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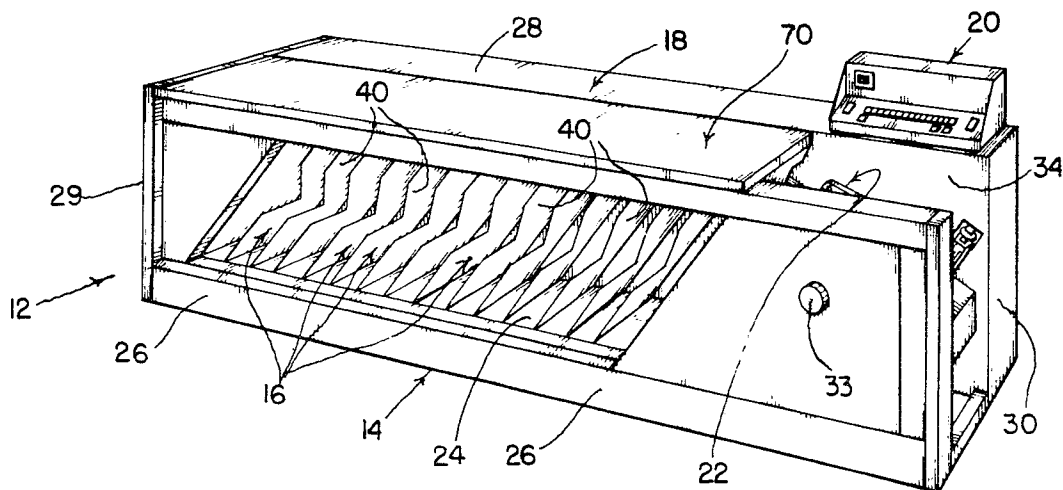
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A collating device.

Collator device 12 having a series of angled, upstanding pockets 16 each with its own individual feed head. Drive means are provided from which the feed heads can be individually ac-

tuated in order or sequence to feed a single sheet of paper out of each pocket 16 to a conveyor where the sheets are directed to a finishing station 22, assembled and stapled into a booklet.



Background of the Invention

The invention relates to collating machines and more particularly to a collating device in which the feed heads for the pockets may be individually
5 selectively controlled.

Those skilled in the art are aware that heretofore known collator devices have used feed heads for the pocket stations which are designed to simultaneously eject sheets from all stations.

10 There has arisen, however, the need for greater flexibility in collator machines in which the ejector mechanism can be individually controlled and timed so that any combination of one or all feed heads can be simultaneously or sequentially actuated in any
15 order desired.

Among the prior art references which are representative of the prior art but which do not anticipate the inventive features of the instant device are U. S. Patent Nos. 3,580,563; 3,773,313; 3,669,442; 3,536,318;
20 3,970,297; and 4,032,132.

Summary of the Invention

A collating machine having bins or pockets which are disposed generally upwardly and at an angle to the vertical such that a number of copies of a single
25 paper may be reposed in the bin. The paper copies are ejected from bins in any order desired including simultaneous ejection of copies from said bins. A

continuous chain drive mechanism is provided which
in turn rotates a shaft and sprocket. An eccentric
or cam mechanism is secured to the shaft and a
solenoid controlled clutch assembly is disposed
5 between the sprocket and eccentric so that the clutch
engage command can rotate the eccentric. The eccentric
in turn engages a feed lever for each of the ejector
feed heads. Electronic controls enable selective
actuation of the clutching mechanism such that a copy
10 from a given bin may be ejected at any time or in any
order with respect to ejector heads in the remainder
of the bins.

Accordingly, it is among the many features and
advantages of the invention to provide a collating
15 device in which the ejector mechanisms for each
pocket may be individually, selectively activated.
The ability to selectively, individually control each
ejector mechanism enables the operator to optimize
cycle time for the number of pockets, bins or stations
20 which are used. The collator device of this invention
is simple, reliable and relatively inexpensive.
Individual ejector mechanism actuation and control
enables the mass of the driving mechanism to be light
and therefore considerably more responsive. The
25 machine is quiet in operation, efficient and compact
in size. The machine is easy to operate and able to
handle a wide variety of paper weights and characteristics.

Brief Description of the Drawings

Figure 1 is a front view in perspective of the collator of this invention;

Figure 2 is a view of the back side of the invention showing the arrangement of the driving elements;

Figures 3 and 4 show the ejector mechanisms in an extended or eject mode and a retracted or ready mode;

Figure 5 is an end view in elevation showing additional features of the drive and ejector mechanism;

Figure 6 is a partial plan view showing additional features of construction of the drive and ejector features;

Figure 7 is a partial elevational view showing additional details of construction of the drive elements;

Figure 8 shows features of the conveyor mechanism at the top of the collator; and

Figure 9 shows additional details of the conveyor mechanism at the top of the bins or stations leading to the finishing station of the collator.

Description of Preferred Embodiment

The paper collating machine of the present invention, generally designated by the number 12, comprises an elongated housing 14 and including a series of pockets, bins or stations 16, a top area 18, a control panel 20, and a finishing station section 22 where assembled

booklets are jogged and aligned and stapled or sewn together. The finishing station as such is old in the collator art and the details thereof do not constitute a part of the instant invention.

5 Housing 14 includes a floor member 24 which serves as the bottom of the stations 16 to be described in greater detail hereinafter. The housing has a front side 26, top side 28, a finishing end 30 and a back side shown exposed with cover removed in Figure
10 2.

 It will be appreciated that the back side when the cover is removed will appear generally as depicted in Figure 2. Extending longitudinally from the back end to the finishing end 30 and located at predetermined
15 distance between the front and back sides is a bulkhead 34 which is generally disposed between the bottom 27 and top 28. Bulkhead 34 divides housing 14 into a collating and finishing section on one side thereof and a drive section on the other side thereof. The
20 collating side of the housing will be described first.

 The bins or stations 16 are comprised of a series of transversely disposed, inclined from the vertical, spaced apart and generally parallel, paper supporting bin shelves 40. Stacks of paper S are placed manually
25 within each of the bin stations 16 formed between shelves 40 to be fed upwardly and thus out of the bin and towards the finishing station area 22. Each bin 16 is provided with an ejector head assembly 44 as best seen in Figures 3-6.

The ejector head assembly is comprised of an elongated feed head arm 46 which has a lower end 48 and an upper end 50 again as best shown in Figures 3 and 4. Lower end 48 is pivotally connected to actuator shaft 52 which extends generally horizontally from the collating side of bulkhead 34 to the drive side of said bulkhead. At the upper end 50 of feed head arm 46 is a pivotal foot support frame 54 which supports a plurality of circular or round paper engaging feet 56. The foot support frame 54 has a tail section 58 which extends downwardly far enough so that, as can be seen in Figures 3 and 4, it extends below the upper end 50 of feed head control arm 46. The foot support frame 54 is pivotally mounted at the upper end of arm 46 such that as a paper copy C (Figure 4) is fed upwardly by the feed head from stack S and is engaged by the conveyor it will be pulled upwardly by the conveyor. The feed head will remain in the position shown in Figures 3 and 4. If for some reason the copy C is not properly engaged or hangs up, the tail 58 of the foot support frame 54 will be forced to pivot as arm 46 moves up and will contact arm 46 thus generating a misfeed signal to stop the machine.

At the upper end of each of the shelves 40 is a pinch roller 60 which is engaged by conveyor belt 62. It will be seen by reference to Figures 8 and 9 that feed rollers 60 are supported on shaft 64 extending between bulkhead 34 and an appropriate longitudinal frame member 66.

The feed rollers 60 are engaged by the conveyor belt 62 as can be seen in Figures 8 and 9. The continuous conveyor belt 62 is driven by drive roller 72 and extends around a series of idler rollers 74 which
5 can be seen to be coactively associated with feed rollers 60 at the upper end of each of the bin trays 40. Thus as paper sheets are fed upwardly out of the bins, they are engaged between belt 62 and rollers 60.

Rollers 74 can be seen to be supported on a series
10 of shafts 76 extending between appropriate frame members on the underside of hinged conveyor assembly 70. Figure 8 shows a partial view in phantom of the conveyor cover in its open position around a pivot 78 and hinge arm 80. In this way, access by the oper-
15 ator to paper jams or for repair of the conveyor is greatly simplified. Referring to Figure 6, it will be seen that a small motor 82 drives belts 84 and 86 and pulleys which are connected to conveyor drive roller 72 on the collating side of the machine as
20 well as a drive roller 84 (Figure 9) which in coaction with roller 86 receives sheets of paper moving into the finishing station channel 88 and directs them on into the finishing station 90. The knob 33 is a paper width adjustment means, and if required additional
25 adjustment means may be provided for paper length.

Shafts 52 extend from the lower end of the feed head assemblies through openings 100 in the bulkhead 34 to feed levers 102. Feed levers 102 have an upper end 104 which pivotally receives shaft 52 from the
30 feed head control arm 46.

In this instance, the feed lever 102 is a generally U-shaped member in the form of an upwardly facing open channel member which extends downwardly and at an angle (Figure 6) to a lower end 106 which is pivotally mounted on a shaft 108 extending between upstanding spaced apart frame members 110 and 112.

Beneath feed levers 102 and in space relationship to the pivot shafts 108 at the lower end of the feed levers 102 are a series of shafts 114 also supported by and extending between upstanding frame members 110 and 112. Next adjacent the inside of frame member 112 are sprockets 116 which engage or are engaged by drive chain 118. It will be noted that drive chain 118 engages the sprockets 116 driving or rotating them all in the same direction. The upper run of continuous chain 118 extends from an idler sprocket 120 (Figure 7) at one end of the housing to motor 122 at the other end of the housing for drive thereof.

At the other end of shafts 114 and close to upstanding member 110 are cams or eccentrics 124. Disposed between the sprockets 116 and the eccentrics 124 are clutch members generally designated by the number 26 with each having an actuating solenoid 124. The clutch mechanism includes a single step rotary ratchet member 130 which has a stop surface 132 engaged by solenoid arm 134.

The ratchet 130 with stop tooth 132 is engaged by solenoid pawl 134 to prevent rotation of the cam member

124. Upon actuation of solenoid 128, the pawl 134 is withdrawn from engagement with the ratchet and eccentric 124 is permitted to rotate a full revolution after which the soldnoid pawl 134 again engages the stop tooth 132 to disengage rotation of the eccentric. Thus, in Figure 7 it will be seen that one feed lever 102 is down because its clutching mechanism has not been actuated while the other is shown to be in the up position because the clutching mechanism has been actuated to turn eccentric 124. The action is shown again in Figures 3 and 4. With programmed controls in the machine, solenoids actuating the clutch assemblies 124, it will be appreciated that selective simultaneous or sequential control of the feed heads in the bins may be achieved.

It will be appreciated that an alternative rotary type of ejection means may also be employed. For instance, the shafts 114 and 52 could be coaxially aligned with a sprocket 116 rotating a single shaft extending to a pulley at the lower end of arm 46. An additional pulley may then be placed at the upper end of the arm 46 with a larger diameter rotary feed wheel means than feet 56 which would be driven by the pulley at the upper end of the arm. Appropriate belt means would interconnect the pulleys at the upper and lower ends for selective rotation of the feed wheel means. Quite clearly the clutch mechanism would remain but the feed levers 102 and eccentrics 124 would be dispensed with.

WHAT IS CLAIMED IS:

1. In a collating device having an elongated housing including a collating compartment and a drive compartment, said collating compartment including a plurality of paper copy storing bins with each bin having its own paper copy ejection means and said collating compartment further including conveyor means for receiving paper copies from said bins, the improvements, comprising:
 - a) first drive means in said drive compartment;
 - b) second driven means operatively connected to said first drive means;
 - c) third actuator means operatively interconnected to said second driven means and to said ejection means for actuating said ejection means to eject a paper copy to said conveyor means; and
 - d) selectively actuated fourth clutch means between said second driven means and said third actuator means for actuation of said third actuator means upon preselected command to said fourth clutch means.
2. The collating device according to Claim 1 and in which said first drive means is a continuous drive means.
3. The collating device according to Claim 2 and in which said second driven means is a sprocket means continuously driven by said first continuous drive means.

4. The collating device according to Claim 3 and in which said paper copy ejection means is a reciprocating generally linearly moving arm and head assembly.

5 5. The collating device according to Claim 4 and in which said third actuator means is comprised of an eccentric and a feed lever means which is connected to said arm and head assembly.

10 6. The collating device according to Claim 5 and in which said fourth clutch means is a solenoid operated ratchet and pawl mechanism which upon electrical command to said solenoid allows the eccentric of said third actuator means to rotate and thereby move said feed lever mean which in turns actuates
15 said arm and head assembly.

20 7. The collating device according to Claim 6 and in which said feed lever means is an elongated member pivotally mounted at one end for limited pivotal movement and which is located with respect to said eccentric so that upon rotation of the eccentric said feed lever means moves said arm and head assembly from a retracted position to an eject position and back to a retracted position.

25 8. The collating device according to Claim 2 and in which said first drive means is a continuously driven chain.

9. In a collating device having an elongated housing including a longitudinal bulkhead separating said housing into a collating compartment and a drive compartment, said collating compartment including a
5 plurality of upwardly angling spaced apart, generally parallel shelf means defining paper copy storing bins said bins being horizontally arranged and being open on one side for operator access thereto and for loading of paper copies into said bins, with each bin having
10 its own individually actuated paper copy ejection means and said collating compartment further including conveyor means above said storing bins for receiving paper copies from said bins and for directing said paper copies away from said bins, the improvements,
15 comprising:
a) first continuous drive means in said drive compartment;
b) second rotational driven means operatively connected to and driven by said first drive means,
20 c) third actuator means operatively interconnected between said second driven means and said ejection means for actuating said ejection means to eject a paper copy upwardly to said conveyor means, and
25 d) selectively acutated fourth clutch means between said second driven means and said third actuator means for actuation of said third actuator means upon preselected command.

10. The collating device according to Claim 9
and in which said first drive means is a continuous
drive chain.

5 11. The collating device according to Claim 10
and in which said second driven means is a rotatable
sprocket continuously driven by said drive chain.

12. The collating device according to Claim 11
and in which said paper copy ejection means is a
reciprocating generally linearly moving elongated arm
10 having a paper engaging head at the upper end thereof.

13. The collating device according to Claim 12
and in which said third actuator means is comprised of
an eccentric and a feed lever means which is oper-
atively connected to said elongated arm for limited
15 reciprocating movement of said arm and said head.

14. The collating device according to Claim 13
and in which said fourth clutch means is a solenoid
operated ratchet and pawl mechanism which upon elec-
trical command to said solenoid allows the eccentric
20 of said third actuator means to rotate and thereby
move said feed lever mean which in turns actuates said
arm and said head.

15. The collating device according to Claim 14
and in which said feed lever means is an elongated
member pivotally mounted at one end for limited pivotal
movement and which is connected at its other end to
5 said arm and which is located with respect to said
eccentric so that upon rotation of the eccentric said
feed lever means moves said arm and head assembly from
a retracted position to an eject position and back to
a retracted position.

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Fig. 1

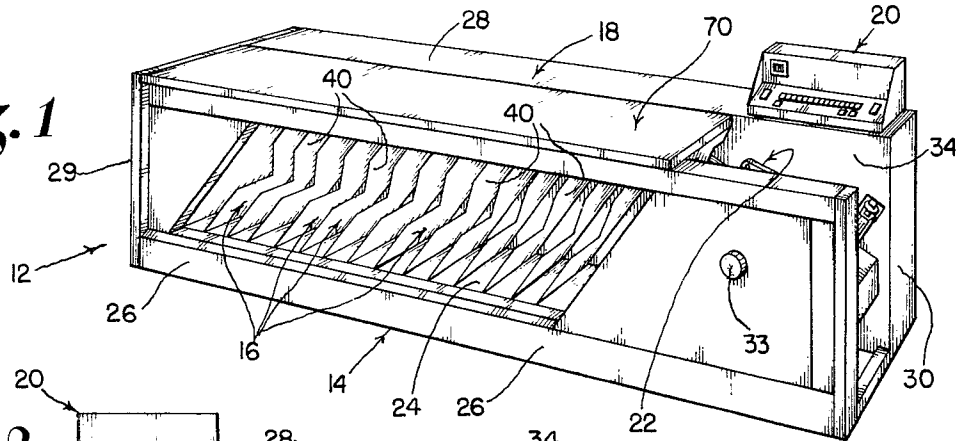


Fig. 2

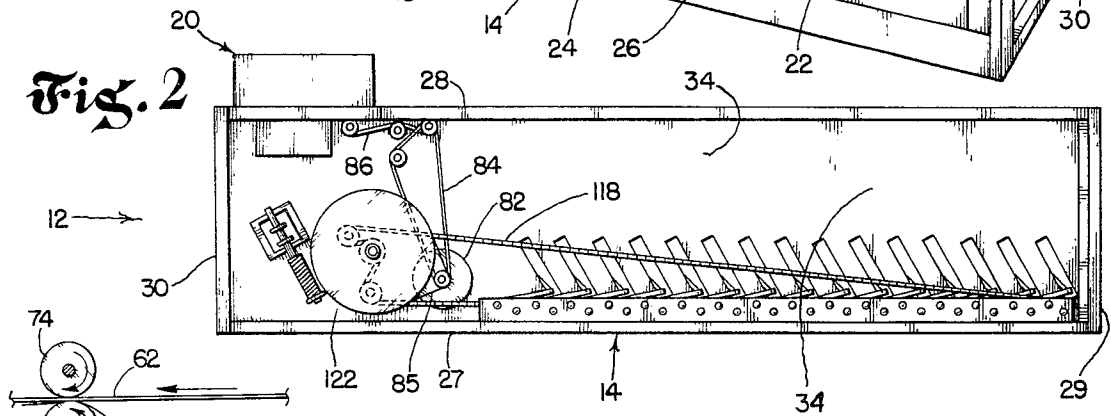


Fig. 4

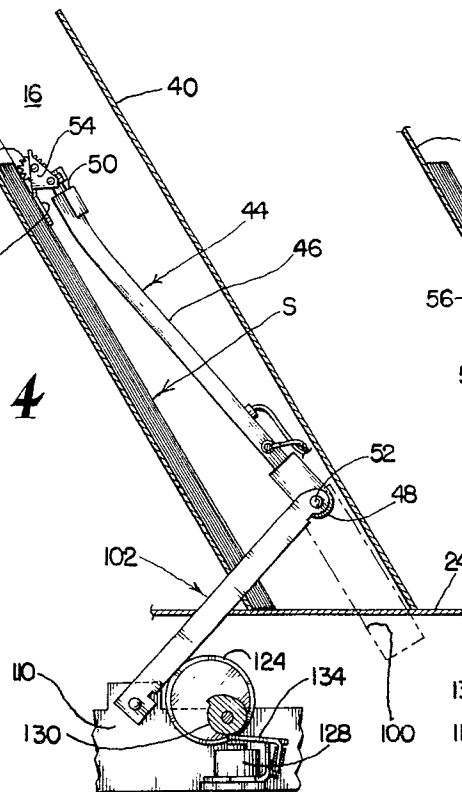
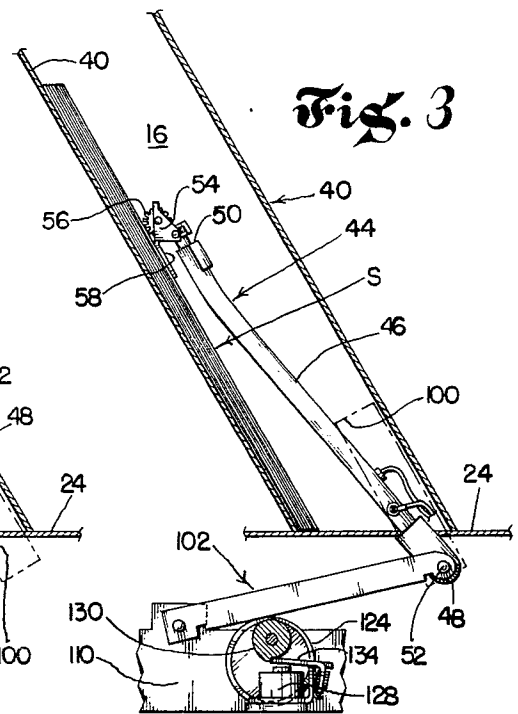
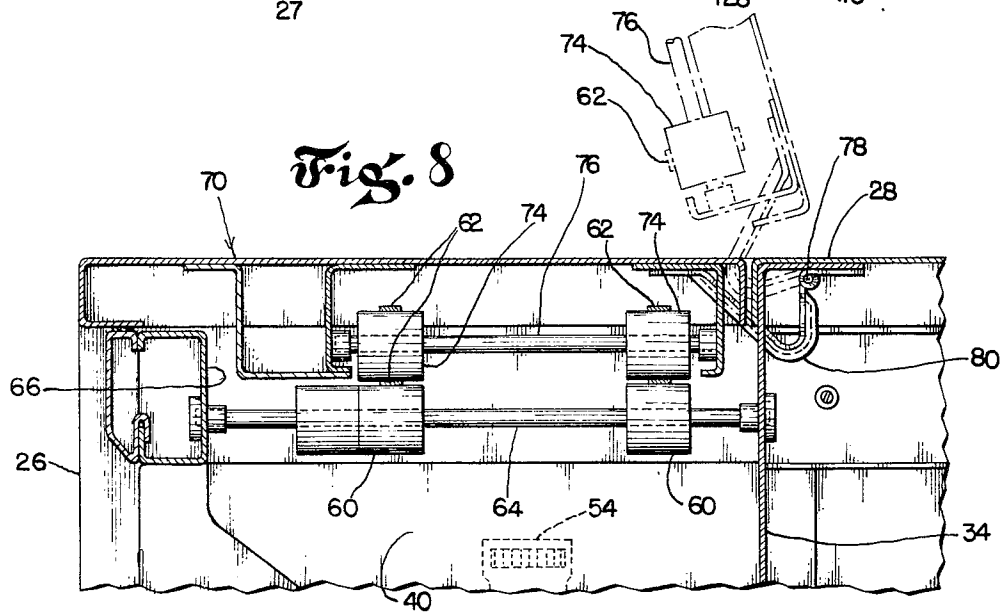
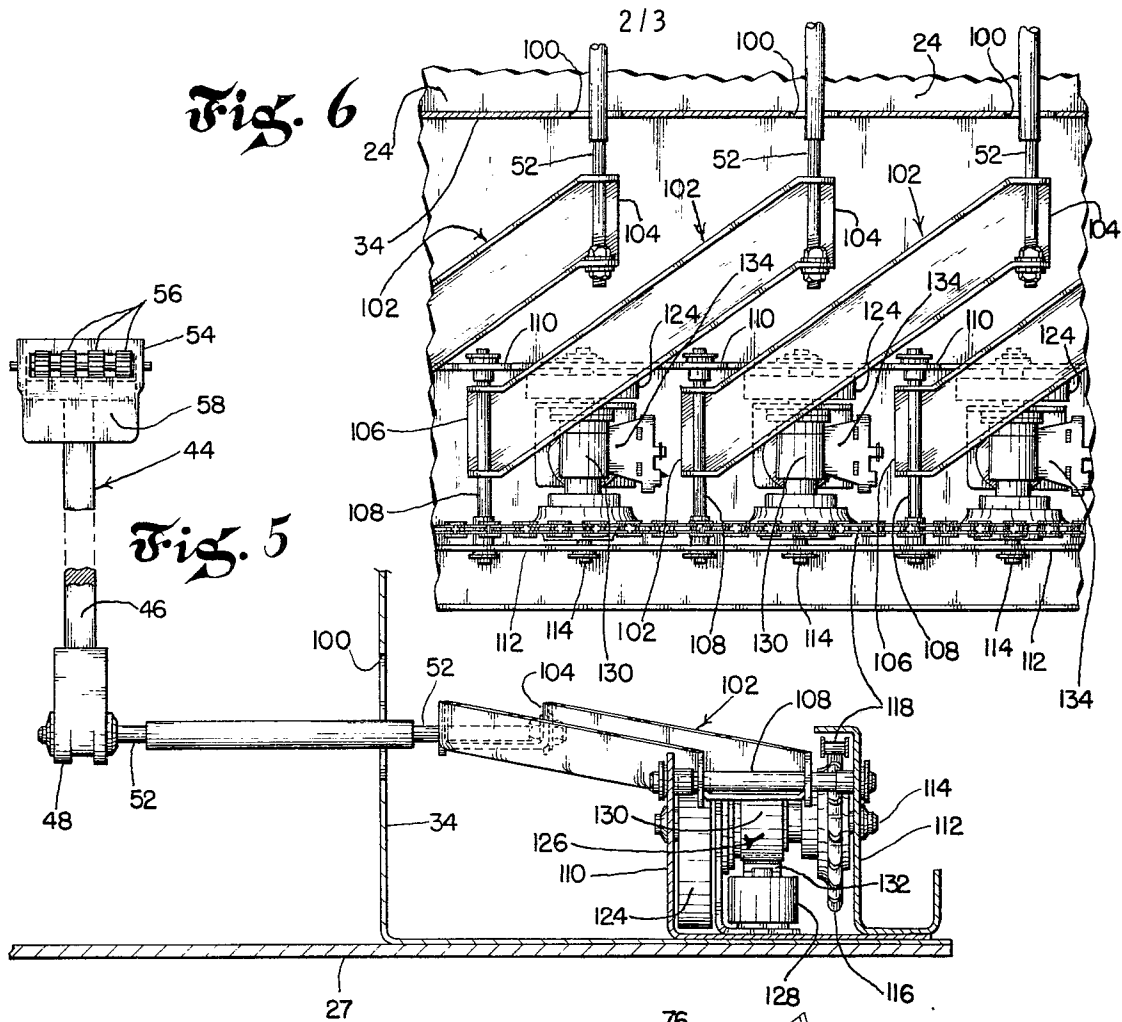


Fig. 3



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