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J. JURNÝ ET AL

3,284,079

DEVICE FOR FEEDING PAPER SHEETS IN PRINTING MACHINES

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2 Sheets-Sheet 1

Fig. 2

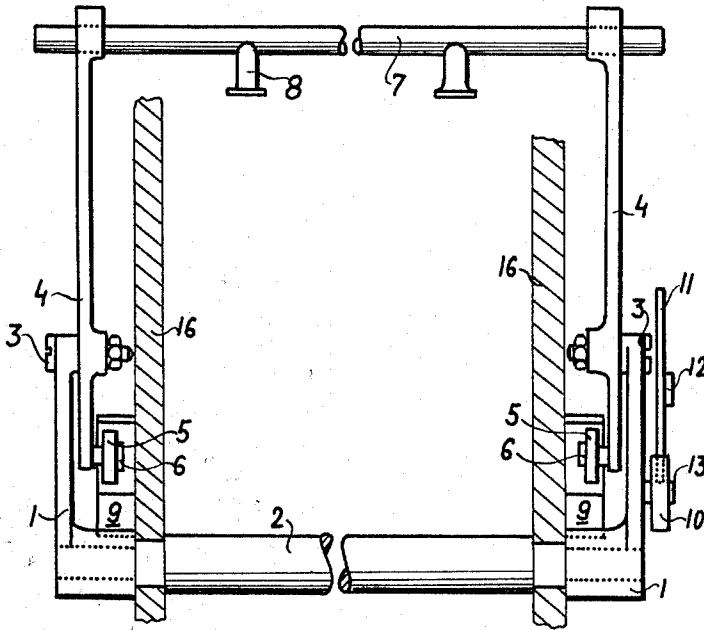
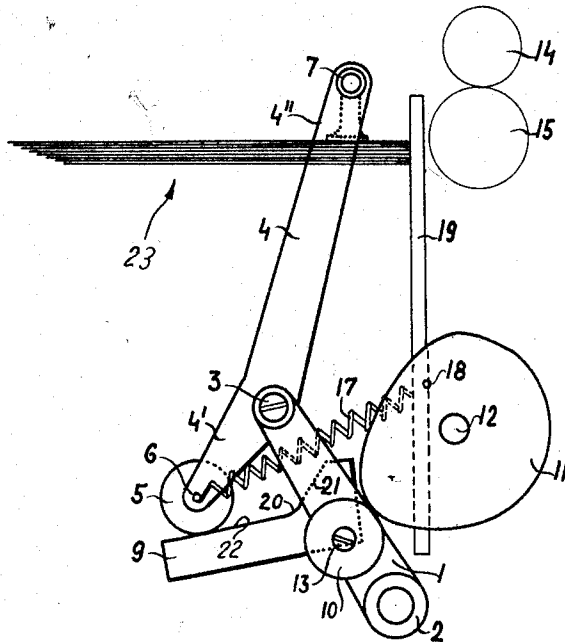


Fig. 1



INVENTORS

Josef Jurný, Karel Štěpánek

BY

Richard Clund
Att.

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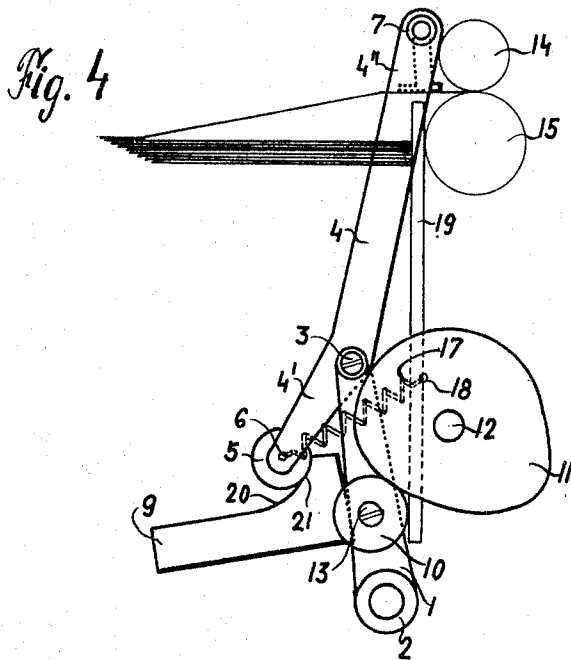
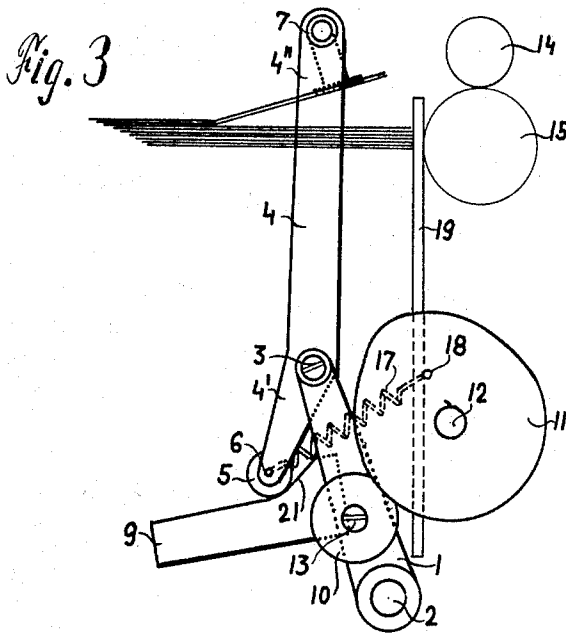
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DEVICE FOR FEEDING PAPER SHEETS IN PRINTING MACHINES

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INVENTORS
Josef Jurný, Karel Štěpánek
BY
Richard Lind
ag't

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DEVICE FOR FEEDING PAPER SHEETS IN PRINTING MACHINES

Josef Jurný, Sebranice u Kunstatu, and Karel Štěpánek, Drnovice u Boskovic, Czechoslovakia, assignors to Adamovske strojirny, narodni podnik, Adamov, Czechoslovakia

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4 Claims. (Cl. 271-27)

This invention relates to devices for pneumatically feeding individual paper sheets to printing machines.

Known devices for feeding individual paper sheets to printing machines employ complicated mechanisms for moving suction cups which carry each paper sheet into the machine. These mechanisms have such a great mass that their inertia interferes with quick movement of the suction cups and limits the capacity of the machine to 6,000 prints per hour.

The known simpler paper feed mechanisms do not reliably separate individual paper sheets taken from a pile or stack.

It is a general object of this invention to overcome the above mentioned drawbacks of known paper feeding devices.

The invention will be best understood from the following specification to be read in conjunction with the accompanying drawings which illustrate a preferred embodiment of the invention, and in which:

FIG. 1 shows working elements of a paper feeding device of the invention and associated elements of a printing machine in side elevation;

FIG. 2 shows the paper feeding device of FIG. 1 in front elevation; and

FIGS. 3 and 4 show the apparatus of FIG. 1 in different operating positions.

The paper feeding device of the invention has a fixed supporting frame of which a front wall 19 and two side walls 16 are partly indicated in the drawing. A horizontal shaft 2 is journaled in the side walls 2. Its two ends carry fixedly attached radial arms 1 in a common axial plane. The fulcrum portion of a two-armed lever 4 is pivoted to the free end of each arm 1 by a pin 3. The shorter arm 4' of each lever 4 carries a cam follower roller 5 on a shaft 6. The roller 5 is held in engagement with a cam 9 fixedly mounted on an associated side wall 16 by a helical tension spring 17 interposed between the shaft 6 and a pin 18 on the front wall 19. The face of the cam 9 has two straight portions 21, 22 inclined relative to each other at an obtuse angle and connected by an arcuate cam face portion 20. The longer arms 4'' of the levers 4 carry therebetween a suction tube 7 equipped with suction cups 8.

A radial cam 11 is mounted on a shaft 12 supported on the stationary machine frame in a manner not further illustrated, and driven to rotate continuously. A cam follower roller 10 rotatably mounted on one of the arms 1 by a pin 13 is held in engagement with the radial cam 11 by the pressure of the spring 17.

When the radial cam 11 is rotated by the shaft 12, the suction cups 8 lift individual sheets of paper from a stack 23, and feed them to the nip between rolls 14, 15 of a printing machine, not otherwise shown.

In the position of the apparatus illustrated in FIG. 1, the cam follower 10 is engaged by that portion of the radial cam 11 which is farthest from the axis of the shaft 12. The roller 5 is held against the lowermost face portion 22 of the fixed cam 9, and the suction cups 8 rest on the top sheet of the stack 23. As the cam 11 is rotated clockwise from the position of FIG. 1 into that of FIG. 3, the cam follower 10 travels over a portion of the cam 11 which is nearer the axis of the shaft 12, and the arm 1 is swung clockwise through an angle sufficient to permit movement of the roller 5 along the gently upwardly sloping cam face portion 22 to the arcuate cam face portion 20. The combined movements of the roller 5 along the cam 9 and the pin 3 with the arm 1 cause the suction cups 8 on the arm 4'' to be lifted straight upwardly from the stack 23, thereby separating the top sheet from the stack.

During continued rotation of the radial cam 11 from the position of FIG. 3 to that of FIG. 4, the cam follower 10 moves even closer to the axis of the shaft 12, and the arm 1 is swung farther in a clockwise direction. The roller 5 being prevented from following the mainly horizontal movement of the arm 1 by the steeper face portion 21 of the cam 9, the suction cups 8 on the longer arm 4'' of the lever 4 are swung in a substantially horizontal path from their position in FIG. 3 toward the rolls 14, 15 of the printing machine to deliver the engaged sheet to the machine.

The manner in which suction is applied to the cups 8 for drawing a sheet from the stack 23 and the manner of releasing the sheet from the cups 8 has not been illustrated since it is conventional. When the cam 11 completes its revolution, the feeding mechanism reverts to the position of FIG. 1. The entire feeding cycle takes only a fraction of a second.

The sheet feeding device of the invention is operated in a simple manner by the radial cam 11 alone which causes the suction tube 7 and the cups 8 mounted thereon to move in a continuous closed loop. The moving mass of the device is very small. It can therefore be operated at high speed, permitting a high output rate of the printing machine.

What we claim is:

1. A sheet feeding mechanism comprising, in combination:

- (a) a support;
- (b) a first cam member fixedly mounted on said support;
- (c) a second cam member mounted on said support for rotation about an axis;
- (d) an arm member having an end portion pivotally mounted on said support;
- (e) a lever member having two arms and a fulcrum portion intermediate said arms said fulcrum portion being pivotally mounted on said arm member;
- (f) first cam follower means on one arm of said lever member;
- (g) second cam follower means on said arm member;
- (h) yieldably resilient means holding said first cam follower means in engagement with said first cam member and holding said second cam follower means in engagement with said second cam member;
- (i) suction means on the other arm of said lever member for holding a sheet to be fed; and

3

(j) drive means for rotating said second cam member about said axis.

2. A mechanism as set forth in claim 1, further comprising pivot pin means engaging a portion of said arm member and said fulcrum portion of said lever member for pivotally mounting said lever member on said arm member, said second cam follower means being interposed between said end portion and said engaged portion of said arm member.

3. A mechanism as set forth in claim 2, wherein said second cam member is a radial cam.

4. A mechanism as set forth in claim 2, wherein said

4

fulcrum portion of said lever member is nearer said first cam follower means than said suction means.

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ROBERT B. REEVES, *Primary Examiner.*

STANLEY H. TOLLBERG, *Examiner.*