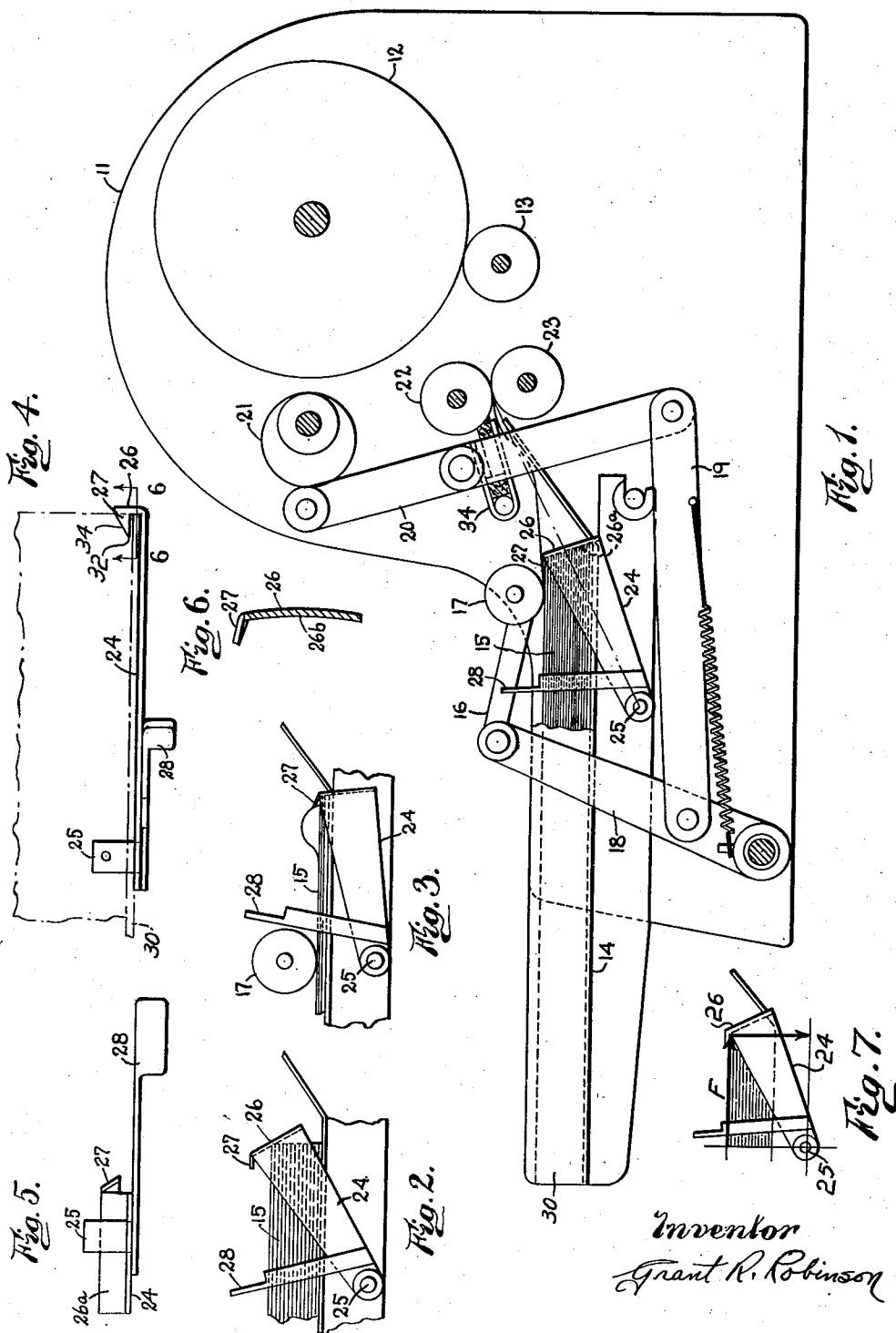


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SHEET SEPARATING DEVICE

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SHEET SEPARATING DEVICE

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1

This invention relates to sheet feeding devices and more particularly to instrumentalities for causing a single sheet to be separated from the stack in preparation for being operated upon by other mechanism or instrumentalities.

In the art, it is recognized that the separating of a single sheet from a stack of sheets presents a problem due to the characteristics inherent in the sheets themselves such as, for example, thickness and surface finishes. Also, the conveniently termed "static condition" that is occasioned or developed between sheets in a stack formation and has a tendency to cause the sheets to adhere to one another and further complicates the separation of a single sheet.

It is further known in the art that many complicated mechanisms have been devised to effect the separating of a sheet from a stack so that the sheet may be singly advanced to be further operated upon. Many such devices employ suction elements adapted to be engaged with the face of the outermost sheet of the stack and, through means of suction, singly separate this sheet for advancement.

Mechanical structures have been utilized for the purpose of separating an outermost sheet from a stack so that the sheet may be singly advanced. Generally stated, the presently known mechanical separating devices require a complicated structure embodying various adjustments to permit of its use in connection with the range of conditions and problems presented. Such mechanical structures have also included a stop which engages with the forward or advance end of the stack. Stops of this character have heretofore been provided with a spring pressed flange portion which overlies and engages a margin of the uppermost sheet of the stack under pressure and, as the stack is decreased, the flange follows the lowering of the stack plane.

Other such devices employ a single stop disposed at right angles to the face plane of the stack and adapted to engage with a portion of the forward end and face plane of the stack. Stops of this character are dependent on gravity to cause the stop to adjust itself as the height of the stack decreases. This presents a problem as the pressure of the stack end against the stop may be in varying degrees and sufficient to prevent the proper adjustment of the stop by itself.

Accordingly, one of the primary objects of the present invention is to provide a sheet separating device of a simple construction and so

2

arranged that the pressure of the advance stack end aids in the proper functioning of the device.

Another object of the invention is to provide a sheet separating device that is so constructed and arranged that as the uppermost sheet is advanced from the stack it will facilitate separation of the sheet from the stack and effect urging of the sheet separating device in its proper functioning direction.

A further object of the invention is to provide an automatically adjusting means that is simple in construction with a minimum of working parts that may be readily assembled and easy and convenient to operate.

The foregoing objects are intended as a general explanation and are not to be construed as limiting the invention thereto as other objects and advantages will become apparent from the following detailed description.

The accompanying drawing illustrates a preferred form of the invention associated with a duplicating machine sufficient to enable those skilled in the art to understand the construction and operation thereof.

Referring to the drawing:

Fig. 1 is a sectional elevation of a portion of a duplicating machine and sheet feeding device having the present invention embodied therewith.

Fig. 2 is a side elevation of the sheet separating device and a stack of sheets being positioned for feeding to other advancing or operating instrumentalities.

Fig. 3 is a view corresponding substantially to Fig. 2 but shows the parts in a different position.

Fig. 4 is a plan view of the stack abutment stop and sheet separating device.

Fig. 5 is an end elevation of the device as shown in Fig. 4, and

Fig. 6 is a section taken substantially along line 6—6, Fig. 4, but shows a modified form of face for the abutment of the sheet stack advance end.

Fig. 7 is a fragmentary view illustrating a feature of the invention.

While not limited thereto a practical embodiment of the present invention is combined with a so-called "fluid process" duplicating machine having opposed side frames 11, only one of which is shown, that rotatably supports a master carrying or printing drum 12 and a coacting pressure roll 13. The machine is provided with a support 14 adapted to receive and support a stack of sheets 15. Sheets are to be singly fed from the stack by a suitable sheet engaging de-

3

vice which, in the present illustration, includes a carriage 16 carrying sheet engaging elements 17 which are reciprocated above the stack 15 by means of a rockable lever 18 connected by means of a link 19 to one end of an actuating lever 20. The opposed end of the actuating lever 20 engages with a cam 21 that is rotated in a timed relation to the drum 12 by suitable driving connections, not shown.

When a sheet is advanced from the stack 15 its forward end is engaged by a pair of rolls 22, 23, which are also operated in a timed relation to the drum 12, and advanced to engage in the bite, formed by the drum 12 and its coacting pressure roll, to be further operated upon as the drum 12 is rotated.

As the sheet is advanced by the rolls 22, 23 the upper face of the sheet is moistened by means of moisture that is first applied to the face of the roll 22 by a suitable fluid applicator 24.

As is well known in the art, a pack or stack of sheets is generally removed from their container or handled in a uniform block formation which presents many problems in feeding sheets singly from the block. Some of these problems may be stated as being directly or indirectly occasioned by varying characteristics inherent in the sheets themselves such as, for example, thickness and surface finishes. Also, the "static condition" impedes the simple and convenient separation of a single sheet from the stack. A further problem is presented in the fact that, as sheets are removed from the stack, the height of the stack is continuously diminished.

I have found that various difficulties in separating a sheet singly from a stack requires consideration of the position and form of the stack, its relation to the point to which the sheets are to be delivered, and a pivot point around which a desirable sheet separating device is arranged to move.

The foregoing factors have been successfully determined in the mechanism now to be described. An arm 24 is pivoted at 25 to a stationary portion of the machine frame below the stack support 14. The front end of this arm is provided with a transversely or laterally extending narrow stop 26 that, when the arm 24 is in a normal operative position as shown in Fig. 1, is disposed at an angle to the plane of the stack support 14 and constitutes a stop for the advanced edge of the stack of sheets 15. The inner stack-engaging face 26a of the stop 26 is provided at its upper edge with a V-shaped projection or lip 27 that is preferably disposed at an angle somewhat greater than a right angle to the stop face 26a, and this lip 27 is located over a forward corner area of the stack 15. As illustrated in Fig. 6, the lip 27 is disposed at an angle of about 115° to the inner face of the stop member 26.

In operation the arm 24 may be rocked upwardly to an inoperative position by a finger tab 28 projecting upwardly therefrom and a stack 15 of sheets placed on the stack support 14. The stack may then be feathered against the stop face 26a and the stop accurately positioned with its projecting lip 27 in engagement with the uppermost sheet of the stack. In Figs. 1 and 2 the stop face 26a is shown as straight but inclined although theoretically, to permit the arm 24 properly to rock about its pivot 25, the stop face should be arcuate in form as indicated at 26b as in Fig. 6. However, it has been found that

4

a straight face 26a will function in a satisfactory manner.

A stack-engaging wall 30 extends upwardly from one side of the stack support 14 and the arm 24 slides in engagement with the outer face of this wall. As illustrated in Fig. 4, the stop 26 extends laterally about the front end of the wall 30 and is provided with the rearwardly extending lip 27 at its upper marginal edge. One edge of the lip 27 extends rearwardly along and adjacent to the wall 30 to a sharp point 32 as indicated in Fig. 4, and the other edge 34 of the lip extends obliquely forwardly and outwardly from the wall 30.

The stack 15 of sheets is aligned with one side against the wall 30 and with its forward edge in engagement with the stop 26. The latter is held in suspended position by the lip 27 resting on the top of the stack. As the carriage 16 moves forwardly, the elements 17 force the top sheet forwardly against the stop whereupon the sheet buckles as shown in Fig. 3. The angle of the lip 27 is such that upon buckling the edge of the sheet comes in contact with the oblique marginal edge 34 of the lip 27 and rides along that edge until it is disengaged from the stop and lip whereupon its advancing edge passes over the stop and is directed to the bite of the feed rolls 22 and 23. The buckling separates the top sheet from the stack, and when the sheet is thus separated the air entrapped beneath it aids to break vacuum attachment between the sheets and to free the top sheet for forward movement.

As the height of the stack 15 of sheets is decreased the arm 24 rocks downwardly, its stop face being always gauged as to level and maintained at the proper height for the stack by the engagement of the lip 27 with the uppermost sheet of the stack. It is pointed out that forward pressure of the stack of sheets, and of the top sheet, against the stop 26 not only does not obstruct downward movement of the pivoted arm 24 but aids gravity by urging such downward movement and so maintains the stop in position with its lip 27 in contact with the top of the stack. Since the pivot 25 is disposed below the support 14, forward pressure of the stack against the stop 26 exerts both forward and downward pressure on the pivoted arm 24 of the stop as indicated by the lines F in Fig. 7.

From the foregoing illustrations and descriptions it is apparent that many modifications and adaptations may be effected with the present disclosure by those skilled in the art without departing from the spirit and scope of the invention; therefore I do not wish to be limited to the specific details and arrangement of parts herein disclosed.

What I claim is:

1. In a sheet feeding device, the combination of a substantially horizontal support for a stack of sheets, means for feeding the top sheet forwardly from the stack and support, a movable member having a narrow upright stack-engaging stop at one corner of the support located forwardly of one side thereof and pivoted for vertical movement about a horizontal axis disposed rearwardly of the stop and below the support, and a rearwardly extending lip on the upper portion of the stop in position to rest on the top sheet of a stack engaged against the stop.

2. The combination defined in claim 1 in which said stack-engaging stop slopes rearwardly from the bottom to the top thereof.

3. The combination defined in claim 2 in

5

which the angle between the stop and lip approximates 115°.

4. In a sheet feeding device, the combination of a substantially horizontal support for a stack of sheets, means for feeding the top sheet forwardly from the stack and support, a wall extending upwardly from one side of the support, an arm at the outer face of the wall having a forward end portion extending laterally about the front end of and for a limited distance from the wall to a position providing at a corner of the support a stop forwardly of the said one side thereof for engaging a stack of sheets in contact with the wall, a rearwardly extending lip on the upper portion of the stop in position to rest on the adjacent forward corner of the top sheet of the stack, and means pivoting the arm for vertical movement about a horizontal axis disposed rearwardly of the stop and below the support.

5. The combination defined in claim 4 in which said lip has one edge extending rearward-

6

ly along and substantially parallel with the wall to a point adjacent to the inner face of the wall and another edge extending obliquely from said point forwardly and away from the wall to the stop.

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