

March 11, 1952

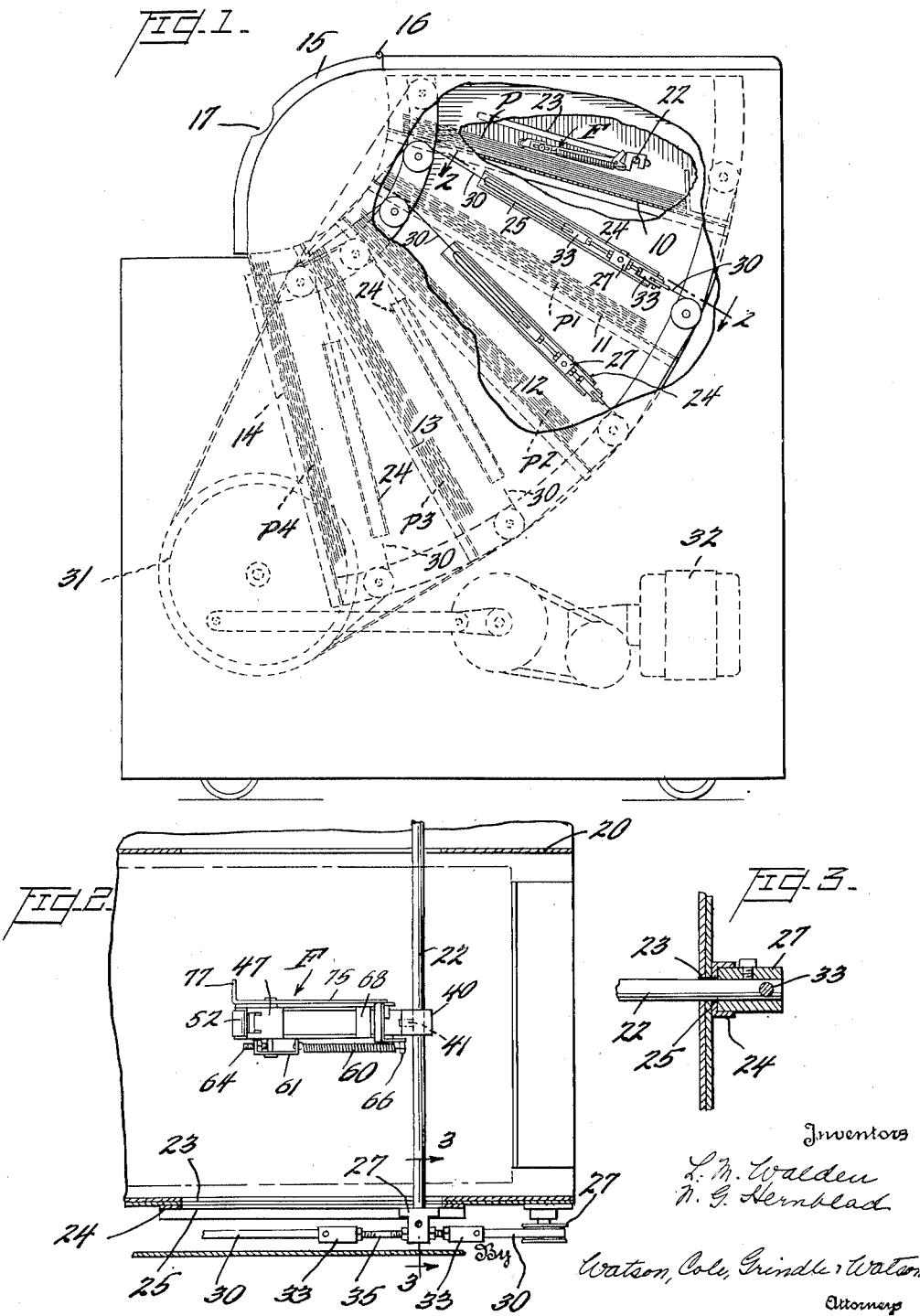
L. M. WALDEN ET AL

2,588,946

RECIPROCATORY SHEET FEED DEVICE FOR COLLATORS

Filed Feb. 19, 1947

4 Sheets-Sheet 1



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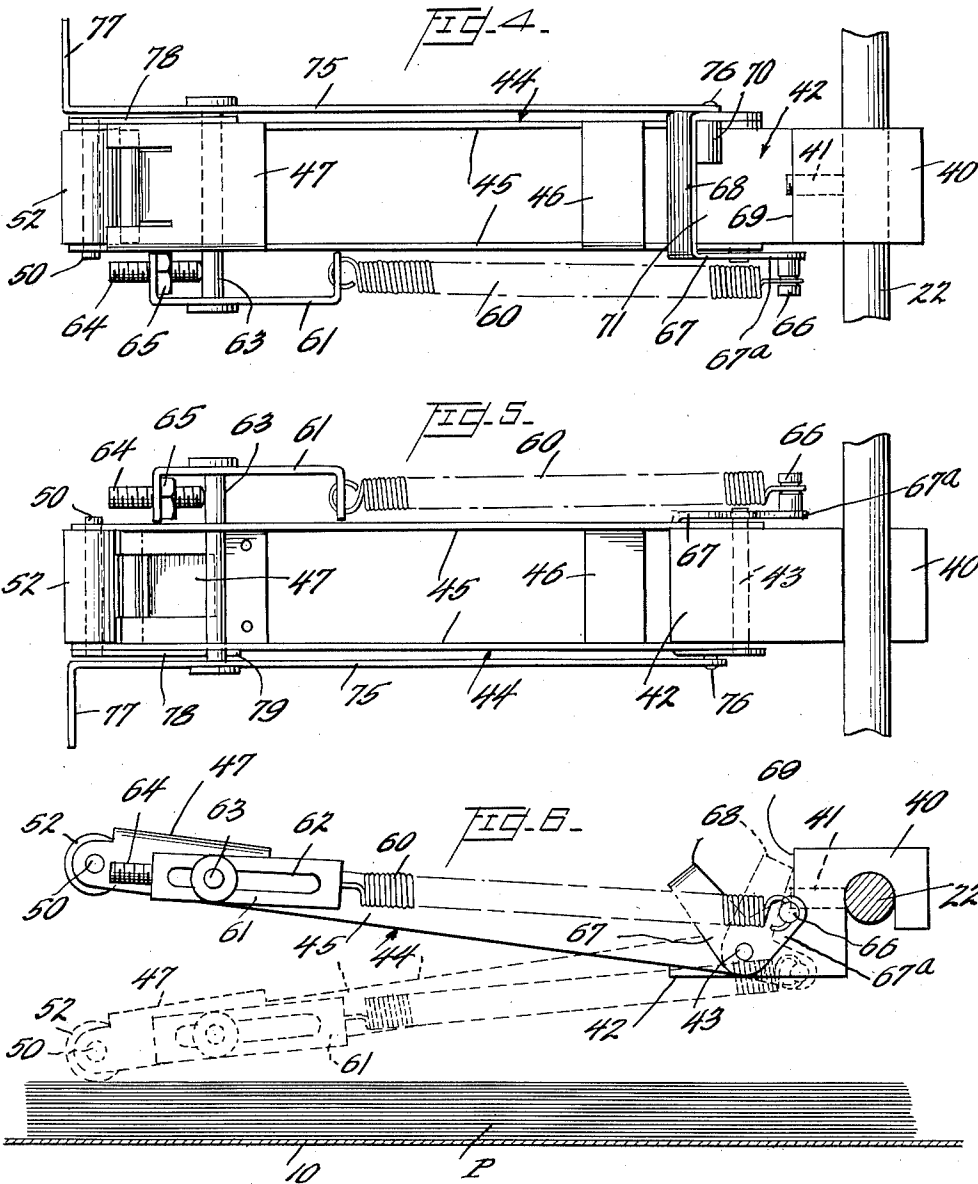
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4 Sheets-Sheet 2



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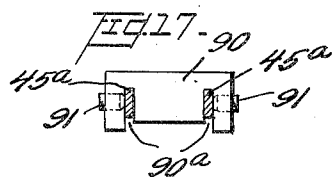
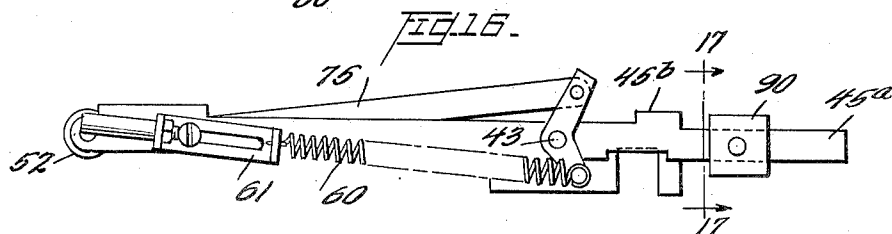
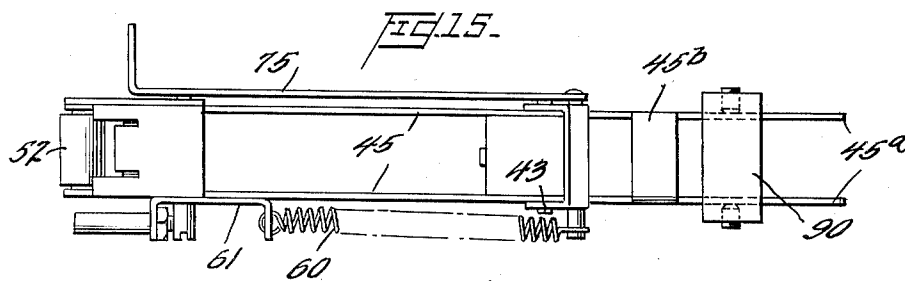
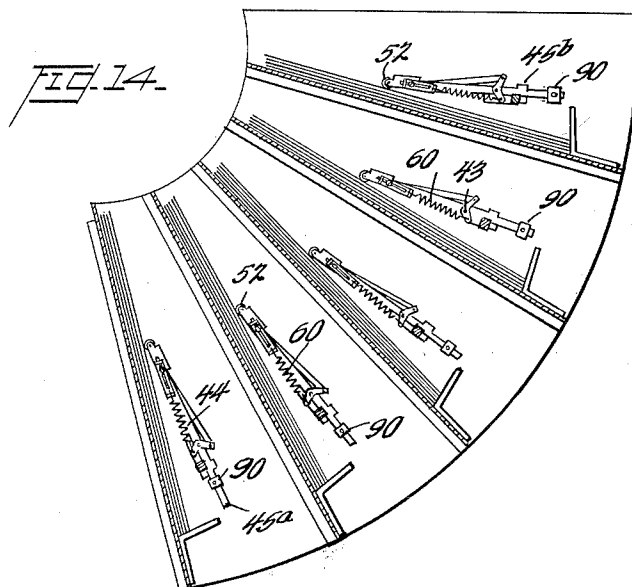
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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,588,946

RECIPROCATORY SHEET FEED DEVICE
FOR COLLATORS

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Application February 19, 1947, Serial No. 729,566

10 Claims. (Cl. 271—42)

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The present invention relates to collating machines and particularly to collators of the type primarily designed and intended to facilitate the simultaneous gathering together of a substantial number of individual sheets, the sheets being taken from different piles.

Collating machines of the type stated have not heretofore been placed in wide general use, although it has been suggested from time to time in the past that a substantial proportion of the labor involved in collating sheets might be saved if adequate equipment were made available. It has for instance been proposed that packs of sheets might be placed in the individual bins of a collating machine and that sheet feeding mechanism be employed to simultaneously feed from the open ends of these bins the top sheets of the several piles, the leading edges of the several top sheets moving into position to be simultaneously grasped by the operator of the machine.

Such a machine is, for instance, disclosed in the pending patent application of Anthony V. Von Haase, Serial No. 578,419, filed February 17, 1945, now Patent No. 2,505,925 dated May 2, 1950, the several pile receiving bins shown in that application being so relatively disposed that the leading edges of the several sheets which are being simultaneously fed at any one time tend to move toward a central position in order that they may be more easily grasped by an operator. In each of the bins is located a sheet feeding device movable in a direction generally parallel to the plane of the topmost sheet of the pile, each of these sheet feeding devices being of the pusher type and having an element for frictionally gripping the uppermost sheet upon movement of the device in sheet feeding direction, and advancing that sheet in the manner stated, the sheet gripping element becoming inoperative upon the return movement of the sheet feeding device and moving idly over the pile to its rearmost position. Means of novel character for simultaneously advancing and retracting the various sheet feeding devices is provided.

The present invention may be said to comprise an improvement upon the mechanism disclosed in the patent application above identified, the improvement residing primarily in the substitution for the sheet feeding devices of the earlier invention improved sheet feeding devices by means of which sheets of widely varying physical characteristics, i. e. which vary in width, length, thickness and stiffness, may be satisfactorily fed. It will be appreciated by those

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skilled in the art that the problem of providing a sheet feeding device which will satisfactorily feed all sizes, weights and qualities of paper is no small one and furthermore that a collating machine in which the sheet feeding instrumentalities will not satisfactorily perform under all conditions of operation cannot be relied upon. In accordance with the present invention a sheet feeding device of great utility is provided, one which will perform its intended function satisfactorily regardless of the type of paper which is to be fed and regardless of the temperature and humidity conditions of the atmosphere of the space in which the machine is to be used.

The invention furthermore relates to a sheet feeding device primarily intended for use in the feeding of successive sheets from a pile, particularly for feeding sheets from a pile located in one or another of the bins of a collating machine of the radial bin type. In this type of collator, one of which is disclosed in the application referred to, certain of the piles of sheets will be disposed horizontally or nearly horizontally and others will be disposed more nearly vertically, so that the several sheet feeding devices must have the capacity to feed sheets at various angles of inclination. The improved sheet feeding device which comprises the subject matter of this application is particularly useful in feeding sheets from the various piles supported by a collator of the radial bin type, being readily adjustable so that the frictional grip of its paper engaging element upon the uppermost sheet may be modified to secure the degree of frictional engagement between the feeding element and sheet which is necessary for the feeding of sheets of any kind either horizontally or at any angle to the horizontal.

A sheet collating machine may be utilized to the fullest extent, a pile of sheets being placed in each bin and the maximum capacity of the collator thus utilized, but in some instances each of the groups of sheets to be formed by the collating operation will contain a number of sheets which is smaller than the number of bins of the collating machine and hence the maximum number of bins and sheet feeding devices of the machine are not used. It is important that the sheet feeding devices be individually constructed in such manner that each may be readily rendered inoperative when it is not to perform sheet feeding operations at a time when other of the sheet feeding devices are to function. Otherwise the operating parts of the sheet feeding device which is not acting

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to feed sheets will be needlessly worn, the sheet gripping and pushing element, for instance, engaging the bottom of the bin in its backward and forward movements, which wears it out rapidly. Such rubbing contact would also tend to vibrate the mechanism as a whole and to thus possibly cause the other sheet feeding elements to operate inefficiently.

It has heretofore been proposed that these devices be constructed in such manner as to be readily adjustable either to operative position or to inoperative position and it is the purpose of the present invention to provide an adjusting mechanism of simple character by means of which the sheet feeding device with which it is associated may be rendered operative or inoperative quickly and surely by an operator standing in his usual position in front of the machine. The mechanism is so constructed that, as the various sheet feeding devices reach positions nearest to the operator, which positions they occupy respectively at the ends of their sheet feeding movements, the operator can readily grasp a handle member which forms part of the adjusting mechanism and manipulate that mechanism to obtain the desired adjustments. Preferably the mechanism is so constructed that the handle, which member may be reached by the operator, is movable in the direction of feed of the feeding device, i. e. toward or away from the operator, so that by a simple pushing or pulling operation the mechanism may be caused to render the feeding device with which it is associated either operative or inoperative as desired.

The invention may have various embodiments, as will become apparent to one skilled in the art. In the accompanying drawings a preferred embodiment is illustrated by way of example and this embodiment will be described in detail, and its mode of operation fully explained.

In the drawings:

Figure 1 shows in side elevation a collating machine of the type fully disclosed in the application referred to, portion of the side wall of the machine being broken away to show the sheet feeding mechanism, the sheet feeding mechanism thus illustrated being constructed in accordance with the present invention;

Figure 2 is a section on line 2—2 of Figure 1;

Figure 3 is a section on line 3—3 of Figure 2;

Figure 4 is a top plan view of one of the sheet feeding devices;

Figure 5 is a bottom plan of the same device;

Figure 6 is a side elevation of the device, the device being shown in its inoperative position in full lines and in its operative position in dotted lines;

Figure 7 is an elevation of that side of the device which is hidden from view in Figure 6; full and dotted lines showing it in its operative and inoperative position respectively;

Figure 8 is a longitudinal vertical section through the device, showing it in position to feed sheets;

Figure 9 is a section on line 9—9 of Figure 8;

Figure 10 is a perspective view of portion of one of the main members of the device, to show details of its construction;

Figures 11 and 12 are perspective views of individual elements of the device, respectively;

Figure 13 is a perspective view of a modified form of the element illustrated in Figure 12, the elements of Figures 12 and 13 comprising the sheet engaging elements or parts;

Figure 14 is a vertical section through a col-

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lator of the radial bin type provided with sheet feeding devices of a type particularly suitable for use in the feeding of sheets which, because of light weight, flimsy texture, glossy surface or other physical characteristics, are difficult to feed in a satisfactory manner;

Figure 15 is a plan view of one of the feeding devices of the collator shown in Figure 14;

Figure 16 is a side elevation of the same; and

Figure 17 is a section on line 17—17 of Figure 16.

The collator may have any desired external form or appearance and its various operating parts, as well as the pile receiving bins, may be enclosed within a casing of which one end wall, partly broken away, is shown in Figure 1. In the collator illustrated there are ten pile receiving bins arranged in two groups of five each, one such group of five being shown in Figure 1. Thus the pile supporting bottoms or floors of these several bins are indicated at 10, 11, 12, 13 and 14, respectively, and upon each of these pile supports there is shown a pile of paper sheets, the several piles being indicated at P, P¹, P², P³ and P⁴. It will be observed that the pile supporting floors 10 to 14 inclusive are angularly disposed with respect to each other and may be said to extend radially from a common point or horizontal line, the bins becoming larger toward the bottoms thereof but each having a sufficiently wide mouth or open upper end to permit the operator to insert into that bin a stack of paper of substantial size. The upper and smaller ends of the bins are entirely open or unobstructed and there may or may not be utilized in association with the bins thus described a guide or hood such as indicated at 15, hingedly connected to the casing of the collator at 16, for guiding the leading edges of the sheets discharged from the bins to a central slot 17 through which they will project and, being closely gathered together, can be conveniently grasped by the operator.

The second group of five radially disposed bins is not fully illustrated but it will be understood that the pile supporting floors of the second group are continuations of the pile supporting floors 10, 11, 12, 13 and 14 of the first group and that there is a simple division plate separating the two groups of bins, such as the plate 20 illustrated in Figure 2. If desired, the plate 20 may be omitted or removed so that instead of ten separate bins there will be only five paper receiving bins of double width.

Within each bin there is located a paper feeding device such as indicated generally at F in Figure 2 and these paper feeding devices comprise elements of a paper feeding mechanism all portions of which need not be described in detail since it is illustrated and described in the patent application mentioned. Each of the feeding devices is reciprocated toward and away from the open mouth of the bin in which it is located along a predetermined path which is generally parallel to the upper surface of the pile in that bin. Conveniently the reciprocatory movement of each device may be imparted to it by means of a rod such as indicated at 22, to which the device is secured, the several rods 22 extending transversely through the several bins with which they are associated and the ends of each rod projecting through slots formed in the side wall of the casing of the collator, one such slot being indicated at 23 in Figure 2 and there being a similar slot, similarly located, in the opposite side wall of the collator casing (not illustrated).

Attached to the outer surface of the collar casing side wall and extending longitudinally of slot 23 is a member 24 which is channel shaped in cross section, as shown in Figure 3, and which has formed therein an elongated slot 25 which is of the same size as slot 23 in the side wall of the collar and in full registration with that slot. Each end of each rod 22 projects through two registering slots 23 and 25 and is received within a slide member 27 located in the groove defined by the parallel upper and lower walls of the channel member 24. Member 24 comprises, in fact, a guide for the slide 27 and in the normal operation of the feeding mechanism the slides 27 at the opposite ends of each rod 22 move forwardly and backwardly along the members 24 as guiding trackways.

Various mechanisms may be utilized for thus advancing and retracting the rod members 22. The mechanism employed for this purpose may be that of the application previously identified or any other which may be deemed to be suitable. Each slide 27 may, for instance, have attached to it the opposite ends of a tape 30, the tape passing around and taking its motion from a drum 31 which is moved first in one direction and then in the other by power taken from an electric motor 32. If tapes such as indicated at 30 are utilized the end of each will be secured within a fitting 33 and fittings 33 are provided with axially aligned bores which are threaded interiorly to receive the exteriorly threaded ends of a rod 35 which passes through the slide member 27. By forming the threads on rod 35 at opposite "hand" and providing suitable clamping nuts, the tension in the associated tape 30 may be maintained taut by rotating this rod and the position of each slide 27 on its associated rod 35 may be adjusted so that the rods 22, all of which are similarly connected to the tapes for operating them, may be maintained in parallelism and in proper relation to the piles over which they move.

The sheet feeding device per se comprises a member which may be designated a base member 40 and which is adapted to be secured in fixed position upon a supporting rod 22 by means of a set screw 41. The rods 22 may be either round or rectangular in cross section, preferably rectangular as shown in Figure 8 of the drawings. The base member includes in addition to the portions which extend over and upon opposite sides of the supporting rod 22, a forwardly projecting portion 42 which is pierced by a bore to receive a pivot pin 43 which is disposed in parallelism to the rod 22 upon which the device is mounted.

An elongated frame member is generally indicated at 44, this member including parallel side portions 45 which are connected by webs 46 and 47, the member 44 being preferably formed from sheet material by stamping and bending operations. The side members 45 of the frame member are provided, at one end of this member, with aligned circular apertures to receive the pin 43 previously referred to, as clearly shown in Figure 5, and the member 44 thus pivotally mounted for rocking movement upon portion 42 of the base 40, about the axis of pin 43.

At their opposite ends the side members 45 of the rocking frame member 44 are provided with registering apertures to receive a pin 50, the pin 50, however, being received in the apertures with a sliding fit so that it may be readily removed when desired. Encircling the pin is a sleeve 51 and affixed to the outer surface of sleeve 51,

which is preferably fabricated of metal, is a hollow cylindrical covering 52 of rubber composition or any synthetic material which has the capacity to frictionally grip a sheet of paper when moved over that sheet and to move the sheet with it. The cylindrical sleeve 52 comprises the paper gripping element of the feeding device and, when the device is moved in the direction indicated by the arrow A in Figure 8 over the pile P shown in that figure, it will be held against rotation and will frictionally grip the top sheet sufficiently strongly to cause the top sheet to separate from and slide over the second sheet. When the feeding device is moved in a direction opposite to that indicated by the arrow A in Figure 8, the element 52 will roll freely in the direction indicated by the arrow B and may thus return to its starting position without applying any frictional gripping force to the topmost sheet of the pile.

The device for permitting free rotation of the gripping element 52 in one direction and preventing it from rotating in the opposite direction is very simple and comprises essentially a roller 53 co-extensive in length with the element 52 and of relatively small diameter, which roller is supported upon the arms 54 of a spring member 55 secured to the undersurface of the bridging web 47 of member 44 and bears against the outer surface of a down turned flange portion 56 of the bridging web 47 of member 44, this down turned flange 56 being in the nature of a fixed abutment. The distance between the forward face of abutment 56 and the center of the pin 50 is less than that obtained by adding together the radius of the paper gripping element 52 and the diameter of the roller 53. As a result of this arrangement rotation of the paper gripping element in the direction of arrow B causes free rotation of the roller 53 in the direction of arrow C but, when the direction of rotation of element 52 is reversed, the roller 53 will be immediately jammed between the surface of element 52 and the surface of abutment 56, its rotation prevented and the rotation of element 52 thus also prevented. The action of the spring arms 54 is to insure close contact between the roller 53 and the element 52 and abutment 56 at all times.

The mechanism for maintaining the desired degree of pressure between the paper gripping element 52 and the top sheet of a pile of paper, and for effecting the movement of the feeding device to inoperative position and holding it in that position until it is to be returned to operative position, includes the elongated helical spring 60 and means for adjusting the tension in the spring and changing the line of action of the spring so that it is either below the axis of the pin 43, when the spring serves to urge the gripping element 52 against the top sheet of a pile, or above that axis, when the spring serves as a portion of the means for retaining the feeding device in inoperative position. These two positions of the spring may be perceived in Figure 6 of the drawings.

At one end the spring is connected to the rocking frame member 44 at a point adjacent the free end of that member. Thus the forward end of the spring is connected to a U-shaped part 61 which is provided with a longitudinal slot 62 to receive the transversely extending rod 63. This rod projects through aligned apertures in the side portions 45 of the frame member 44 and is fixed in the position in which it is shown. A set screw 64 may be adjusted to move the part 61 transversely of the rod 63 and a lock nut 65 maintains the set screw in any desired position of

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adjustment. The part 61 may freely rock about the axis of rod 63 at all times and thus align itself with the line of action of the spring regardless of the position of the rocking frame 44, as will be observed from an inspection of Figure 6, the point of said screw 64 merely sliding over the smooth rounded surface of rod 63. By the means shown the spring tension may be varied as desired.

The opposite end of the spring 60 is connected to a transversely extending lug 66 fixed upon a member 67 which may be generally designated a shiftable spring anchor, since it is in the nature of a member which may be actuated so as to bring the lug 66 into position above the axis of pin 43, or into position below the axis of this pin, both such possible positions being illustrated in Figure 6 by means of full and dotted lines. The angle through which the shiftable spring anchor may rock in one direction is determined by contact of the transversely extending portion 53 of the spring anchor with the vertical face 69 of the base 40, and in the opposite direction by contact of a lug 70 against the generally horizontal abutment surface 71 of portion 42 of base 40, the transversely extending portion of the spring anchor being generally U-shaped so as to bridge frame member 44 and be rockably mounted at two spaced points upon the pin 43. It will be seen that lug 66, to which the spring is attached, is actually mounted upon an arm 67a rigid with the main portion of the shiftable spring anchor.

The lug 70 is affixed to one of the legs of the U-shaped member and preferably to that leg which is remote from spring 60, as most clearly shown in Figure 4. To effect shifting of the spring to its lowermost position, or from its lowermost position to its uppermost position, the spring anchor is rocked and this may be conveniently accomplished by means of an operating rod 75, one end of which is pivotally connected to the spring member by means of a rivet or the like 76 and the other end of which is supported so as to occupy a position at all times adjacent the forward end of the frame 44. Thus the transverse rod 63 previously referred to projects through a slot formed in the operating rod 75 so as to slidably support the operating rod. The operating rod 75 is provided at its forward or outer end with a transversely extending operating handle 77 and it will be readily perceived that the operator of the collator may readily effect movement of the paper feeding device from operative to inoperative position or vice versa, by pushing or pulling upon handle 77 in a direction generally parallel to the direction of the longitudinal axis of the rocking frame member 44. The action is very quick, being analogous to the rapidity of action of the ordinary snap switch.

In order that the paper gripping element 52 may be readily removed for the sake of inspection, repair or replacement, its supporting pin 50 is so mounted in the side members 45 of frame member 44 as to be readily withdrawn. Fixed upon the end of pin 50 is a latch 78 having a hooked end 79 which is adapted to be hooked over the transverse rod 63 previously referred to, as shown in Figure 9. The latch 78 is ordinarily confined between the adjacent side member 45 of the frame and the operating rod 75 so that the pin 50 may not accidentally be displaced. When the operating rod 75 has been moved rearwardly, however, the latch 75 may be lifted so as to disengage the forward end of rod 75 (as shown in dotted lines in Figure 7) and then pulled later-

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ally to withdraw pin 50 and permit detachment of element 52. It is important that the paper gripping elements be detachably mounted inasmuch as the surfaces of these elements are subject to wear and replacement from time to time is necessary.

Certain papers are of extremely smooth nature and materials which ordinarily suffice to frictionally feed sheets of other types will not grip these with sufficient intensity. When paper of this difficult character is to be handled the elements 52 of the several devices of the collator may be removed and elements such as indicated in Figure 13 of the drawings substituted. The paper gripping element of Figure 13 is generally similar to that shown in Figures 8, 9 and 12 but a member such as indicated at 80 is interposed between its ends, this member being preferably fabricated of metal and in the form of a disc or ring disposed in a plane transverse to the axis of the gripping elements, the periphery of the disc or ring being provided with sharp outwardly projecting teeth which will embed themselves in the surface of any paper sheet which requires the use of a device of this nature because of its glossy character.

The type of sheet feeding device which has been described in detail is suited for the feeding, either from a horizontal pile, or from piles which are disposed at various angles to the horizontal, of many types, weights and grades of paper but in the feeding of certain types and weights of paper it is highly desirable, in many cases essential, to provide means for regulating more precisely than is possible by adjusting the tension of spring 60, the pressure of the paper engaging and gripping element against the top sheet of the pile. The pressure of the gripping element 52 against the top sheet may be accurately adjusted by providing the rocking frame member 44 with a counterbalancing weight, the weight being upon that side of the pivot 43 which is remote from the gripping element 52 and being adjustable toward and away from the axis about which the frame member is mounted for rocking movement so that a greater or less portion, as desired, of the weight of the rocking frame member and the parts mounted thereon, may be counterbalanced.

Such a paper feeding device is illustrated in Figures 14, 15 and 16 of the drawings. It will be observed upon inspection of these views that the feeding device there shown is, in substance, identical with that illustrated in the preceding views but that the side members 45 of the rocking frame member 44 are provided with parallel elongations or extensions 45a, projecting to the right (Figures 15 and 16), of the axis about which the frame member may rock. These prolongations 45a are connected by a stiffening cross web 45b and constitute parallel rails or trackways upon which a weight 90 is mounted for sliding movement longitudinally of the frame member. It will be observed from Figure 17 that the weight is provided with parallel slots or recesses 90a for the reception of extensions 45a and that set screws 91 are provided for securing the weight in any desired position of adjustment upon the parallel supporting extensions 45a. The weight 90 may be of any desired shape and securing means other than set screws 91 may be provided, it being essential only that the weight be so mounted that its distance from pivot 43 may be varied as desired and that it be provided with some means

for maintaining it in any position to which it may be adjusted.

It is clear that the pressure of the paper gripping element 52 upon the top sheet of a pile will be decreased as the weight is moved away from the pivot 43, the weight in fact neutralizing to a greater or less extent the pull of the spring 60 which constantly urges element 52 against the pile. By adjusting the length of spring 60 and the position of weight 90 this pressure of the gripping element may be very precisely regulated and, as previously stated, it is essential to be able to effect such precise adjustment in the feeding of sheets of certain types. Adjustment may be readily effected at any time and the operator, who may place papers having widely different characteristics successively in the collator or other paper feeding machine, can quickly move the weight to such position that element 52 bears upon the top sheet of the pile with the degree of pressure necessary for successful feeding.

A sheet feeding device of the character just described is particularly suitable for use with a collator of the radial bin type. As may be observed from an inspection of Figure 14, a series of these devices are employed in feeding sheets simultaneously from the several bins toward a common destination point. Because of the different angles which the feeding devices make, respectively, with the horizontal, the pressures of the several feeding elements 52 against the top sheets of the respective piles will vary, assuming that the tensions of the several springs are identical and the counterweights similarly positioned. Under these circumstances certain of the feeding devices may function satisfactorily and others not satisfactorily. To a certain extent the pressures may be controlled by adjusting spring tensions but the tension of each spring must always be great enough to enable it to accomplish its primary function, i. e. to maintain the associated feeding device in inoperative position when this is desired. When supplied with a counterbalancing weight, however, the pressure of each feeding element 52 against the top sheet of the pile over which it operates may be precisely adjusted or regulated, quite independently of the pressures which the other elements 52 exert against the top sheets of the respective piles which they engage. Hence it is easily possible for the operator to insure perfect sheet feeding from each bin by properly adjusting the counterbalancing weight of the feeding device operating over the pile in that bin.

Other mechanical changes and re-arrangements may be effected in adapting the invention to the feeding of paper of various types, all without departure from the invention.

It is found that, in the operation of the collator, a single sheet is fed from each of the several piles of sheets with certainty and uniformity at each operation of the machine. The mechanism is simple, may be fabricated and assembled at low cost, and will operate perfectly over long periods of time without attention.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. Sheet feeding mechanism of the pusher type comprising, in combination, a support for a pile of sheets, an element adapted to frictionally engage the top sheet of the pile, a base spaced from said element, means for reciprocating said base along a predetermined path of travel which is generally parallel to the top sheet of the pile,

an elongated member pivotally mounted on the base for rocking movement about an axis, the friction element being attached to the free end of said member, and mechanism associated with the base and member for maintaining said member either in operative position with said element in engagement with the top sheet of a pile on said support, or in inoperative position with said element in spaced relation to such pile, said mechanism including a spring one end of which is connected to said member at a point remote from the axis about which said member may rock relatively to the base, and an anchor for the other end of the spring, said anchor being movably supported on the base so that the line of action of the spring may be shifted from one side of said axis to the other.

2. Sheet feeding mechanism of the pusher type comprising, in combination, a support for a pile of sheets, an element adapted to frictionally engage the top sheet of the pile, a base spaced from said element, means for reciprocating said base along a predetermined path of travel which is generally parallel to the top sheet of the pile, an elongated member pivotally mounted on the base for rocking movement about an axis, the friction element being attached to the free end of said member, and mechanism associated with the base and member for maintaining said member either in operative position with said element in engagement with the top sheet of a pile on said support, or in inoperative position with said element in spaced relation to such pile, said mechanism including a spring one end of which is connected to said member at a point remote from the axis about which said member may rock relatively to the base, and an anchor to which the other end of the spring is secured, said anchor being movably supported on the base for limited movement relatively thereto so that that end of the spring which is attached to the anchor may be moved to a position intermediate the top sheet of the pile and said axis or to the side of said axis remote from the pile.

3. The combination set forth in claim 2 in which said anchor is pivotally mounted on said base and the base is provided with stop surfaces limiting the pivotal movement of the anchor.

4. The combination set forth in claim 2 in which said anchor is pivotally mounted on said base and said mechanism also includes an operating rod one end of which is operatively connected to said anchor and the other end of which is located adjacent said sheet engaging element, longitudinal movement of said rod effecting rocking movement of said anchor.

5. The combination set forth in claim 2 in which one end of the spring is connected to said member by means of a part which is pivotally mounted on said member and adjustable longitudinally thereof to vary the tension in the spring.

6. Sheet feeding mechanism of the pusher type comprising, in combination, a support for a pile of sheets, an element adapted to engage the top sheet of the pile, a base spaced from said element, means for reciprocating said base along a predetermined path of travel which is generally parallel to the top sheet of the pile, an elongated member pivotally mounted on the base for rocking movement about an axis, the element being attached to the free end of said member, mechanism including a spring one end of which is connected to said member at a point remote from the axis about which said member may rock relatively to the base, and an anchor for the other

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end of said spring, said anchor being pivotally mounted on the base on the side of said axis remote from said element and for movement in a direction transverse to the elongated member so that the line of action of said spring may be shifted from one side of said axis to the other.

7. Sheet feeding mechanism of the pusher type comprising, in combination, a support for a pile of sheets, an element adapted to engage the top sheet of the pile, a base spaced from said element, means for reciprocating said base along a predetermined path of travel which is generally parallel to the top sheet of the pile, an elongated member pivotally mounted on the base for rocking movement about an axis, the element being attached to the free end of said member, mechanism including a spring one end of which is connected to said member at a point remote from the axis about which said member may rock relatively to the base, and an anchor for the other end of the spring said anchor being pivotally mounted on the base on the side of said axis remote from said element and for movement in a direction transverse to the elongated member.

8. The combination set forth in claim 7 the base is provided with stop surfaces limiting the pivotal movement of the anchor.

9. The combination set forth in claim 7 said mechanism also includes an operating rod one end of which is operatively connected to said

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anchor and the other end of which is located adjacent said sheet engaging element, longitudinal movement of said rod effecting rocking movement of said anchor.

10. The combination set forth in claim 7 in which one end of the spring is connected to said member by means of a part which is pivotally mounted on said member and adjustable longitudinally thereof to vary the tension in the spring.

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