July 25, 1933. F. McCARTHY 1,919,238

SHEET FEEDER

Filed Oct. 17, 1928 3 Sheets-Sheet 1

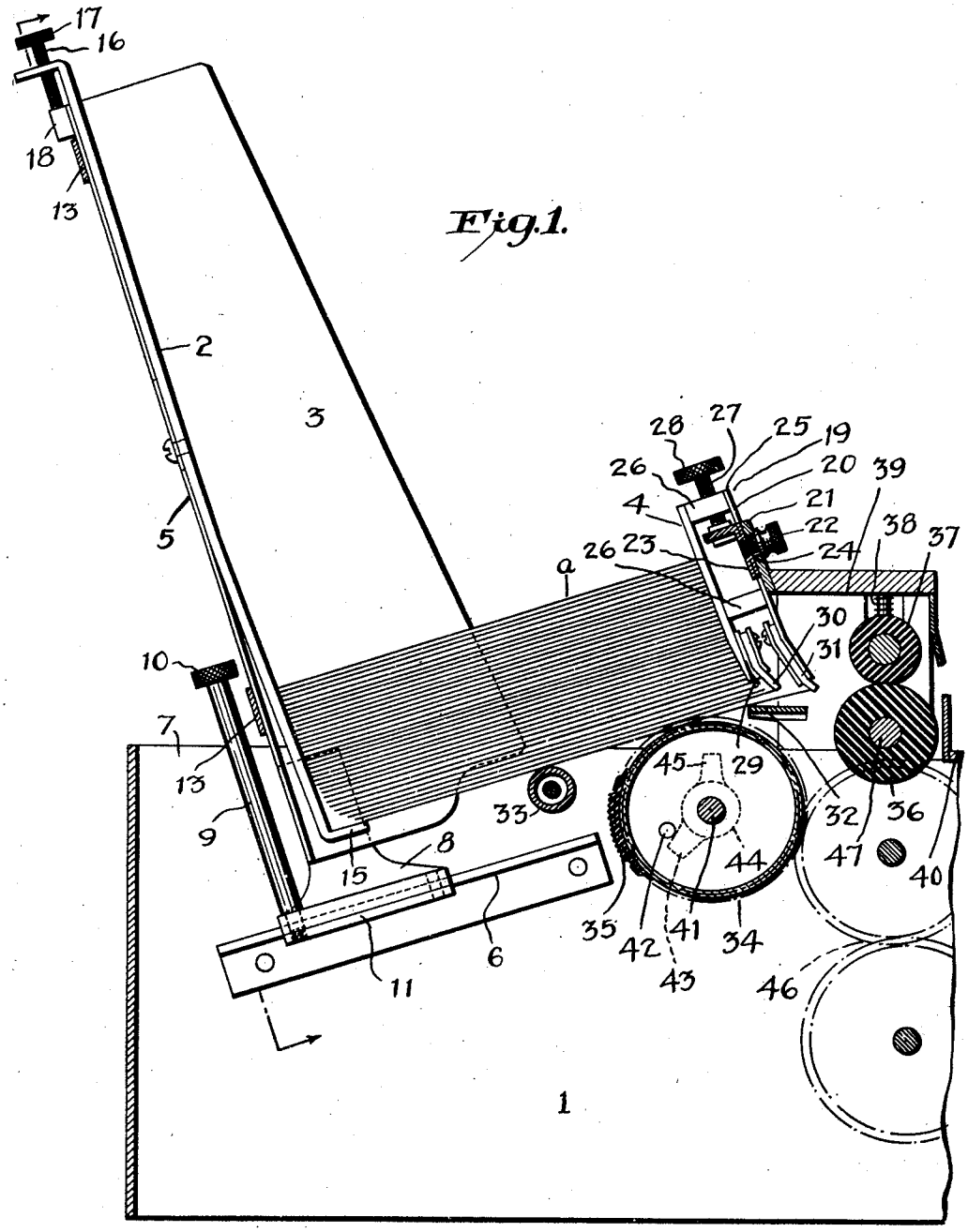


Fig.1.

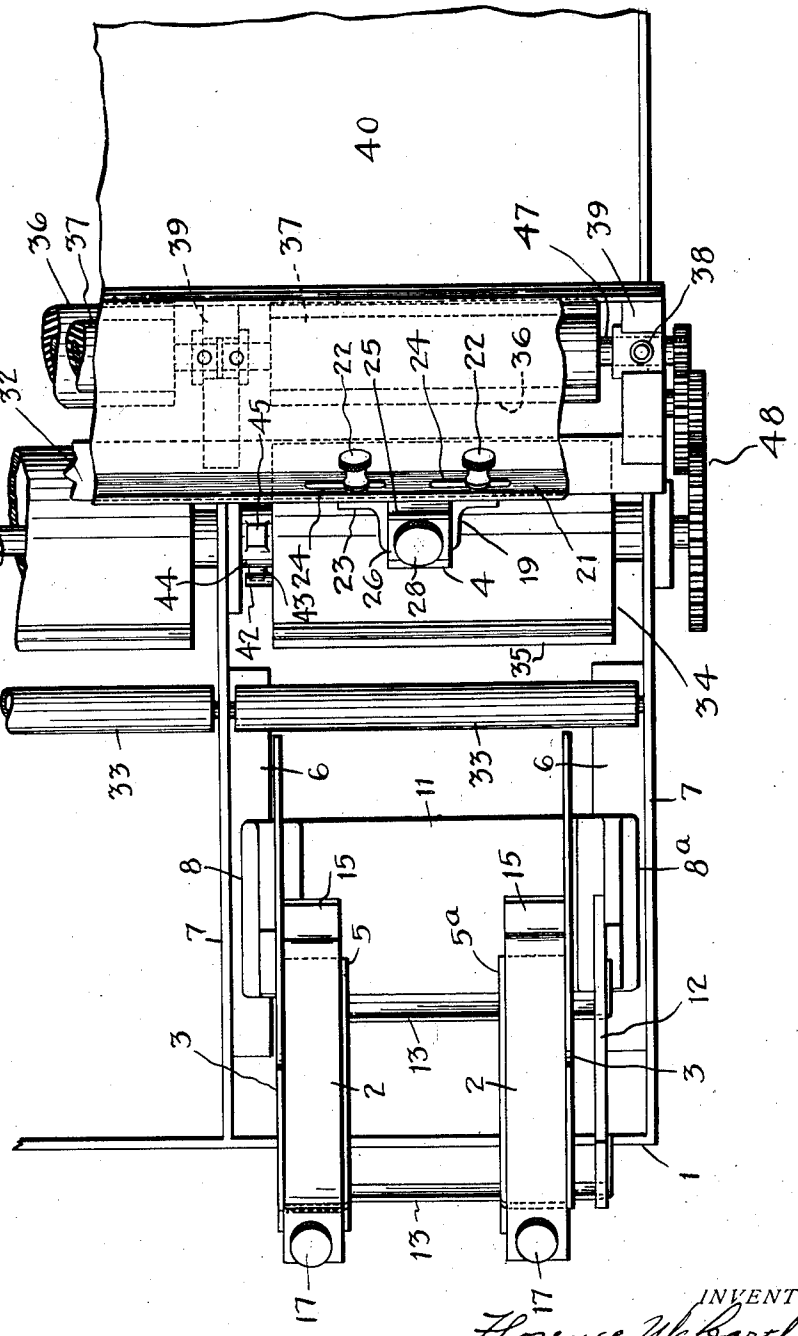
INVENTOR
Florence McCarthy
BY
J. F. Lundenburg
his ATTORNEY

July 25, 1933. F. McCARTHY 1,919,238

SHEET FEEDER

Filed Oct. 17, 1928 3 Sheets-Sheet 2

Fig. 2.



INVENTOR

Florence McCarthy

BY J. F. Brandenburg

ATTORNEY

July 25, 1933. F. McCARTHY 1,919,238

SHEET FEEDER

Filed Oct. 17, 1928 3 Sheets-Sheet 3

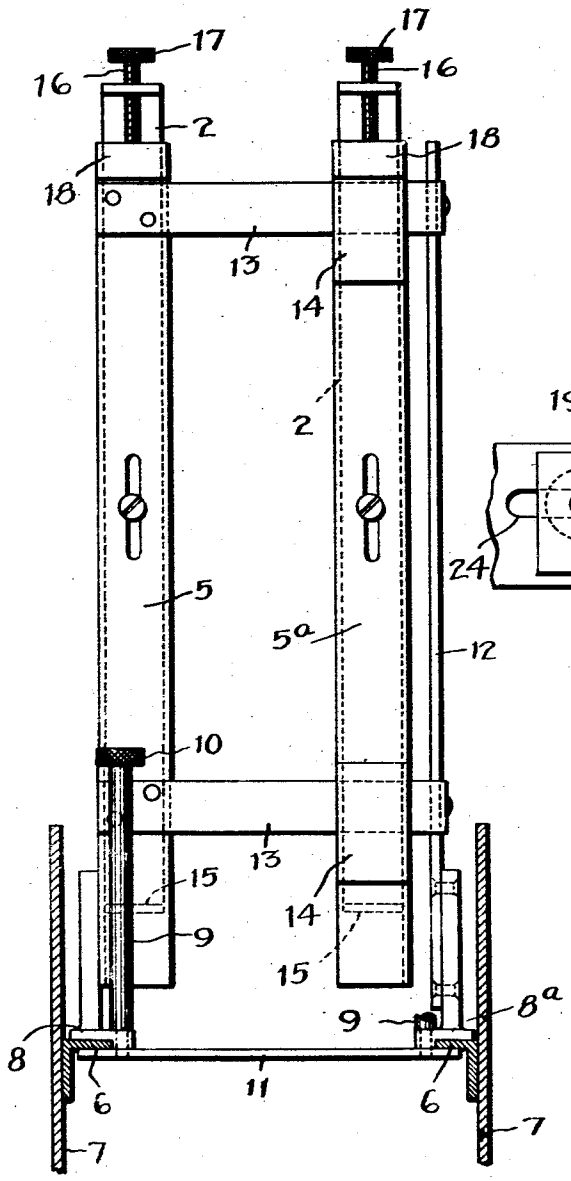
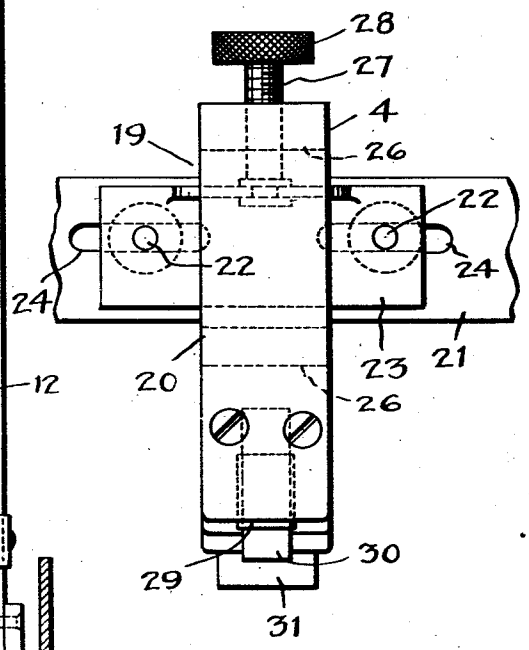


Fig. 3.

Fig. 4.



Florence McCarthy INVENTOR

BY J. F. Chamberlain ATTORNEY

Patented July 25, 1933 1,919,238

UNITED STATES PATENT OFFICE

FLORENCE McCARTHY, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO McCARTHY BUSINESS MACHINES CO., INC., OF NEW YORK, N. Y., A CORPORATION OF DELAWARE

SHEET FEEDER

Application filed October 17, 1928. Serial No. 313,006.

The invention relates to improvements in sheet feeders and more especially to feeders wherein flexible articles of sheet material are fed one at a time from the bottom of a stack or column.

One of the features of the invention is particularly applicable to a feeder wherein the successive articles are protruded by a feeding device at the bottom of the stack and when protruded are engaged and moved onward at increased speed by another instrumentality, and the object, in such an organization, is to prevent retardation of, or possible injury to, the article, and to avoid unnecessary consumption of power, by reason of the article being held back by the feeding device. For these and other purposes I provide a revoluble feeding device which is adapted to engage at regular intervals with the faces of successive articles and which is so constructed and driven as to be free to be impelled and caused to drop out of action by the articles when their speed is increased. A further object, in this connection, is to restrain the feeding element from proceeding around under momentum and prematurely reengaging with the stack.

Another object is to secure a highly efficient stripping action by virtue of which one article only is allowed to be protruded at a time from the stack, the superincumbent articles being restrained. For this purpose a stripper is provided comprising a series of stripping elements which coact successively with the articles when they are advanced, to the end that all but the bottom article shall be reliably restrained from being protruded from the magazine, all as more particularly described hereinafter.

A further feature enabling the stripping action to be improved and rendered more certain involves matters of construction and relation whereby the forward portions of the articles are elevated in rear of the stripper, so as to separate the forward ends of the lower articles and to compel the bottom article to flex downward in order to pass beneath the stripper. In this connection, the elevation of the forward portions of the articles is preferably effected by means of the bottom feeding device, though other means may be employed for the purpose.

Another part of the invention involves a combination of the bottom feeding means by which the articles are protruded one at a time, the stripping means for restraining all but the bottom article from being protruded, and a plurality of bottom supports supporting the stack at regions in rear of the feeding device and at opposite sides of the transverse center, which supports are raisable and lowerable to regulate the degree of action of the feeding device on the articles and their presentation to the stripper, and which, by being raised or lowered with reference to each other, enable the relations between the articles and the feeding device and the stripper to be corrected so as to compensate for a warped condition of the articles or differences in thickness between the sides thereof, or other conditions which may exist and which would adversely affect the feed.

Other novel and advantageous matters of combination, construction, operation, relation and adjustment will become apparent.

In the accompanying drawings, forming part hereof:

Fig. 1 is a vertical section taken in a fore and aft plane through a feeder embodying the invention;

Fig. 2 is a plan view thereof, with a portion broken away, and showing also a portion of an adjoining feeder;

Fig. 3 is a rear sectional elevation; and

Fig. 4 is a detailed view showing the stripper in rear elevation mounted on its support.

The sheet feeder herein illustrated may be embodied in gathering and inserting machines such as disclosed in my Patent No. 1,878,590.

A machine such as disclosed in the said patent includes an envelope magazine and feeding means and a series of enclosure magazines with feeding means. The drawings of the present case illustrate such an enclosure magazine and its instrumentalities, but features of the invention are applicable as well to envelope feeders, or to feeders for other articles of sheet material.

Fig. 2 shows, by way of illustration, a complete magazine feeder, and a portion of an adjoining feeder.

A suitable supporting frame is marked 1.

The stack *a* of articles, of which only a portion is shown, is defined by back elements 2, side elements 3, and a front element 4. The magazine and the stack are preferably tilted rearward, in order to reduce the weight of the stack on the forward portions of the lower articles.

The side and back elements are connected in two adjustable units, each comprising a side element 3 and a back element 2, a simple construction being one in which each unit comprises a corner piece 5 or 5ª of angular cross-section. The back elements 2 may be applied to the inner faces of the rear flanges of these members, or may be formed by said flanges themselves.

Simple and convenient means are provided for adjusting the units forwardly and rearwardly, and also transversely with respect to each other, in order to accommodate the magazines to different lengths and widths of articles.

In the particular construction shown shelves 6 are fixed to vertical walls 7 of the frame 1, the shelves being inclined upwardly and forwardly. Slides 8 and 8ª are supported on these shelves, and can be moved forwardly and rearwardly and held at any point. Clamping rods 9 with knobs 10 at their upper ends, have reduced portions which are rotatable in holes in the basal portions of the slides, and threaded extremities which engage tapped openings in a clamping plate 11. One of these rods is broken away in Fig. 3.

The slide 8 has the piece 5 fixed to it, and to the slide 8ª there is fixed an upright 12. Cross-bars 13 connect the piece 5 and the upright 12, and the piece 5ª is supported by these cross-bars, the piece 5ª having portions 14 frictionally clasping the cross-bars and enabling this piece to be shifted nearer to or farther from the piece 5, and to hold its position.

The lower ends of the rear elements 2 are bent forward at 15 to form rear bottom supports for the stack, these supports sustaining the stack at regions at opposite sides of the transverse center. Screws 16 with manipulating knobs 17 are retained in a swiveled manner in the upper ends of the pieces 5 and 5ª and engage threaded openings in lugs 18 on the upper ends of the elements. By manipulation of these screws, the supports 15 can be raised and lowered and can be adjusted at any desired relative elevations, this feature having an important bearing on other parts, which will be explained.

At the lower front region of the magazine there is a stripper 19. The construction of stripper illustrated in the drawings is especially advantageous in connection with flexible sheet articles, such as mailing enclosures, fed from the magazine in the direction of their length, but it may also be applied in connection with envelopes or with other articles, or articles which are fed transversely to their length.

The frame 20 of the stripper is mounted adjustably on a fixed cross-bar 21, to which the stripper may be clamped by screws 22 and a shoe 23, which latter forms part of the stripper assemblage. The screws 22 pass through horizontal slots 24 in the bar 21, enabling the stripper to be shifted sideways to position it centrally with respect to the pieces 5 and 5ª when the latter are relatively adjusted in the transverse direction.

The stripper frame 20 preferably comprises spaced front and rear members 25 and 4 united by spacer pieces 26; and the member 25 is slidable up and down between the fixed part 21 and the shoe 23. Adjustment of the stripper up or down is effected by a screw 27 having a knob 28, this screw being threaded through the upper piece 26 and having swiveled connection with the shoe 23, which latter is prevented from moving vertically by the screws and slots 22 and 24.

A comparatively stiff metal blade 29 is clamped to the front of the lower portion of the front element 4 of the magazine, which forms part of the stripper assemblage, this blade projecting downward below the lower end of said member and constituting a thin edged preliminary separating device coacting with the forward ends of the lower articles of the stack.

Clamped to the member 4 directly in front of the blade 29 there is a flexible finger 30 of rubber or other similar frictional material, which extends downward below the blade. Clamped to the rear side of the member 25 there is a second flexible rubber finger 31, which extends relatively below the finger 30.

By the successive separating and restraining actions of these or other suitable stripping elements, the bottom article is allowed to pass, but all the superincumbent articles in the lower part of the stack are reliably retained in the magazine. It will be perceived that the finger 30 may, and preferably does, cause, the article being protruded to flex downward somewhat in order to pass beneath this element, and that the finger 31 projects further below the natural path of the article so that the article must flex still further downward in order to pass beneath this element.

The forward portions of the lower articles in the stack are normally supported on a shelf 32, or on the rear edge of this shelf. The fingers 30 and 31 act upon the articles at a point or points in front of this transverse line of support.

At about the middle, between the front and the back of the stack, the articles may be supported on a roller 33.

A rotary or revoluble feeding device 34 is located beneath the forward portion of the bottom of the stack, at a distance in rear of the stripper, and in rear also of the front support 32.

The preferred form of feeding device illustrated in the present drawings comprises a cylinder or roller, the greater part of the surface of which is smooth in the circumferential direction so as not to feed, and which may and preferably does afford support for the articles. On the circumference of the drum there is a frictional feeding segment 35 of rubber or other suitable material, which projects above the surface of the cylinder, and the circumferential extent of which is limited approximately to the movement which it is desired to give to the bottom article by this feeding element.

As the segment 35 comes around at the top in forward rotation, it lifts the portions of the articles above this region, thereby increasing or creating the downward flexure of the articles in passing thence beneath the stripper. At the same time it advances the bottom article, causing it to protrude from the stack, while the other articles next above are held back by the stripper.

The forward edge of the protruded article is advanced against the convex surface of a driven roller 36, and by this surface is guided upward between said roller and an upper roller 37, which is pressed downward by springs 38, these rollers being mounted in a housing 39. These rollers then draw the article forward at a speed greater than that at which it was advanced by the feeding device 34, and, while it is still engaged by that device, withdraw the article entirely from the magazine and deliver it onto a surface 40.

In a broader aspect these rollers are illustrative of a means for receiving and moving onward the articles protruded from the magazine or stack.

While the protruded article is being thus withdrawn or forwarded at increased speed, the feeding device 34 would tend to hold it back and produce slippage, wasting power and perhaps injuring the sheet material. To overcome this condition, the feeding device is constructed and operated so as to yield freely to the impetus given by the accelerated speed of the article.

In the preferred form shown herein, the ends of the cylinder 34 are mounted on an axial drive shaft 41 so as to be free to turn relatively thereto, the shaft 41 being continuously driven in a forward direction. One end of the cylinder has a projecting pin 42, which is acted upon by a driving arm 43 on a collar 44 fixed to the shaft. This forms a species of free driving connection, by means of which the feeding segment 35 is revolved in a forward direction by the drive shaft, and which leaves the cylinder and its segment free to be moved forwardly at higher speed than they would be turned by the shaft.

The result is that as soon as the feeding element has performed its function of protruding a bottom article far enough to be seized and carried forward by the rollers 36, 37 or other means, the feeding element will be snatched forward unresistingly by the pull of the article and will drop down out of action.

The free movement of the cylinder and its segment 35 is limited, however, by another arm 45 on the collar 44, this arm being positioned so as to prevent the cylinder spinning around under momentum so as to bring the segment back into engagement either with the face of the article being withdrawn or prematurely against the face of the next article.

The shaft 41 is driven through suitable gearing 46 from a source of power. It may be understood that this gearing connects with the shaft at a point beyond where it is broken off in Fig. 2, and that the same shaft may drive all the cylinders of a number of magazines placed side by side.

The shaft 47 of the forwarding roller 36 is driven from the shaft 41 through speed-multiplying gearing 48.

The stack being preferably tilted rearward, the various bottom supports are disposed in such relation to each other as to support the articles at a corresponding upward and forward inclination, and where references are made to the articles flexing downward and upward and to the elements of the stripper successively extending downward to different distances, it will be understood that such directions are relative to the general bottom plane or to the general direction in which the articles would naturally be advanced if they were not deflected.

In the combinations of cooperative parts and instrumentalities involved in this feeder, the adjustability of the supports 15 up and down, and their capacity for relative adjustment, are important. Raising or lowering of the rear portion of the stack regulates the action of the feeding element on the bottom article and the angle and height at which the articles encounter the elements of the stripper.

By relative vertical adjustment of these supports, it is possible to compensate for any diagonal warping of the sheet articles, or any condition which tends to cause one forward corner to be higher than the other, or difference in thickness in the two sides of the articles, or any condition which would cause the feeding element 35 to act on the sheets more strongly at one side of the feeding segment than at the other, or the forward edges

of the sheets to be canted sideways so that the stripper elements would not have the proper action thereon. The stripper having been adjusted vertically, slight adjustment of one or other or both of the suppports 15 insures proper functioning of the organism.

The general operation of the feeder has been explained in connection with the foregoing description, and need not be repeated.

While the preferred embodiment of the invention has been described in full, it will be understood that there may be numerous changes in form and details, and by way of substitutions, additions and subtractions, without departing from essentials.

I claim:

1. In a sheet feeder, the combination of means for holding a column of sheet articles, a feeding device at one end of the column, said device comprising a continuously driven rotary part, and a revoluble feeding element in driven relation to said part, the relation being such that said element is free to be moved forwardly with respect to said rotary part, and means for receiving articles successively protruded by said element and moving them onward at increased speed, the construction of the feeding device being such that the feeding element is restrained from proceeding around and engaging an article under the momentum acquired from such increase in speed.

2. In a sheet feeder wherein articles are protruded one at a time from the bottom of a stack of articles and are thereupon moved onward one at a time at increased speed, a feeding device at the bottom of the stack comprising a rotary part continuously driven in one direction, a cylinder having a projecting feeding segment to engage at regular intervals the faces of successive articles, and a free driving connection between said part and said cylinder.

3. In a sheet feeder wherein articles are protruded one at a time from the bottom of a stack of articles and are thereupon moved onward one at a time at increased speed, a feeding device at the bottom of the stack comprising a rotary part continuously driven in one direction, a cylinder having a projecting feeding segment to engage at regular intervals the faces of successive articles, a free driving connection between said part and said cylinder, and a stop between said part and said cylinder preventing the cylinder being whirled by momentum imparted by a withdrawn article into premature reengagement with the stack.

4. In a sheet feeder wherein articles are protruded one at a time from a column and are thereupon moved onward one at a time at increased speed, a feeding device at one end of the column comprising a rotary part continuously driven in one direction, a feeding element free to move angularly about the axis about which said rotary part turns and relatively thereto, a free driving connection between said part and said element, and a stop between said part and said element limiting the extent of free movement of said element about said axis.

5. In a sheet feeder wherein the articles are fed one at a time from the bottom of a stack, a revoluble feeding device adapted to act upon the bottom of the stack at regular intervals thereby lifting the articles and advancing the bottommost one, said feeding device being positioned to act at its highest point upon the forward portion of the stack rearwardly of the forward edges of the articles, a stripper comprising a plurality of stripping elements disposed to be successively encountered by the leading edge of an article being protruded, the outer element or elements extending relatively farther downward than the inner element or elements.

6. In a sheet feeder wherein the articles are fed one at a time from the bottom of a stack, a revoluble feeding device adapted to act upon the bottom of the stack at regular intervals thereby lifting the articles and advancing the bottommost one, said feeding device being positioned to act at its highest point upon the forward portion of the stack rearwardly of the forward edges of the articles, a stripper comprising a plurality of flexible stripping elements disposed to be successively encountered by the leading edge of an article being protruded, the outer elements extending relatively farther downward than the one in rear.

7. In a sheet feeder wherein the articles are fed one at a time from the bottom of a stack, a revoluble feeding device adapted to act upon the bottom of the stack at regular intervals thereby lifting the articles and advancing the bottommost one, said feeding device being positioned to act at its highest point upon the forward portion of the stack rearwardly of the forward edges of the articles, a stripper comprising a plurality of frictional stripping elements disposed to be successively encountered by the leading edge of an article being protruded, the outer element extending relatively farther downward than the one in rear.

8. In a sheet feeder wherein the articles are fed one at a time from the bottom of a stack, a revoluble feeding device adapted to act upon the bottom of the stack at regular intervals thereby lifting the articles and advancing the bottommost one, said feeding device being positioned to act at its highest point upon the forward portion of the stack rearwardly of the forward edges of the articles, a stripper comprising a plurality of stripping elements disposed to be successively encountered by the leading edge of an article being protruded, said elements comprising an inner stiff thin edged element for prelimi-

nary separation of the articles and a plurality of frictional elements placed in succession in front of said stiff edged element and at successively relatively lower levels.

9. In a sheet feeder, the combination with stack defining means, of a revoluble frictional feeding device adapted to act upon the bottom of the stack at regular intervals thereby lifting the articles and advancing the bottommost one, said feeding device being positioned to act at its highest point upon the forward portion of the stack rearwardly of the forward edges of the articles, and flexible stripping means spaced forwardly from the feeding device, the construction being such that each article as it is protruded is caused to pass over an elevation and flex downwardly in order to pass beneath the stripping means.

10. In a sheet feeder, the combination with stack defining means, of a revoluble frictional feeding device adapted to act upon the bottom of the stack at regular intervals thereby lifting the articles and advancing the bottommost one, said feeding device being positioned to act at its highest point upon the forward portion of the stack rearwardly of the forward edges of the articles, flexible stripping means spaced forwardly from the feeding device, and means for supporting the forward part of the stack at a region in rear of the stripping means and in front of the feeding device, the construction being such that each article as it is protruded is caused to pass over an elevation and flex downwardly in order to pass beneath the stripping means.

11. In a sheet feeder wherein the articles are protruded one at a time from the bottom of a stack, a stripper beneath which the articles must pass, means whereby the articles are relatively raised at a region a short distance in rear of the stripper so that the bottom article must flex downward in order to pass under the stripper, and a pair of forwarding rollers close in front of the stripper, the relative positions being such that the portion of the article in advance of the stripper is directed upwardly by the lower of said rollers to pass between the rollers, the article being reversely flexed in different portions at the same time while being fed.

FLORENCE McCARTHY.