April 10, 1945. H. BOBST 2,373,222

SHEET DETECTOR

Filed Sept. 17, 1941

Fig. 1.

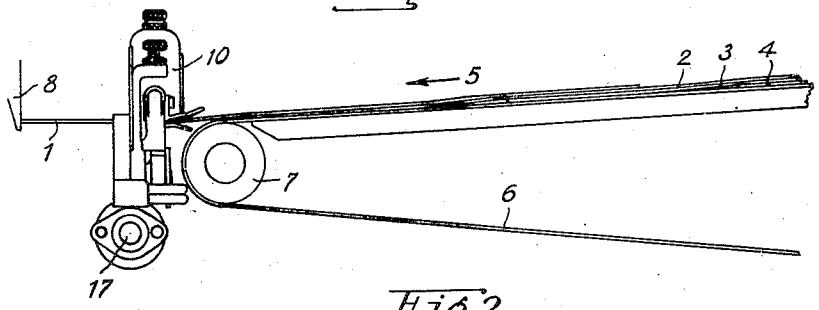


Fig. 2.

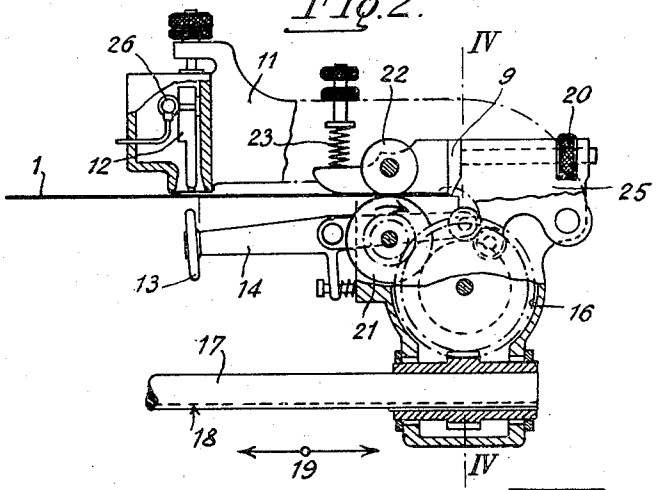


Fig. 4.

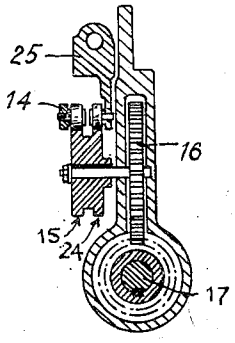
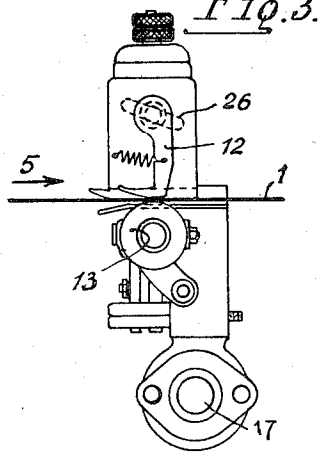


Fig. 3.



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SHEET DETECTOR

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In Switzerland October 10, 1940

4 Claims. (Cl. 271—57)

It is known to dispose in automatically working machines for feeding blanks, controllers to ensure for example electro-magnetically the feeding of blanks one at a time, said mechanisms stopping the feeder as soon as two superimposed blanks are fed together.

In automatic stackers the overlapping blanks do not permit an exact gauging so that the presence of a supplementary sheet cannot be revealed positively.

The known gauging mechanisms further are not precise or involve heavy or encumbering devices. In the usual blank feeders, the gauge is commonly disposed in the passageway of the blanks, near the middle part of it and just after they have left the pile, in order to be able to control as well blanks of a large size as blanks of a small size. Due to the fact that a part of the mechanism must be placed under the sheets and another part over the sheets, the slight flexure of the bearings serves to make a precise measure impossible. In order to avoid these inconveniences, the measures are made each time when the machine does not vibrate or by means of jaw-shaped gauges of a large size, permitting the passage of large blanks.

According to the present process, the gauging takes place near the edge of the stacked blanks and near the front registering marks, each time when a single thickness of cardboard passes where the gauging operation is made.

The drawing shows an embodiment of an apparatus for executing said process.

Fig. 1 is a side view showing the extremity of stacked blanks and the apparatus.

Fig. 2 shows said apparatus on a larger scale, part in cross-section, the blanks being intended to travel in a direction front to back perpendicular to the plane of the drawing.

Fig. 3 is a front view of the apparatus on the same scale as in Fig. 2.

Fig. 4 is a cross-section along the line IV—IV of Fig. 2.

In Fig. 1, the stacked blanks 1, 2, 3 and 4 come from the right in direction of arrow 5. They are conveyed by bands 6 passing over pulleys 7.

As the blanks are stacked, the front edge of blank 1 is free and reaches alone the front registering marks 8 at proximity of which there is therefore only one thickness of cardboard. This matter of fact is only momentary, it lasts practically during the time when the considered sheet is registered partly against the marks 8 in the direction of feeding and partly against the lateral abutment 9, to be seen at Fig. 2, in the transverse direction. Immediately after that, the sheet is seized by the parts of a machine, not to be seen here, in which said sheet is worked. While the latter enters into the machine, the sheet 2 that follows it goes forward as well, and there are soon two sheets superimposed at the place where sheet number 1 only showed a single thickness before.

It is at that place and at the exact moment when possible to measure a single thickness that an apparatus of control designated by 10 in Fig. 1 will be able to measure with all the precision needed and this much more due to the fact that the apparatus is movable in the transverse direction, and it will always be driven to the edge of the sheet and will avoid the necessity of having a deep jaw-shaped device, cause of inaccuracy. As the details of Fig. 2 show, the apparatus 10 is made of a frame 11, supporting a case whose height is skillfully regulated and comes above the passage of sheets. Said case contains a freely hanging lever 12, under which and in relation to which a small roller 13 is raised and lowered, being able to draw near at such a distance that between the roller and the lever's base remains only a space hardly greater than to a sheet's thickness. Fig. 2 shows the small roller out of action, i. e. distant from the lever base, and Fig. 3 shows it working, i. e. in the position of measuring. These two positions are obtained by rocking of lever 14, operated by a cam 15, to be seen in the cross-section of Fig. 4. Said cam is driven by a toothed-wheel 16, from a driving shaft 17, placed transverse to feeding direction and having a key-way 18 making it possible to remove the whole apparatus 10 in the two directions indicated by the arrows 19, with regards to the wideness of sheets that must be controlled.

This removing is even more important because of the fact that the apparatus of control supports the lateral abutment 9, in a position skillfully regulated with a screw 20. To register the sheets laterally, the apparatus has besides that two friction pulleys 21, 22 of which the pulley 21, driven in the direction shown by an arrow, comes under the sheet to be controlled, while the pulley 22, Fig. 2, shown in working position, comes above, but can be lifted to allow the passage of sheets. In working position of pulley 22 the pulleys 21, 22 tend to pull sheets by side against the lateral abutment 9. The raising of pulley 22 against the action of a regulable spring 23 is made with the aid of a second cam 24, to be seen

at Fig. 4, and working on lever 25 bearing said pulley.

The lever 12 supports a mercury-switch 26 intended to close a stopping circuit of the stacker as soon as said lever moves when more than one sheet at a time passes through.

This is now how the described mechanism operates to work the claimed process:

When the stacked sheets move and the top sheet for example the one lying on the sheet 1 was just introduced in the machine not shown and placed on the left, close to the stacker, the cam 15 raises the roller 13. This operation must take place exactly between the moment when the said sheet has been taken away and when the next sheet has not yet reached the marks 8, but gets near, because in case of error, it is necessary that a movement could be communicated to the lever 12 in order to rock the said lever and stop the stacker as soon as the measured thickness exceeds that of a single sheet.

As soon as the measured sheet reaches the marks 8 and stops there or just before its stop, the roller 13 lowers in resting position and the pulley 22 in working position that provokes the lateral sliding of the sheet against the abutment 9. Then the sheet is entirely registered.

These operations begin again on the passage of each sheet and as long as everything works normally.

On the contrary, if two sheets cross simultaneously the control's apparatus 10, it is quite evident that the overthickness given will provoke the rocking of lever 12, serving to rock the mercury-switch 26 which has the duty to stop immediately the function of the stacker.

Given that it merely involves always a short movement while the controlled sheet is at stillstand in said position, it is possible then to check it with an appropriate gauge. On the other hand, it is also possible to control the sheets by means of a rocking lever placed across the feeding direction and effecting the control operation when sheets are registered laterally.

What I claim is:

1. In a machine having a trip device, a sheet detector for ensuring the delivery or feeding of but one sheet at a time from a supply of sheets being fed from a conveyor, including a driving shaft disposed on said machine in a transverse direction with respect to the feeding direction of the sheets for imparting power to said detector, a detector frame mounted exclusively on said shaft and adjustable along the same according to the width of sheets being fed, a first detector member movably mounted upon said frame with a detecting portion below the position of a sheet to be measured, a second detector member pivotally mounted on said frame above the sheet to be measured and in alignment with said first detecting member, shifting means actuated by said shaft upon said detector frame for moving the first detecting member up into active detecting position close to the second detecting member in front of the first sheet from the conveyor at the moment when said sheet alone is disposed between the two detecting members, and means operated by one of said detecting members for causing actuation of said trip device upon encounter of said one detecting member with more than a single sheet at said position.

2. A sheet detector according to claim 1, in which the second detecting member includes a swingable pivoted lever and the first detecting member includes a pivoted arm carrying upon its extremity a roller for making contact with the under surface of a sheet, and wherein the shifting means includes a driven cam upon said frame serving periodically to lift said arm and roller into active position.

3. A sheet detector according to claim 1, in which the second detecting member includes a swingable pivoted lever, an electric switch member operated by the second detecting member for actuating said trip device, and the first detecting member includes a pivoted arm carrying upon its extremity a roller for making contact with the under surface of a sheet, and wherein the shifting means includes a driven cam upon said frame serving periodically to lift said arm and roller into active position.

4. A detector according to claim 1, in which the second detecting member includes a pivoted pendent lever swingable in the feeding direction, said lever being adapted upon swinging of same past normal pendent position by a greater sheet thickness than that of one sheet to actuate said trip device.

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