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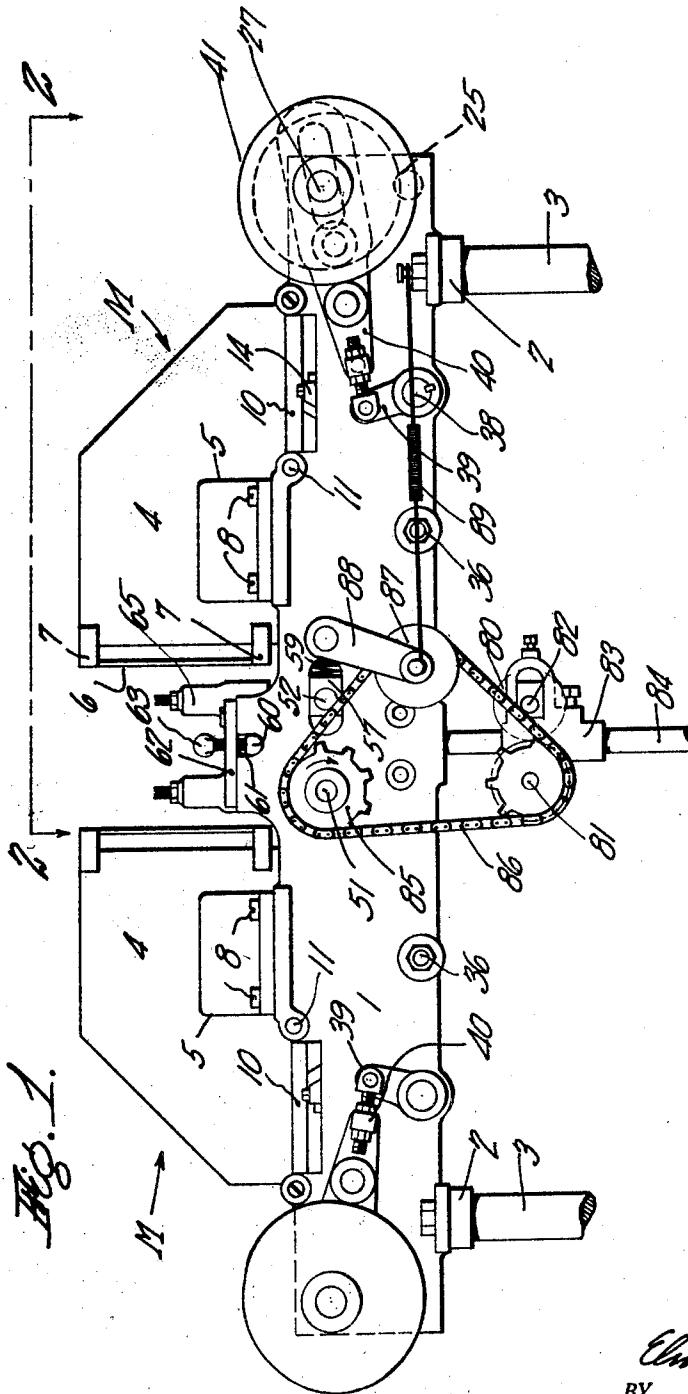
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E. L. SMITH

SHEET FEEDING APPARATUS

Filed March 17, 1926

2 Sheets-Sheet 1



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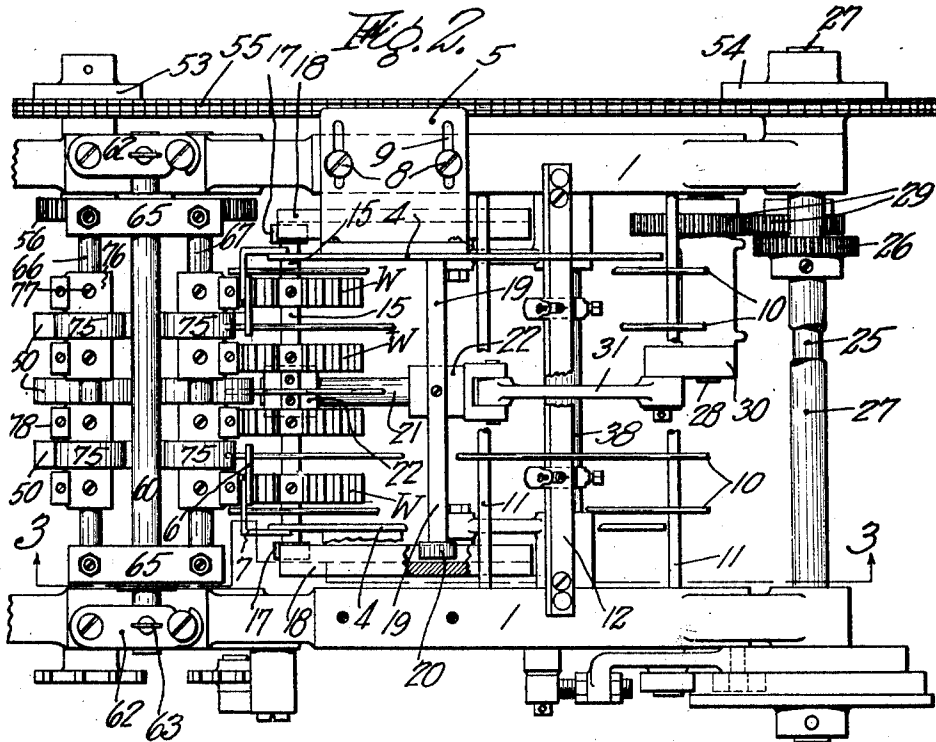
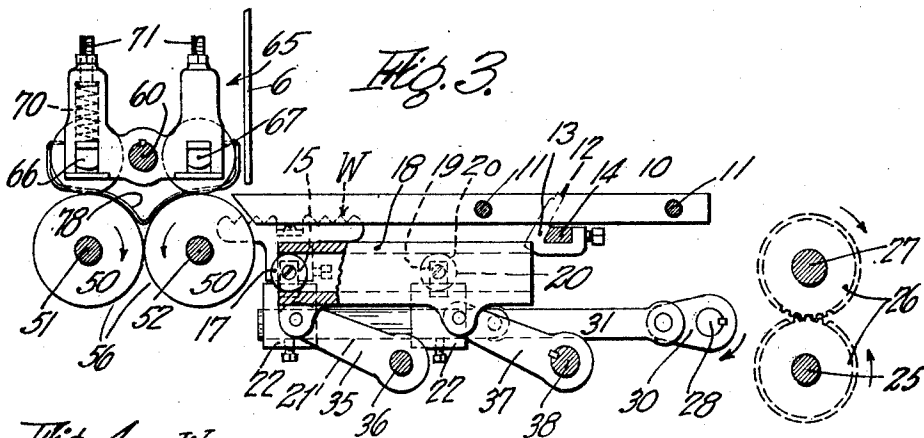
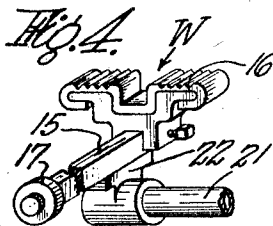
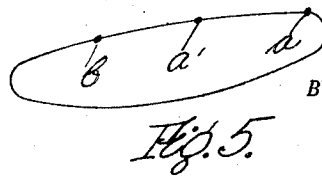
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

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SHEET-FEEDING APPARATUS.

Application filed March 17, 1926. Serial No. 95,435.

This invention relates to sheet feeding or sheet delivery apparatus and is directed more particularly to apparatus for feeding sheets of paper or the like successively from a stack thereof.

The invention is capable of broad application wherever it is desired to feed successive sheets of paper, but in the form at present preferred is particularly adapted for feeding sheets of wrapping paper to a wrapping machine in a timed relation with respect thereto.

Wrapping machines of the present day have been developed to a high state of efficiency and are capable of operating at high speed and it is therefore important that the wrapping material be delivered thereto at a corresponding high speed and in an accurate timed relation in respect thereto.

According to one novel feature of my invention, I provide in a sheet feeding apparatus a means for removing successive sheets from a stack and other means for receiving said sheets and delivering them therefrom.

According to another novel feature of the invention, the removing means and receiving means are arranged so that they operate in an overlapping timed relation whereby the sheet is not released by the removing means until fairly under the control of the receiving means, and is accomplished by a novel combination and arrangement of parts adapted to drive the said removing and receiving means at a corresponding speed while the sheet is under the influence of both of said means.

Other novel features will be observed from the following description of the invention which is illustrated in the form at present preferred by means of the accompany drawings, in which:

Fig. 1 is a side elevational view of an apparatus embodying the principal features of my invention;

Fig. 2 is a plan view of Fig. 1 taken on line 2-2;

Fig. 3 is an enlarged sectional elevational view taken on the line 3-3 of Fig. 2;

Fig. 4 is a perspective view of one of the sheet removing members; and

Fig. 5 is a diagrammatic representation

at an enlarged scale, of the path of movement of the sheet removing members.

Referring to the drawings in detail, side frames are represented at 1 that are tied together by cross bars 2, which are secured to and supported by upright supports that may be in the form of rods 3.

In the embodiment of the invention shown, the apparatus includes means for simultaneously feeding two separate wrappers or an inner liner and a wrapper, but it will only be necessary to describe one complete feeding mechanism since the other may be an exact duplicate thereof in so far as its structure is concerned. One may, of course, be arranged to work in connection with a sheet different in size from the other, or one may be arranged to deliver a sheet prior to or subsequent to the other, so that the relative sizes of sheets handled or relative times for delivery may be arranged according to the use for which it is desired to employ the apparatus.

A magazine M for a stack of sheets comprises side walls 4 supported by brackets 5 adjustably secured to the upper side of the side frames and front plates 6 secured thereto by angle braces 7. By means of the screws 8 working in slots 9 of the brackets, the side plates may be moved towards or away from one another and adjusted to accommodate various widths of wrapper sheets.

The stack of sheets is supported on spaced bars 10 extending longitudinally of the magazine which is carried by transverse rods 11 fixed to the side frames. These bars are arranged to form a grid so that the stack of sheets is supported at various points to provide open spaces therebetween in which the sheet removing means may operate on the undermost sheet of the stack, while means for preventing the removal of more than the lowermost sheet of the stack comprise a needle pick 12, of usual form, carried in a holder 13 adjustably secured to a bar 14 carried by the frames 1.

Means for removing the lowermost sheet from the stack will now be described. Wipers or sheet engaging members W, that may be called strippers, are provided that are detachably secured to a transverse bar 15

and are arranged therealong so as to work on the lowermost sheet of the stack at points between the grid or supporting bars 10. Each of the strippers preferably includes a corrugated facing member, such as 16, that may be of yieldable material, such as rubber, and adapted to frictionally engage the surface of the bottom-most sheet of the stack as the wipers are moved thereagainst for a sheet removing operation.

The bar 15 is provided with rollers 17 at opposite ends thereof that are movable along supports in the form of channel tracks 18. A bar 19, similar to the bar 15 and parallel thereto, also has rollers 20 in supporting channel tracks 18 and is rigidly tied to the bar 15 by means of a rod 21 fixed in brackets 22 which are secured to the underside of both the bars 15 and 19. The bars 15 and 19 having rollers 17 and 20 form a rigid, movable structure which may be termed a carriage and is adapted to roll back and forth in the channel tracks, the movement of which is accomplished by means of the following.

A shaft 25, rotatable in the side frames, is driven by means of gears 26 from a main shaft 27 and is also geared to a jack shaft 28 by means of elliptical gears 29, which shaft 28 carries a crank 30 that is connected to the bracket 22 of the carriage by a connecting rod or link 31.

The mechanism just described will roll the carriage, and consequently the strippers, back and forth and preferably with an accelerated speed at a certain time by means of the elliptical gears for the purpose later to be described, while at the same time the supports or channel tracks are raised and lowered by the following means. Supporting and operating levers 35, pivotally mounted on studs 36 of each of the side frames (see Fig. 3), have their upper ends pivotally connected to the channel tracks 18 for supporting and actuating the tracks, while other levers 37, fixed to an oscillating shaft 38, also have their upper ends similarly pivoted to the said channel tracks. The shaft 38 (see Fig. 1) is oscillated by means of a lever 39 fixed to the outer end thereof which is actuated by a cam follower 40 in operable engagement with a suitable cam such as 41.

The mechanisms just described for moving the strippers back and forth and for simultaneously raising them up and down are preferably so arranged and relatively timed that the path of movement thereof will be substantially as illustrated at an enlarged scale in Fig. 5 and may be easily accomplished or varied as desired by providing such lever, cam and gear arrangements as will combine to actuate the same in the desired manner. However, in the form of the invention at present preferred, the

parts are arranged so that the path of movement will correspond to the path illustrated.

For clearness, the path may be subdivided in the following manner: "a" to "b" in the direction of the arrow may represent that portion of the cycle of movement when the strippers are in contact with and acting on the lowermost sheet of the stack, while from "b" around to "a" may represent that portion when the strippers leave the sheet and return beneath the stack to again engage at "a" the next successive sheet for removal thereof.

According to an important feature of the invention, the speed of the wipers need not be uniform throughout the cycle of operation; that is, the mechanism may be arranged and adapted so that as the stripper arrives at point "a", the speed is somewhat slower than from "b" to "a" so that the impact of the stripper with the sheet will not cause a slipping of the stripper on the sheet. Also, according to another feature, as the sheet is delivered to receiving rolls subsequent to its removal from the stack, and also since the sheet will be engaged and under the influence of both the feed rolls and the wiper at the same time as from the point "a" to "b", the mechanism is arranged so that the stripper will travel at a lineal speed substantially corresponding to that of the feed rolls. With this arrangement, there will be no relative movement between the stripper and the sheet or between the rolls and the sheet while the sheet is under the influence of both. That is, the sheet may be engaged by and under the influence of the feed rolls as it is being removed from the stack by the stripper without disturbing its frictional engagement with either.

The feed rolls referred to are indicated by 50 and are fixed on shafts 51 and 52 rotatable in the side frames 1 and 1'. The shaft 51 is driven by means of sprockets 53 and 54 and chain 55 from the shaft 27 and is geared by means of the gears 56 to the shaft 52 for driving said shaft 52 in an accurate timed relation with respect thereto. The shaft 52 is preferably mounted in bearings 57 that are movable in slots 58 of the frames 1 and springs 59 acting on the bearings tend to urge the rolls of shaft 52 against those of shaft 51.

Other rolls 75 for frictional engagement with the rolls just described are provided and act in conjunction therewith to receive sheets therebetween that are delivered thereto by the strippers W. These rolls 75 are mounted in a frame structure which is adapted for easy removal from the apparatus to render the rolls 50, just described, readily accessible. The frame includes a central supporting bar 60 that may be dropped into slots 61 at the upper sides of

the frames 1, and horizontally swinging straps 62 arranged to overlie the said shafts are provided with thumb screws 63 for pressing and holding the shafts in the slots 5 of the frames. Bearing brackets 65, fixed to the shaft 60 adjacent the frames 1, carry non-rotatable but vertically movable shafts 66 and 67 which are preferably disposed directly above and parallel to the shafts 51 and 52. Springs 70, the tension of which is adjustable by means of screws 71, are carried in the brackets 65 and are arranged to bear on opposite ends of said shafts and tend to urge the rolls 75 against the rolls 50.

15 The feed rolls 75, rotatably carried by the shafts 66 and 67, are held from longitudinal movement therealong and are disposed so as to overlie and contact with the rolls 50 by set screws 77. Guides 78, in the form of thin strips, have their upper ends secured to the collars 76 and are shaped as best shown in Fig. 3 so as to be adapted to guide the sheets between the rolls 75 and 50 and between the engaging faces of rolls 50.

25 Other guides (not shown) and which may be of ordinary form well known in the art, may be provided and arranged to guide the sheets as they are delivered by the rolls 50 to other rolls 80 fixed on shafts 81 and 82 rotatably carried in brackets 83. The brackets 83 are adjustably carried by depending rods 84 fixed to the side frames 1. These rolls 80 may or may not be necessary according to the use for which the apparatus 35 may be employed, but when desired or necessary may be driven in the following manner. A sprocket 85 of the shaft 51 is connected by a chain 86 to a sprocket 87 of the shaft 81 while a chain tightener in the form of a flanged idler or wheel 87 rotatably carried 40 on a swinging lever 88 is acted upon by a spring 89 fixed to the post 3 and functions to maintain the chain taut in the desired manner.

45 In operation, a stack of wrappers may be placed upon the grid bars of one of the magazines and a stack of similar sheets of the same or a different size may be similarly placed in the other of the magazines. The needle pricks 12 are adjusted so as to impinge several of the lowermost sheets of the stacks to thereby prevent the removal of more than the lowermost sheet.

55 Depending upon the relative timing of the separate stripping or sheet removing mechanisms, the lowermost sheet will be engaged by the strippers which arrive in contact with the sheet at a somewhat retarded speed. As the strippers move forwardly, 60 the lowermost sheet is removed from the stack and its forward end is received between the upper and lower rollers 75 and 50, which rolls assist the strippers in feeding the sheet forwardly so that its forward 65 edge is directed downwardly by the guides

78 and between the rolls 50. It will be observed that a sheet may be delivered to the rolls from either or both of the stacks and that the rolls 50 will receive and feed the same from the apparatus. As previously 70 pointed out, the strippers are arranged and adapted so that when the sheet is under the influence of both the feed rolls and strippers, the said strippers are actuated at a speed corresponding to that of the peripheral speed of the rolls so that there will be 75 no relative movement of the strippers and sheet when in contact. Also this arrangement insures that the sheets are well under the influence of the feed rolls before being released by the strippers. When the strippers 80 leave the sheet, the motion thereof is appreciably accelerated so that they are quickly returned again to their sheet engaging position. 85

From the foregoing, it will be observed that I have provided an apparatus having a sheet removing means for delivering a sheet into a delivering means that is so arranged that, when the sheet is being acted 90 upon by both, their speed (at least during that period) is the same, whereby there is no tendency for the sheet to move relative to either of said means.

Having described the invention in the 95 form at present preferred, what I now claim and desire to secure by Letters Patent is:

1. In a sheet delivery device, the combination of a support for a stack of sheets with means for delivering sheets therefrom comprising, feed rolls and a stripper for engaging a sheet of said stack and delivering it to said feed rolls, means for operating said rolls and said stripper at a corresponding 100 certain speed during a portion of their cycle of operation and adapted to operate said stripper at a retarded speed as it engages said sheet and to accelerate the movement thereof up to said certain speed thereafter. 105

2. In a sheet delivery device, the combination of a support for a stack of sheets with means for delivering sheets therefrom comprising, rolls for receiving and delivering sheets, a stripper for feeding sheets from said stack to said delivery rolls, means for 110 operating said rolls at a constant speed, means for operating said stripper at a variable speed arranged to move said stripper at an accelerated speed so that during the latter part of its feeding movement its speed 115 will correspond to that of the rolls. 120

3. In a sheet delivery device, the combination of a support for a stack of sheets with means for delivering sheets therefrom comprising, rolls for receiving and delivering 125 sheets, a stripper for feeding an endmost sheet from said stack to said rolls arranged to engage a sheet during a portion of a cycle of operation, means for operating said rolls at a certain speed, means for operating said 130

stripper at a speed less than said certain speed as it engages said sheet which is accelerated to a speed corresponding to said certain speed as a sheet is engaged by both the rolls and stripper.

4. In a sheet delivery device, the combination of a support for a stack of sheets with means for delivering sheets therefrom comprising, a stripper for removing an endmost sheet of said stack, rolls for receiving said removed sheet, means for driving said rolls at a certain speed, means for operating said stripper so that it accelerates from a retarded sheet engaging speed at the beginning of its removing movement up to correspond to that of the certain speed of the rolls.

5. In a sheet delivery device, the combination with a support for a stack of sheets of means for removing successive sheets therefrom comprising, rolls to receive a sheet, a stripper movable along a support in a plane parallel to the endmost sheet of the stack, the said support movable to bring the stripper into and out of engagement with said endmost sheet, means to actuate the stripper, means to actuate the support adapted and arranged so that the speed of the stripper is equal to that of the rolls while the sheet is being acted upon by both said rolls and stripper.

6. In a sheet delivery device, the combination with a support for a stack of sheets of means for removing successive sheets therefrom comprising, rolls to receive a sheet, a support movable towards and away from said stack, a member movable along said support, a stripper carried by said member, means to actuate the support and to actuate the said member arranged so that said stripper will be moved into contact with the endmost sheet of said stack and transfer it to the rolls, the said actuating means being arranged so that the stripper is moved at a speed corresponding to that of the rolls while the sheet is engaged by said rolls and stripper.

7. In a sheet delivery device, the combination with a support for a stack of sheets of means for removing successive sheets therefrom comprising, supports located at opposite sides of said stack, a frame reciprocable along said supports, strippers carried by said frame, means for moving the support towards and away from said stack and means for moving the frame along said supports adapted and arranged whereby the stripper is moved into contact with the endmost sheet of said stack to effect a removal thereto.

8. In a sheet delivery device, the combination with a support for a stack of sheets of means for removing successive sheets therefrom comprising, supports adjacent said stack, a frame reciprocable along said supports, strippers carried by said frame, means for moving the supports towards and away

from said stack and means for moving the frame along said supports adapted and arranged whereby the stripper is moved into contact with the endmost sheet of said stack to effect a removal thereto, feed rolls to receive said sheet while it is under the influence of said stripper, the said actuating means being arranged to move the stripper at a speed corresponding to that of the rolls while the sheet is engaged by both rolls and stripper.

9. A sheet delivery device comprising in combination, supports for a stack of sheets, rolls carried in said supports for receiving a sheet therebetween, a frame for detachably mounting on said supports having rolls for engaging with said first named rolls.

10. A sheet delivery device comprising in combination, supports for a stack of sheets having guideways for receiving a frame, driven rolls mounted between said supports, a frame for insertion in said guideways having rotatable rolls for engaging with the first named rolls.

11. A sheet delivery device comprising in combination, supports having guideways, driven rolls mounted between said supports, a frame having portions for fitting in said guideways and including independently movable shafts each carrying rolls for engaging with the rolls of the supports.

12. A sheet delivery device comprising in combination, supports having guideways, shafts extending between said supports having rolls fixed thereon, a frame having a central shaft for fitting in said guideways, brackets fixed on said shaft, shafts extending between said brackets that are vertically movable therein and rolls rotatable on said shafts, all adapted and arranged so that as the central shaft of the frame is inserted in the guideways, the rolls of the frame are in engagement with the first named rolls.

13. A sheet delivery device comprising in combination, supports having guideways, shafts extending between said supports having rolls thereon, a frame having portions for fitting in said guideways, members yieldingly carried in said frame supporting rolls for yieldingly and frictionally engaging the first named rolls.

14. In a sheet delivery device, the combination of a support for a stack of sheets with means for delivering sheets therefrom comprising, a stripper for engaging and removing an endmost sheet of a stack, rolls for receiving a removed sheet, means for operating said rolls, means for operating said stripper so that its speed accelerates from a slow sheet engaging speed to a relatively faster speed as a sheet propelled thereby is engaged by the rolls.

In testimony whereof I have affixed my signature.

ELMER L. SMITH.