ARRANGEMENT FOR GENERATING CONTROL PULSES FOR THE ADJUSTMENT OF THE LEVEL OF A FEED BOARD PARTICULARLY FOR PRINTING MACHINES

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References Cited
UNITED STATES PATENTS

ABSTRACT

The level of a stack of paper sheets on a feed board, from which individual sheets are transferred in the course of printing to the printing cylinders is maintained at a proper height using a feeler determining the actual level of the stack. The feeler is provided with an extension, which actuates a switch fixed on a vertically slidable supporting board itself provided with regulating means for adjusting the height of said supporting board with respect to the supporting body. The thus generated control pulses actuate electromagnetic means or an electric motor, raising the feed board to the proper level.

4 Claims, 2 Drawing Figures
Fig. 2.
ARRANGEMENT FOR GENERATING CONTROL PULSES FOR THE ADJUSTMENT OF THE LEVEL OF A FEED BOARD PARTICULARLY FOR PRINTING MACHINES

BACKGROUND OF THE INVENTION

This invention relates to arrangement for generating control pulses for the adjustment of the level of a feed or pile board, particularly for printing machines with pneumatic feeding means.

During the course of printing the upper level of the stack of paper sheets is maintained by means of sundry regulating devices at a certain height with respect to the feeding means according to the kind and quality of the paper. The pneumatic feeding means withdrawing paper sheets from the stack are provided with different devices regulating the height of the feed board.

There are known regulating devices which use the separating lugs of the feeding devices as feelers. Some known devices are provided with a contact on the stable part of the feeding device and with a contact on the feeler. The adjustment is accomplished by changing the position of one of these contacts causing thus an earlier or later closing of an associated electric circuit. The electric motor or electromagnet controlling the mechanical raising of the feed board is thus supplied with a starting or control impulse.

These arrangements have the drawback that the adjustment can be accomplished only when the whole arrangement is at rest. Another drawback is the high susceptibility for its electric contacts to burn when the machine is run slowly.

Other known arrangements use adjustable switches mounted on slides, moving alternately upwards and downwards. A feeler arranged between the switches contacts the stack of paper sheets. This arrangement cannot function well at high speeds due to its complicated design and the large number of supporting and auxiliary elements required for the switches, feelers, and the adjustment means.

With other known arrangements the feeler the course of the working stroke is caused to shift a control bolt, into engagement with a bearing which can be displaced from its rest position and which controls an electric switch. The adjustment of the height is accomplished by adjustment of the clearance between the control bolt and between a regulating screw, arranged on the bearing.

A drawback of this latter arrangement is its complicated design and its need for a large space, whereby the regulating screw moves in accordance with the working stroke of the whole arrangement. Adjustment in the course of operation is difficult. Other known arrangements have a guiding lever of the feeler elongated so that it forms a two arm lever, one end of which is adapted to provide an impulse by means of a contact with a pivotably supported switch. Regulation is accomplished by deviating the switch, the contact of which is located opposite to the direction of movement of the feeler.

A drawback of even these arrangements is that the switch is mounted pivotably so that the position of the contact changes in the course of regulation and the contact is placed opposite to the direction of movement of the feeler, so that it must be secured against damaging in the course of movement of the feeler.

towards its lower turning point, or the movement of the feeler must be limited. This construction does not allow for the provision of control means for adjustment directly on the arrangement or at an accessible place so that the adjustment has to be performed by means of a Bowden cable or by means of a flexible shaft from a place distance from the feeding device.

SUMMARY OF THE INVENTION

It is an object of this invention to provide means for the adjustment of the upper level of the stack of paper sheets at a predetermined height with respect to the feeding device and with respect to the kind and quality of the supplied paper.

Another object is to eliminate slowly operating electric switches and to prevent thus burning of electric contacts.

A further object of this invention is to locate all control elements at a place easily accessible for attendance.

A still further object is to eliminate elements limiting the movement of the feeler at its upper and lower extreme position.

Another object of the invention is to provide a design, where the position of the switch contact element connected with the feeler remains stable.

A still further object is to provide a simple arrangement requiring minimum space.

In accordance with this invention an electric switch is provided on a substantially vertical supporting board, which is supported to be vertically slidably on the machine supporting body. The switch is operated by an extension of a feeler means determining the level of the stack of paper sheets. The height of the supporting board is controlled by cam means on a horizontal shaft to be secured in any adjusted position.

DESCRIPTION OF THE DRAWINGS

An embodiment of this invention is shown in the accompanying drawings, where

FIG. 1 is a sectional view along the plane $A-A$ indicated in FIG. 2 and

FIG. 2 a front view in direction "P", partly in section as indicated in FIG. 1.

DESCRIPTION OF PREFERRED EMBODIMENT

The arrangement comprises an electric switch 1 fixed to a supporting board 2. The supporting board is mounted slidably on two bolts 3 supporting the body 4 of the machine distribution box. Housed within the body is a rotatably supported regulator shaft 5.

The arrangement further comprises a sensing device 7 mounted by means of bolts 21 and links 23, 24 on bolts 25, 26 fixed on the body 14. The sensing device 7 is connected by means of the bolt 21 with a pull rod 9 connected by way of a bolt 32 with a supporting lever 31, with is actuated by not shown cam means. The cam is adapted to perform oscillating movement taking along the pull rod 9, which transmits the movement to the sensing device 7. Details of the drive of the sensing device 7 can be arranged according to the US patent application No. 754,041, now U.S. Pat. No. 3,558,126.

Air is supplied to the sensing device 7 by means of a flexible hose 27 from a stud nipple 28 fixed on the body 14. The sensing device 7 performs an arcuate movement indicated in FIG. 2 by the broken line 30.
The movement of the sensing device 7 is coordinated with the movement of the suction cups 29 which vertically moves and transfers the paper sheets 19 from the stack 20 to the printing cylinders. The supporting board 2 holding the electric switch 1 is itself mounted to be vertically slideable on two bolts 3. An elliptic recess 12 is provided in the supporting board 2, into which recess 12 there is inserted an engaging eccentric collar 11 fixed on the regulating device 4. The device 4 is rotatable on the body 14 of the distribution box and extends beyond the front face of the distribution box. A number of spherical recesses 13 are provided on the circumference of an extension of the regulating shaft device 4 and a ball 6, guided in a bore of the body 14 and pressed by a spring 5 against the circumference of said extension engages resiliently into one of said recesses 13. The regulating device 4 extends beyond the front face of the distribution box symmetrically with other regulating or adjusting devices 16, 17 and 18. The regulating device 16 serves for adjustment of vacuum of the suction cups 29; the regulating device 17 serves for adjustment of pressure in the sensing device 7 and the regulating device 18 serves for adjustment of pressure in a not shown blowing device. A roller 8 is mounted to be rotatable on the pull rod 9 of the sensing device 7 and is adapted to engage with an extending strip 10 of resilient material which is actuated to close the switch 1 by being pressed down.

The described arrangement operates as follows:

If individual paper sheets 19 are taken from the stack 20, the lug of feeler of the foot part of the sensing device 7 drops lower and lower at each working stroke. Simultaneously the roller 8 on the pull rod 9 is equally lowered until it presses the resilient extension 10 and causes it to close the contacts of the switch 1. Closing of switch 1 in turn actuates an electromagnet or electric motor, which raises the feed board for a certain height, generally for the thickness of 6 to 8 sheets of customary size paper. Upon raising of the board, the contacts of the electric switch 1 are thus again disconnected and the cycle is repeated in the course of successive printing. The predetermined adjustment of the level of the stack 20 of paper sheets is accomplished by adjustment of the height of the electric switch 1. The higher the switch 1 is adjusted, the higher the level of the paper stack 20 is maintained and vice versa. The adjustment of the height of the electric switch 1 is achieved by turning the regulating shaft device 4, the eccentric collar 11 of which engages in the elliptic recess 13 of the supporting board 2 which is thereby shifted vertically along the bolts 3. The spring loaded ball 6 secures the adjusted position of the regulating device 4.

I claim:

1. An arrangement for generating control pulses for the adjustment of the level of a feed board, particularly for printing machines, where paper sheets contained in a stack are vertically removed and individually transferred for further processing, said arrangement comprising a supporting body, an electric switch fixed on a substantially vertical supporting board, means for adjustably supporting said supporting board slidably in a vertical direction on said supporting body, feeler means mounted on said supporting board for determining the level of the stack of paper sheets and movable vertically in response to the removal of sheets therefrom, an extension fixed on said feeler means adapted to cooperatively engage said switch on vertical movement of said feeler means, regulating means for adjusting the height of said supporting board with respect to said supporting body to determine the distance between said extension and said switch, said regulating means comprising a horizontal control shaft with cam means and means for securing said shaft in any predetermined position whereby said switch may be operated in response to the removal of a predetermined number of sheets from said feed board.

2. An arrangement as set forth in claim 1 comprising a roller fixed on said feeler means cooperating with an extension controlling the position of switch contacts.

3. An arrangement as set forth in claim 1 wherein said supporting board is provided with an elliptical aperture and said regulating means comprises a shaft extending through said aperture, a cam fixed to said shaft and adapted to cooperate with said aperture to move said board on rotation of said shaft, said shaft being provided with resilient recess and detent means arranged about its circumference to incrementally define the rotation of said shaft.

4. The arrangement according to claim 3 including means for adjustably limiting the vertical movement of said feeler means.