Jan. 7, 1958 A. W. NOON 2,819,075

SHEET-SEPARATING DEVICE

Filed Dec. 20, 1954

Fig. 1

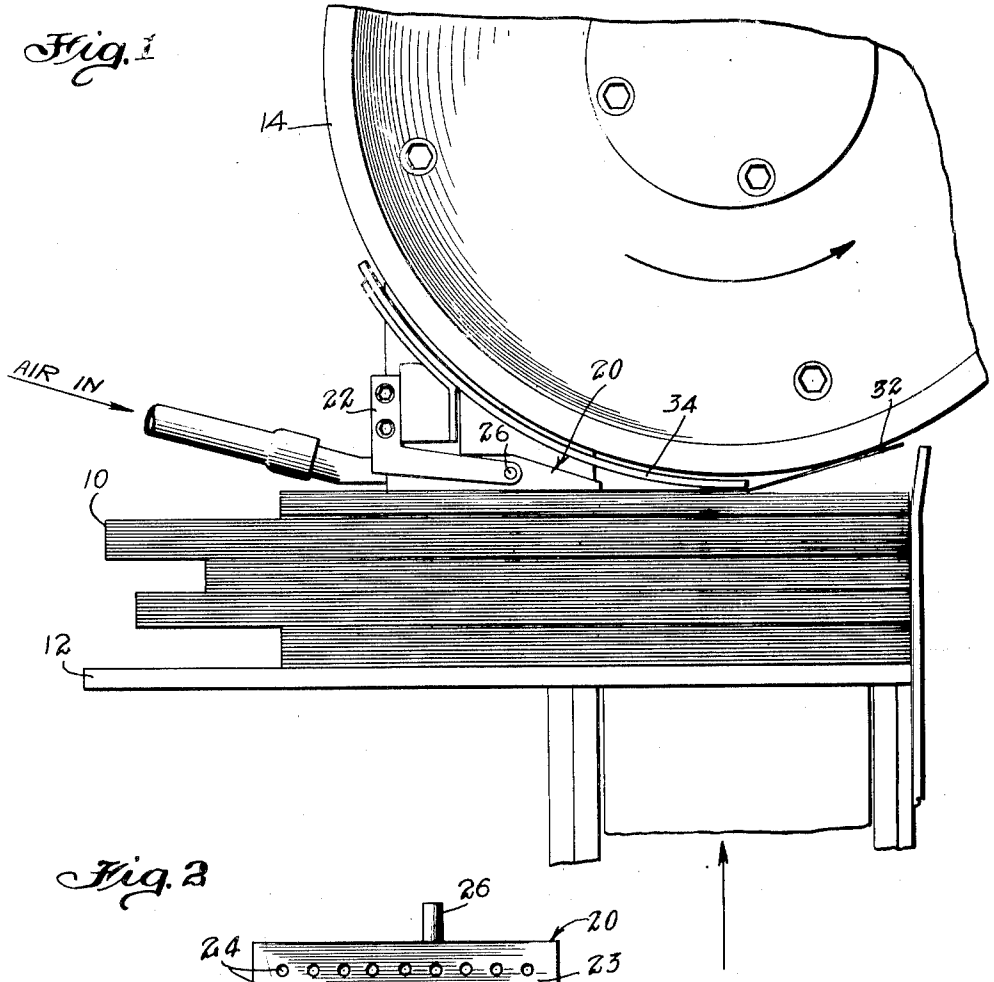


Fig. 2

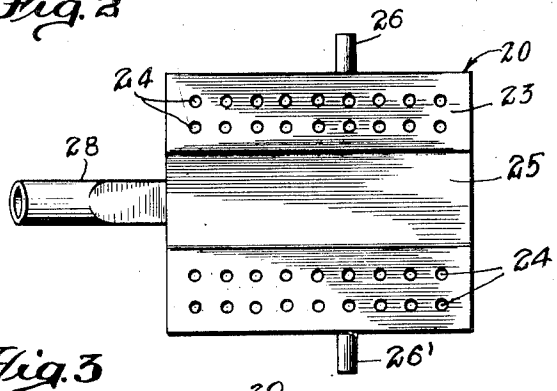
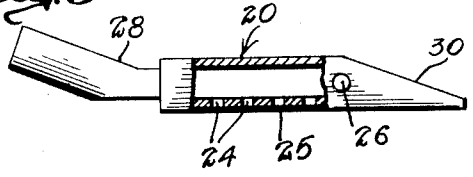


Fig. 3



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SHEET-SEPARATING DEVICE

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5 Claims. (Cl. 271—26)

This invention relates to systems for handling sheets of material such as paper and the like, and, more particularly, is an improvement in apparatus to enable the ready separation of the top sheet from a stack of sheets.

Devices are known, in the printing art, for example, which automatically prepare the top sheet of a stack of sheets for removal by the printing-press machine by blowing air at the edges of the stack and thus lifting the top sheet. This has not proved too satisfactory, since oftentimes more than one sheet may thus be blown and removed, or the sheets may be bent by the air pressure.

It is an object of the present invention to provide improved apparatus for separating the top sheet of paper from a pile so that it can be readily picked up by subsequent apparatus.

A further object of the present invention is to provide improved apparatus for separating the top sheet from a stack of sheets without picking up more than a single sheet.

Still another object of the present invention is to provide improved apparatus which separates a top sheet from a stack of sheets without marring or bending it.

Yet a further object of the present invention is to provide a novel, useful, simple, and improved apparatus for automatically raising or separating the top sheet from a stack of sheets.

These and further objects of the invention are achieved by employing a device in the form of a hollow body. One face of said body is flat and has a plurality of perforations. Air under pressure is directed into the hollow body and is emitted through said perforations. A stack of sheets to be separated are urged against the perforated flat portion of the body. The air is blown into the body and penetrates through the layers of the uppermost sheet. Air also forms a thin layer between the bottom facing of the body and the upper sheet. The upper sheet thus floats between the next sheet in the stack and the body. Thus, it can be readily removed from the stack without disturbing the other sheets. As soon as it is removed, the next sheet is urged upwardly and is separated in the same manner.

The novel features that are considered characteristic of this invention are set forth with particularity in the appended claims. The invention itself, both as to its organization and method of operation, as well as additional objects and advantages thereof, will best be understood from the following description when read in connection with the accompanying drawings, in which:

Figure 1 is a view of the embodiment of the invention in position on a stack of sheets;

Figure 2 is a bottom view of the embodiment of the invention; and

Figure 3 is a side view partially in section of the embodiment of the invention.

Referring now to Figure 1, a stack of sheets **10** of varying sizes are shown on a platform **12**, which is urged upwardly by means not shown. By way of example,

a portion of a separating drum may be used to remove the sheets singly. Such a drum is described and claimed in an application by this inventor, Serial Number 390,897, filed November 9, 1953, for an Automatic Separating System, now Patent No. 2,791,424. This drum **14** has perforations in its periphery to which suction is applied. Accordingly, when a sheet is attracted to the drum by means of a low-pressure area created in a slot (not shown) in the drum, the sheet is grasped by the suction, held against the drum periphery, and is carried by the drum to another position. Other mechanism which is well known, such as suction cups or other devices, may be employed for removing the top sheet of a stack to a subsequent position for processing.

The embodiment of the invention shown in Figure 1 consists of a hollow body **20**, which is supported in position by means of a bracket **22**. As shown in Figures 2 and 3, the embodiment of the invention has a flat face **23** containing a plurality of perforations **24**. This flat face is substantially rectangular in shape, although this need not necessarily be the case. This face may be entirely flat with perforations scattered thereover and a satisfactory operation may be achieved. However, the device operates in its best mode when a transverse portion of the flat face **25** is recessed or grooved. In this instance, the apertures in the face are on either side of the groove. The hole pattern may be altered as desired. On either side of the body, rods **26, 26'** extend. These are inserted into holes in the support bracket **22**, so that the body may be supported pivotally. At one side of the body is a nozzle **28**. Air under pressure may be directed into the body through this nozzle and is emitted through the openings in the flat face. The over-all shape of the body, for convenience, is somewhat boxlike, with the side **30** opposite the side to which the nozzle is attached being sloped toward the flat face to enable mechanical clearance of the drum.

The perforated face is positioned on the top sheet of the stack of sheets nearer one end. The air pressure applied is not critical but should be sufficient to provide an air flow through the perforations **24** sufficient to maintain a thin layer of air between the perforated face and the uppermost sheet. The air which is emitted downward from the perforations in the flat face spreads over the top surface of the top sheet, and, since it is emitted downward, some of it penetrates the sheet material which is pervious to air under pressure. This has the effect of separating the top sheet from the sheet next to it, so that top sheet **32** is actually floated on air and the distant end can be readily attracted to the separating drum **14** by the forces of suction, and the top sheet is separated from the stack without any difficulty or without disturbing any of the other sheets. The upward force on the platform **12** immediately moves the stack so that the next sheet is separated effectively and is in position to be withdrawn. A guardrail **34** is provided to insure that only one end of the top sheet is drawn to the drum. In an embodiment of the invention which was built and operated, the air pressure used was approximately between five and ten pounds a square inch, and the upward pressure applied onto the stack of sheets was on the same order. Sheets were separated at a very high rate of speed without any difficulties being experienced.

By reason of the mounting, the body swivels to adapt itself to any irregularities in the pile of sheets. The top sheet and those underneath it are not folded, riffled, or bent in any fashion, the sheets being held in position by the upward and downward pressures and maintained with the same degree of flatness with which they are placed in the stack. Of course, the paper or other material forming a stack should be pervious to a degree, to

permit a downward air pressure to penetrate them and separate them from one another.

Accordingly, there has been shown and described hereinabove a novel, useful, and simple device for separating the top sheet of a stack in order that it may be readily removed therefrom.

I claim:

1. A device for separating the top sheet from a stack of sheets of material pervious to air comprising a substantially flat surface having a plurality of perforations dispersed within an area of said flat surface which is less than the area of a top sheet, means to position said substantially flat surface on said top sheet, and means to apply air under sufficient positive pressure through the apertures in said flat surface against said top sheet to force air through said top sheet thereby separating it from the stack.

2. A device for separating the top sheet from a stack of sheets of material pervious to air comprising a hollow body having at least one substantially flat side, a plurality of perforations in said substantially flat side dispersed within an area of said flat surface which is less than the area of a top sheet, means to support said body with its substantially flat side over said top sheet, means to urge said stack of sheets toward said hollow body, and means to apply air under sufficient positive pressure into said hollow body to force air through said top sheet thereby separating it from the stack.

3. A device for separating the top sheet from a stack of sheets of material pervious to air comprising a hollow body having at least one flat surface, a groove extending across said flat surface, a plurality of perforations in said flat surface dispersed within an area of said flat surface which is less than the area of a top sheet, means to support said hollow body with its flat surface proximate to the surface of the top sheet of said stack of sheets, means to urge said stack of sheets towards said hollow body,

and means to supply air under sufficient positive pressure into said hollow body to force said air through said perforations and over and through said top sheet thereby separating it from said stack.

4. A device for separating the top sheet from a stack of sheets of material pervious to air comprising a boxlike hollow body having a rectangular flat side, a groove extending across said flat side, a plurality of perforations in said flat side on either side of said groove dispersed within an area of said flat surface which is less than the area of a top sheet, means to introduce air under positive pressure into one of the adjacent sides of said body, and means to support said body to be pivotably adjustable about an axis parallel to said flat side.

5. In a system for feeding single sheets of paper and the like into a processing apparatus means for separating the top sheet from a stack of sheets to be fed comprising a boxlike hollow body having a flat side, a groove extending across said flat side, a plurality of spaced perforations in said flat side on either side of said groove dispersed within an area of said flat surface which is less than the area of a top sheet, means to introduce air under positive pressure into one of the other sides of said body, means to support said body to be pivotably adjustable about an axis parallel to said flat side, and platform means for pressing said stack of sheets against said flat surface whereby the top sheet is separated by an air layer from the stack.

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