon said supporting means, a movable guide depending beneath the upper surface of said supporting means adapted to co-act with said sheets and to swing laterally to permit the removal thereof, and an anti-friction roller positioned upon said guide.

9. In mechanism of the class described, in combination, supporting means, means adapted to throw a series of sheets thereon, means projecting above said supporting means adapted to remove said sheets laterally therefrom, and means adapted automatically to throw said removing means laterally in raised position, to depress the same and to retract them in depressed condition in a direction parallel to the surface of said supporting means, said last means comprising a pair of relatively swinging members, and a spring interposed therebetween.

10. In mechanism of the class described, in combination, supporting means, means adapted to throw a series of sheets thereon, means projecting above said supporting means adapted to remove said sheets laterally therefrom, means adapted automatically to throw said removing means laterally in raised position, to depress the same and to retract them in depressed condition, said last means comprising a pair of relatively swinging members, and a spring interposed therebetween, and a cam adapted, upon a pre-determined number of sheets being thrown upon said supporting means, to cause the actuation of said last mentioned means.

11. In mechanism of the class described, in combination, supporting means, means adapted to throw a series of sheets thereon, means projecting above said supporting means adapted to engage and remove laterally said series of sheets, a lever, a link connecting the free end of said lever with said removing means, a spring tending to extend the said link with reference to said lever, a guiding surface, a second guiding surface positioned below said first guiding surface, and means connected with said link adapted to engage said guiding surfaces, said spring being adapted, upon said lever being swung in one direction, to raise said means into engagement with the upper of said guiding surfaces, and, upon being swung into an-



other position, to permit it to fall into operative relation to said second guiding surface.

12. In mechanism of the class described, in combination, supporting means, means adapted to throw a series of sheets thereon, means projecting above said supporting means adapted to engage and remove laterally said series of sheets, a lever, a link connecting the free end of said lever with said removing means, a spring tending to extend the said link with reference to said lever, a guiding surface, a second guiding surface positioned below said first guiding surface, means connected with said link adapted to engage said guiding surfaces, said spring being adapted, upon said lever being swung in one direction, to raise said means into engagement with the upper of said guiding surfaces, and, upon being swung into another position, to permit it to fall into operative relation to said second guiding surface, and means adapted to swing said lever.

13. In mechanism of the class described, in combination, supporting means, means adapted to throw a series of sheets thereon, means projecting above said supporting means adapted to engage and remove laterally said series of sheets, a lever, a link connecting the free end of said lever with said removing means, a spring tending to extend the said link with reference to said lever, a guiding surface, a second guiding surface positioned below said first guiding surface, means connected with said link adapted to engage said guiding surfaces, said spring being adapted, upon said lever being swung in one direction, to raise said means into engagement with the upper of said guiding surfaces, and, upon being swung into another position, to permit it to fall into operative relation to said second guiding surface, a spring adapted to swing said lever in one direction, and a cam adapted alternately to compress and release said spring.

14. In mechanism of the class described, in combination, supporting means, means adapted to throw a series of sheets thereon, means projecting above said supporting means adapted to engage and remove laterally said series of sheets, a lever, a link connecting the free end of said lever with said removing means, a spring tending to extend the said link with reference to said lever, a guiding surface, a second guiding surface positioned below said first guiding surface, means connected with said link adapted to engage said guiding surfaces, said spring being adapted, upon said lever being swung in one direction, to raise said means into engagement with the upper of said guiding surfaces, and, upon being swung into another position, to permit it to fall into operative relation to said second guiding surface, a spring adapted to swing said lever in one direction and a cam adapted to compress and

release said spring upon a predetermined number of sheets being thrown upon said supporting means.

15. In mechanism of the class described, in combination, cutting means, means adapted to feed a web to said cutting means at a certain rate of speed, a sheet path comprising tapes traveling at a higher rate of speed adapted to draw severed sheets from said cutting means, the tapes upon one side of said sheet path being extended beyond those of the opposite side, and means adapted to curl said sheets toward said extended tapes.

16. In mechanism of the class described, in combination, cutting means, means adapted to feed a web to said cutting means at a certain rate of speed, a sheet path comprising tapes traveling at a higher rate of speed adapted to draw severed sheets from said cutting means, a swinging member adapted to throw said sheets out of said sheet-path, supporting means adapted to receive said sheets from said path, and a movable guide depending beneath the upper surface of said supporting means adapted to co-act with said sheets and swing laterally to permit the removal thereof.

17. In mechanism of the class described, in combination, cutting means, means adapted to feed a web to said cutting means at a certain rate of speed, a sheet-path comprising tapes traveling at a higher rate of speed adapted to draw severed sheets from said cutting means, a swinging member adapted to throw said sheets out of said sheet-path, supporting means adapted to receive said sheets, means adapted to remove said sheets laterally from said supporting means, a spring adapted to actuate said removing means, and means adapted alternately to compress and release said spring.

18. In mechanism of the class described, in combination, cutting means, means adapted to feed a web to said cutting means at a certain rate of speed, a sheet-path comprising tapes traveling at a higher rate of speed adapted to draw severed sheets from said cutting means, a swinging member adapted to throw said sheets out of said sheet-path, a supporting means adapted to receive said sheets, means adapted to remove said sheets laterally from said supporting means, means adapted to retract said removing means into operative position, and means adapted to maintain the said removing means in operative condition during movement in one direction and in inoperative condition during movement in another direction.

19. In mechanism of the class described, in combination, cutting means, means adapted to feed a web to said cutting means at a certain rate of speed, a sheet-path comprising tapes traveling at a higher rate of speed adapted to draw severed sheets from said cutting means, a swinging member adapted



to throw said sheets out of said sheet-path, supporting means adapted to receive said sheets, means projecting above said supporting means adapted to engage said sheets, 5 a spring tending to throw said engaging means laterally and remove said sheets from said supporting means, means adapted to compress said spring and retract said engaging means, and means adapted to depress 10 said engaging means during retraction.

20. In mechanism of the class described, in combination, a sheet-path comprising a plurality of tapes, those upon one side of the path being extended beyond those upon 15 the other, said tapes being so disposed as to curl the sheet toward the extended side of the path, a swinging member adapted to throw the sheets away from the extended side of the path, supporting means adapted 20 to receive said sheets, and a movable guide depending beneath the upper surface of said supporting means and adapted to swing laterally to permit the removal of said sheets therefrom.

25 21. In mechanism of the class described, in combination, a sheet-path comprising a plurality of tapes, those upon one side of the path being extended beyond those upon the other, said tapes being so disposed as to 30 curl the sheet toward the extended side of the path, a swinging member adapted to throw the sheets away from the extended side of the path, supporting means adapted to receive said sheets, means adapted to throw a series of sheets laterally from said supporting 35 means, a spring adapted to actuate the same, and means adapted alternately to compress and release said spring.

40 22. In mechanism of the class described, in combination, supporting means, means adapted to throw a series of sheets upon said supporting means, a movable guide depending beneath the upper surface of said supporting means adapted to co-act with 45 said sheets, means adapted to remove said sheets laterally from said supporting means, said guide being adapted to swing laterally to permit said removal, a spring adapted to actuate said removing means, and means 50 adapted alternately to compress and release said spring.

23. In mechanism of the class described, in combination, cutting means, means adapted to feed a web to said cutting means at 55 a certain rate of speed, a sheet path comprising tapes traveling at a higher rate of speed adapted to draw severed sheets from said cutting means, the tapes upon one side of said sheet path being extended beyond those 60 of the opposite side, means adapted to curl said sheets toward said extended tapes, supporting means, means adapted to throw said sheets out of said path upon said supporting means, and a guide depending beneath the 65 upper surface of said supporting means

adapted to co-act with said sheets and to swing laterally to permit the removal thereof.

24. In mechanism of the class described, in combination, cutting means, means adapted to feed a web to said cutting means at 70 a certain rate of speed, a sheet path comprising tapes traveling at a higher rate of speed adapted to draw severed sheets from said cutting means, the tapes upon one side of said sheet path being extended beyond 75 those of the opposite side, means adapted to curl said sheets toward said extended tapes, supporting means, means adapted to throw said sheets out of said path upon said supporting means, means adapted to remove 80 said sheets laterally from said supporting means, a spring adapted to actuate said removing means, and means adapted alternately to compress and release said spring.

25. In mechanism of the class described, 85 in combination, cutting means, means adapted to feed a web to said cutting means at a certain rate of speed, a sheet path comprising tapes traveling at a higher rate of speed adapted to draw severed sheets from said 90 cutting means, a swinging member adapted to throw said sheets out of said sheet path, supporting means adapted to receive said sheets from said path, a movable guide depending beneath the upper surface of said 95 supporting means adapted to co-act with said sheets and swing laterally to permit the removal thereof, means adapted to remove said sheets laterally from said supporting means, a spring adapted to actuate said re- 100 moving means, and means adapted alternately to compress and release said spring.

26. In mechanism of the class described, a sheet path comprising a plurality of tapes, 105 those upon one side of the path being extended beyond those upon the other, said tapes being so disposed as to curl the sheets toward the extended side of the path, a swinging member adapted to throw the sheets away from the extended side of the 110 path, supporting means adapted to receive said sheets, a movable guide depending beneath the upper surface of said supporting means and adapted to swing laterally to permit the removal of said sheets therefrom, 115 means adapted to remove said sheets laterally from said supporting means, a spring adapted to actuate said removing means, and means adapted alternately to compress and release said spring. 120

27. In mechanism of the class described, in combination, cutting means, means adapted to feed a web to said cutting means at a certain rate of speed, a sheet path comprising 125 tapes traveling at a higher rate of speed adapted to draw severed sheets from said cutting means, the tapes upon one side of said sheet path being extended beyond those of the opposite side, means adapted to curl said sheets toward said extended tapes, support- 130



ing means, means adapted to throw said  
sheets out of said path upon said support-  
ing means, a guide depending beneath the  
upper surface of said supporting means  
5 adapted to co-act with said sheets and to  
swing laterally to permit the removal there-  
of, means adapted to remove said sheets  
laterally from said supporting means, a  
spring adapted to actuate said removing

means, and means adapted alternately to 10  
compress and release said spring.

In testimony whereof I affix my signa-  
ture, in the presence of two witnesses.

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