

[54] **SHEET FEED APPARATUS**

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 [58] Field of Search.....**271/62, 39, 61, 30, 28, 24, 271/22**

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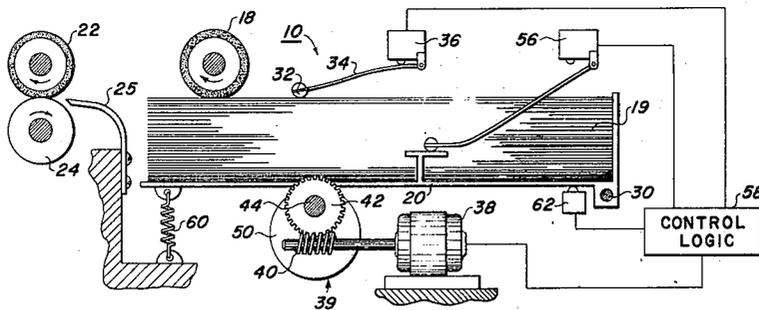
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[57] **ABSTRACT**

Sheet feed apparatus comprising a frame, a tray for supporting a stack of sheets adapted to be fed along a predetermined path, the tray mounted for pivotable movement on an axis a direction away from the direction in which feed is to be affected, a cam member operatively engageable with the lower portion of the tray to continually pivot the tray in an upward direction on the high rise portion of the cam and then return the tray to its original position upon a rotation of the cam to the low rise portion, drive means for operatively rotating the cam member in intermittent fashion upon receipt of discrete electrical signals, and control means associated with the stack for actuating the drive means when the top of the stack falls below a predetermined plane until the sheets have been fed.

1 Claim, 1 Drawing Figure



SHEET FEED APPARATUS

This invention relates to improvements in sheet feeding devices and particularly to an improved stack advancing mechanism.

It is commonly known to feed sheets from the top of a stack which normally requires an elevator to raise the stack to a constant level or alternatively a feeder which adjusts to different stack heights. This type of arrangement has placed undue restraints on some machine configurations as are used, for example, in the copying field.

It is an object of the present invention to improve sheet feed apparatus.

It is another object of the present invention to maintain the level of a stack of sheets to be fed in a manner more simple than heretofore.

It is still another object of the present invention to enable the feeding of a stack of sheets without complicated elevating mechanisms or associated equipment.

It is still another object of the present invention to feed sheet material without elevating feed rolls in the sheet material path.

The foregoing objects as well as others will become more apparent with the following description which is to be read in conjunction with the FIGURE showing the apparatus of the present invention.

The sheet feeding mechanism 10 of the invention includes a nudger roll 18 adapted to feed the top sheet of a stack 19 of sheets on a tray 20 to feed rollers 22 and 24. As the sheets are fed into the rollers 22 and 24, one or more guide members 25 serve to guide the sheets into the nip of the rollers as well as ensure proper alignment of the leading edge of the stack of sheets. In feeding sheets from the stack one at a time, as the topmost sheet is advanced forward, the movement of the topmost sheet will tend to advance the second sheet also. In order to ensure separation of the topmost sheet from the stack, roller 24 functions as a rejector roll through a slip clutch operating off the drive of the gearing from the positively driven roll 22.

In accordance with the present invention as sheets are fed from the top of the stack, the tray 20 is elevated by pivoting on an axis 30 by means of a control mechanism as will now be described. Situated on the top of the stack in contact with the topmost sheet is a paper level sensing mechanism comprising a wheel 32 secured to an arm 34 which is pivotally mounted to a switch 36. As the sheets are fed, wheel 32 through gravity will try to follow the level of the sheets and such action will cause switch 36 to be energized and provide a signal to a control motor 38 through a control logic 58. Motor 38 provides the drive input to an elevating mechanism 39 which will now be described. The elevating mechanism 39 comprises a worm 40 which meshes with a worm wheel 42 which, in turn, drives a shaft 44 received by the wheel which shaft is mounted for rotation on suitable bearings. Mounted on the shaft 44 is an elevating cam member 50 which is eccentric in shape and

serves to urge the lower surface of the tray member 20 upwardly under control of the sheet level sensing switch 36 thereby causing tray member 20 to pivot about the axis 30. Upon tray member 20 reaching its uppermost position, a switch 56 similar to switch 36 is actuated which is coupled to motor 38 through control logic 58. Control logic 58 serves to energize the motor until tray member 20 is returned to its original position through the action of a spring 60. At this time, a limit switch 62 is actuated to signal control logic 58 to deenergize motor 38.

It will now be appreciated that as the sheets from the stack are fed, the tray member continues to maintain the topmost sheet into contact with the feed rolls 18 due to the action of the level sensing control and elevating mechanism just described. In this manner, the level of the stack is maintained at a predetermined height which enables separation and advancement of a single sheet from the stack without the requirement of elevating feed rolls and the like.

It will be appreciated that the tray mechanism of the present invention is a unique way for feeding a stack of sheets. It does not require complicated drives or sensing mechanisms which are not only costly but tend to complicate and restrict the design of sheet feed apparatus. It will be further appreciated that the device of the invention can be used in many applications and is especially useful in the copying art where sheet feed mechanisms which are simple and reliable are in great demand.

What is claimed is:

- 1. An improved sheet feed apparatus comprising a frame, a tray for supporting a stack of sheets adapted to be fed along a predetermined path, said tray being mounted for pivotable movement on an axis in an upward direction, a cam member operatively engageable with the lower portion of said tray to pivot said tray in an upward direction during operation on a high rise portion of said cam and then return said tray to its original position upon actuation of said cam to a low rise portion thereof, drive means including a motor connected to a worm member driving a worm wheel operatively rotating said cam member in response to discrete electrical signals, control means associated with said stack including first circuit means operative in response to the level of said stack for energizing said motor in intermittent fashion for actuating said drive means when the top of said stack falls below a predetermined plane until said sheets have been fed from said tray and second circuit means operative when said tray reaches its uppermost position for continuously energizing said motor to return said tray to its starting position, and a spring member connected to said frame and the bottom of said tray to facilitate the return of said tray to its starting position.

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