Oct. 7, 1969 R. H. RUETSCHLE 3,471,141

SHEET SEPARATOR MECHANISM

Filed Oct. 31, 1967 6 Sheets-Sheet 1

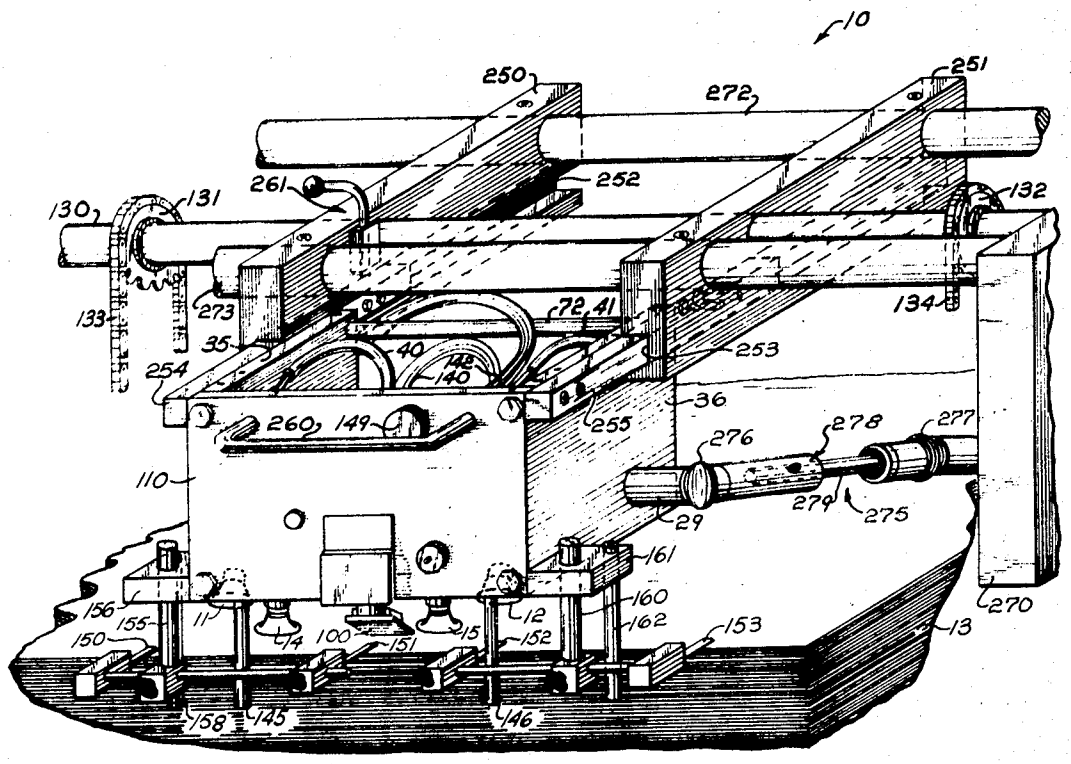


FIG. 1

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SHEET SEPARATOR MECHANISM

Filed Oct. 31, 1967 6 Sheets-Sheet 2

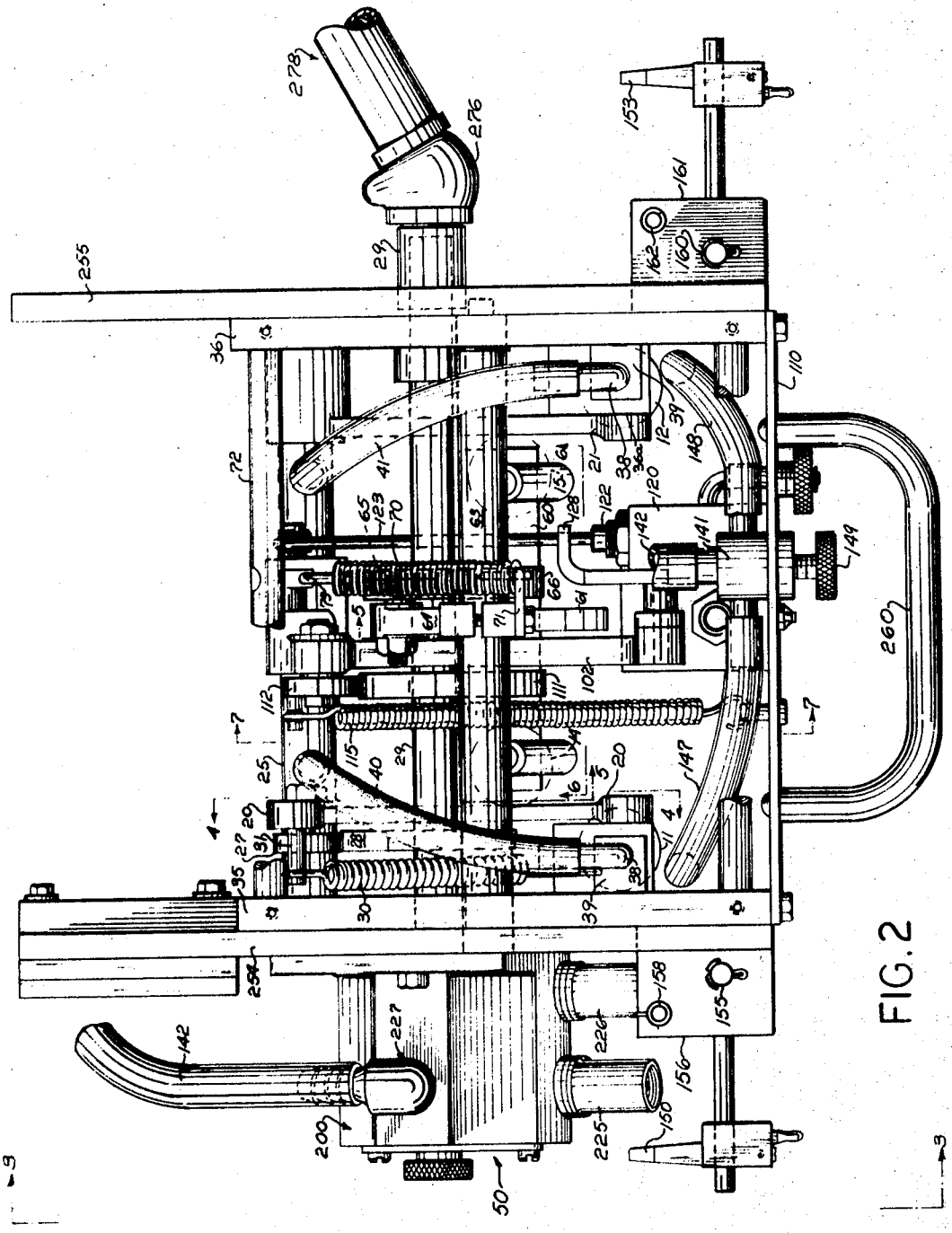


FIG. 2

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SHEET SEPARATOR MECHANISM

Filed Oct. 31, 1967 6 Sheets-Sheet 3

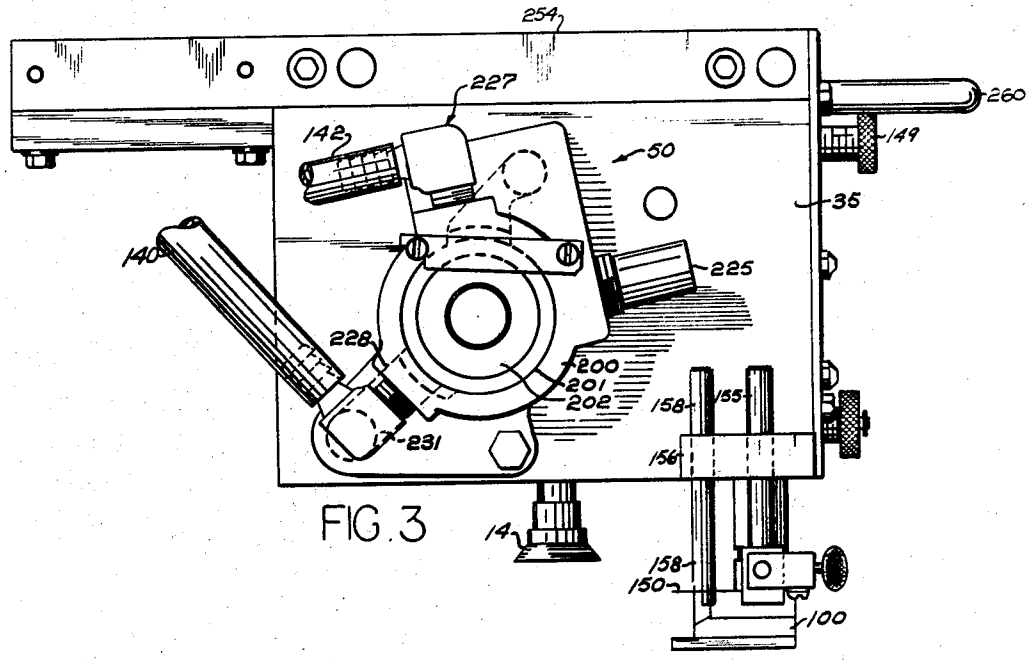


FIG. 3

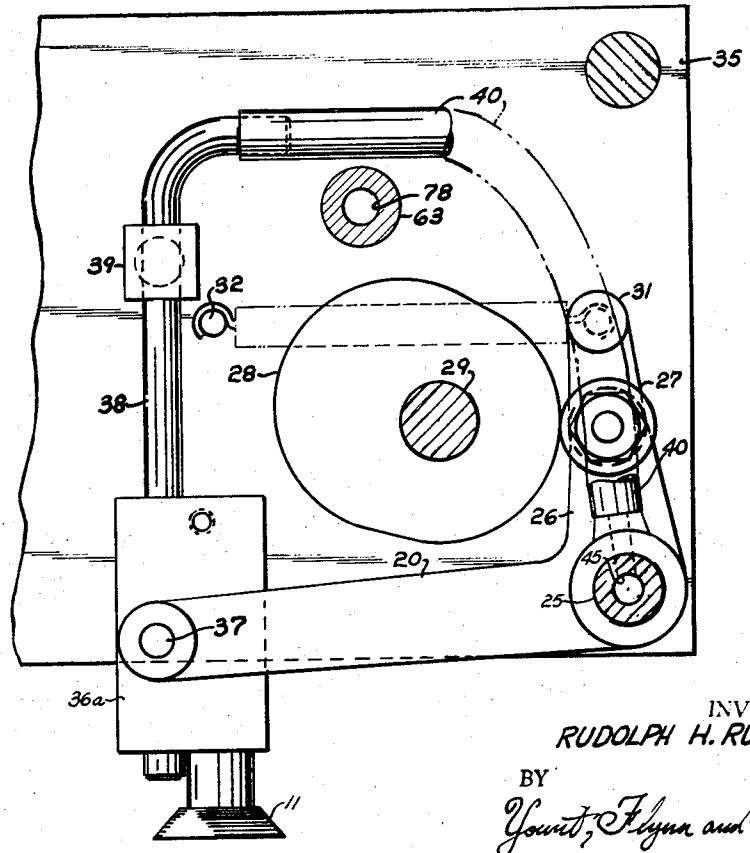


FIG. 4

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SHEET SEPARATOR MECHANISM

Filed Oct. 31, 1967 6 Sheets-Sheet 4

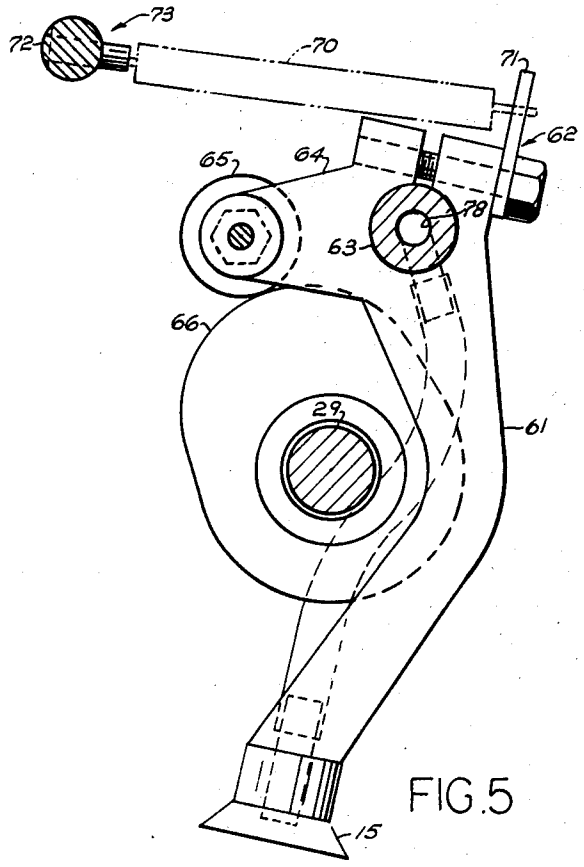


FIG. 5

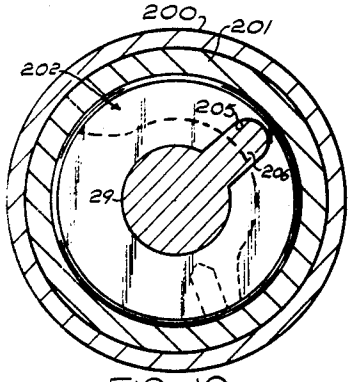


FIG 10

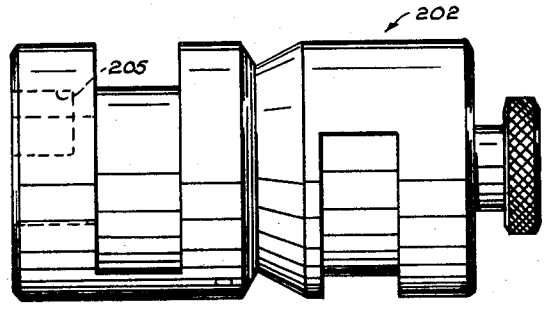


FIG. 11

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SHEET SEPARATOR MECHANISM

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FIG. 6

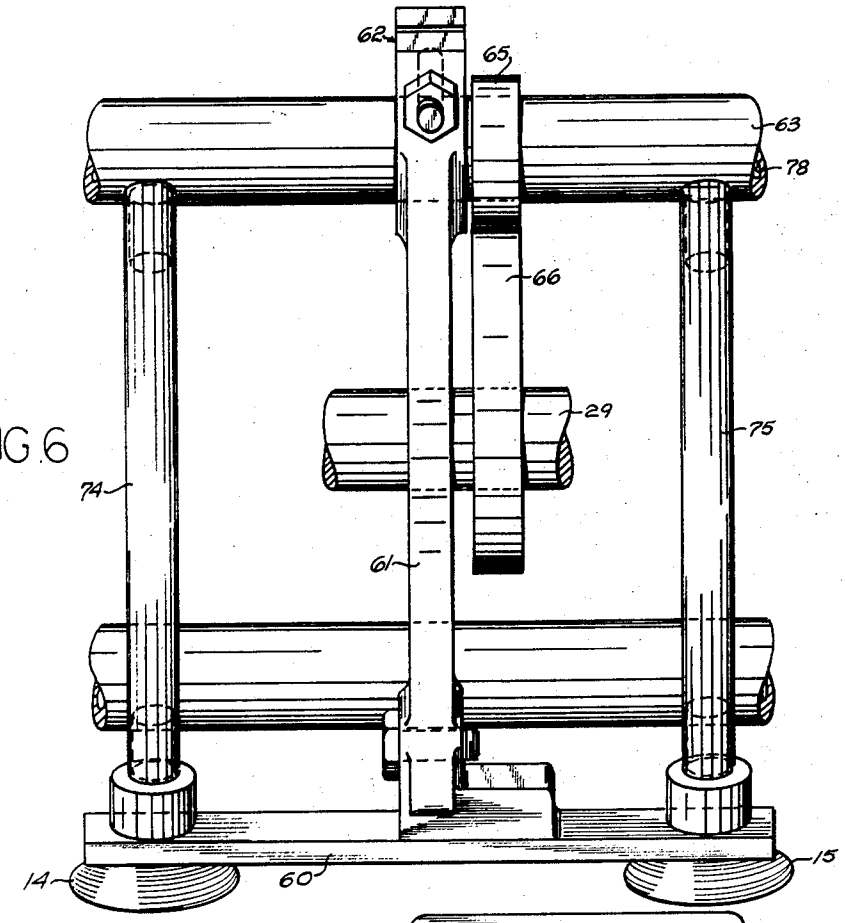
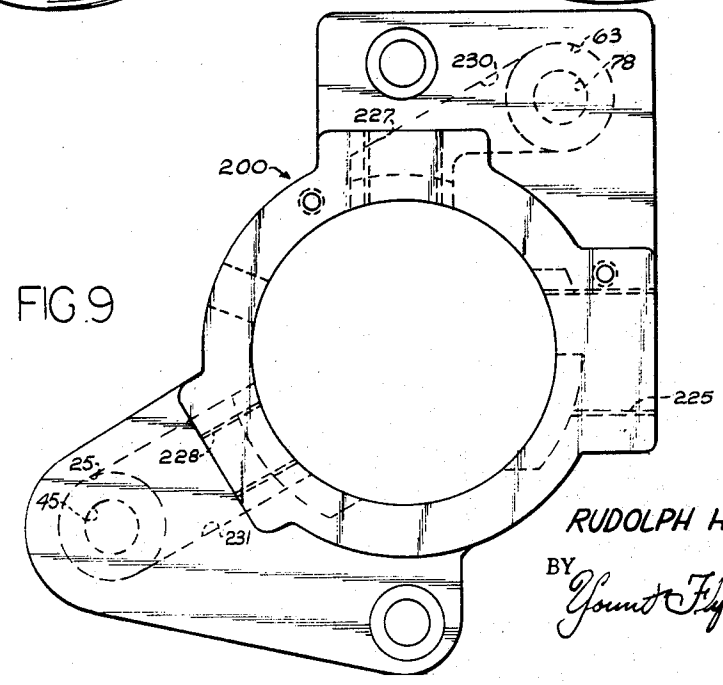


FIG. 9



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SHEET SEPARATOR MECHANISM

Filed Oct. 31, 1967 6 Sheets-Sheet 6

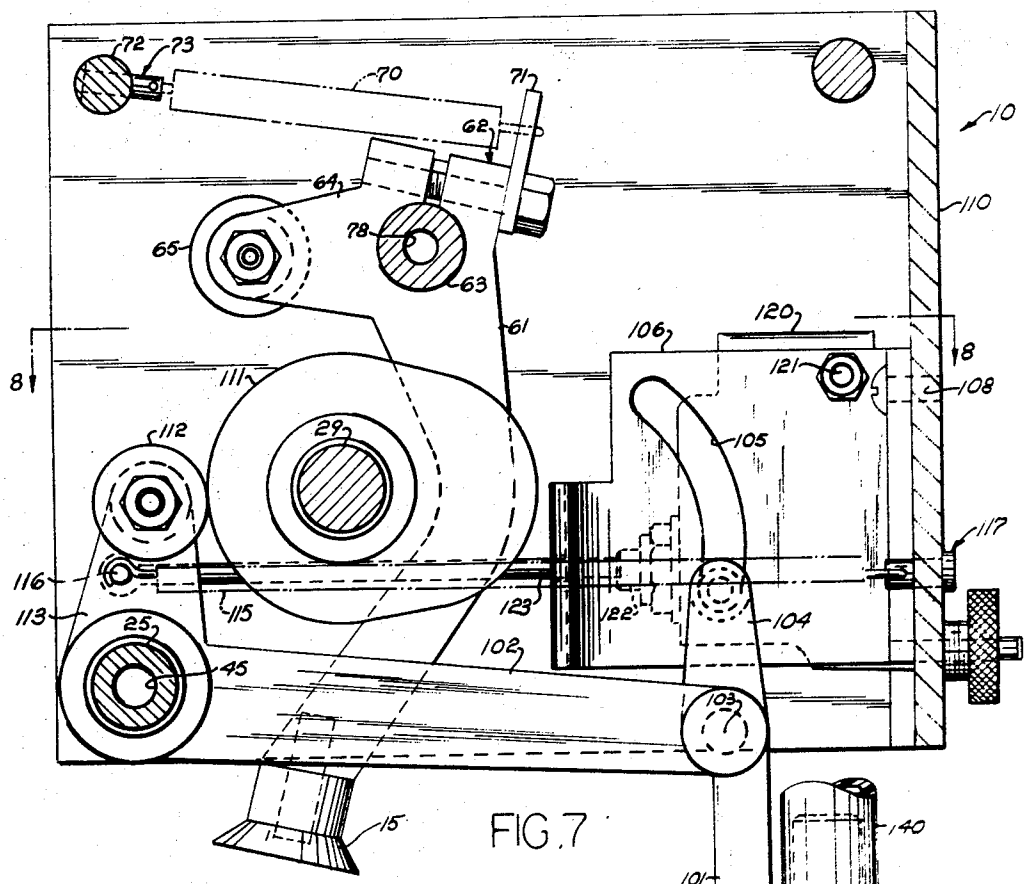


FIG. 7

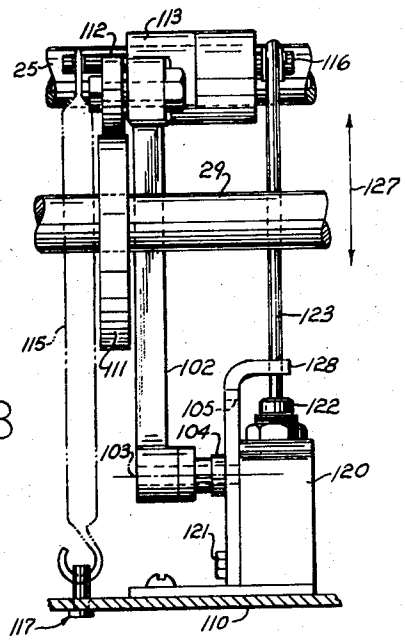


FIG. 8

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United States Patent Office

3,471,141

Patented Oct. 7, 1969

3,471,141

SHEET SEPARATOR MECHANISM

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Filed Oct. 31, 1967, Ser. No. 679,472

Int. Cl. B65h 3/08

U.S. Cl. 271—26 19 Claims

ABSTRACT OF THE DISCLOSURE

A sheet separator mechanism includes lifting suckers and sheet forwarding suckers which receive a sheet from the lifting suckers and move the sheet forwardly of the pile. The sheet lifting suckers and sheet forwarding suckers are operated by cams which are carried by a camshaft. The cams operate on levers which are carried by first and second shafts, which extend parallel with the camshaft, and provide for pivoting movement of the levers. A valve is operatively associated with the camshaft and has a rotor member carried by the camshaft and rotatable with the camshaft. The valve member controls the suction which is directed to the sucker members. The suction which is directed to the sucker members is directed through passageways in the first and second shafts which carry the lever members for actuating the sucker members. Flexible conduits extend from the shafts to the sucker members to deliver the vacuum to the sucker members. The separator also includes a presser foot which operates to sense the top of the pile and control the raising and lowering of the pile. This presser foot mechanism is also operated by a cam carried by the camshaft.

The present invention relates to a sheet separator mechanism, and particularly to a sheet separator mechanism which includes raising sucker means which engage the topmost sheet of a pile and lift the topmost sheet, and forwarding sucker means which receive the sheet from the raising sucker means and forward the sheet relative to the pile.

The principal object of the present invention is the provision of a new and improved sheet separator mechanism which includes sheet raising suckers for lifting the topmost sheet of a pile and sheet forwarding suckers which receive the sheet from the raising suckers and move the sheet forwardly relative to the pile and which separator is compact in construction, readily adjustable for handling different stock sizes, durable, and efficient in operation.

A more specific object of the present invention is the provision of a new and improved sheet separator mechanism which includes raising sucker means for lifting the topmost sheet of a pile and forwarding sucker means which receives the sheet from the raising sucker means and moves the sheet forwardly of the pile, and wherein the raising and forwarding suckers are moved upon pivoting movement of lever members which are carried by a pair of shafts which extend in a parallel relation, and which shafts have fluid passageways therein for communicating the sucker members with a source of suction.

A further object of the present invention is the provision of a new and improved sheet feeder, as noted in the next preceding paragraph, wherein the shafts communicate at one end with a timing valve mechanism which controls the application of suction to the fluid passageways in the shafts and wherein the passageways in the shafts are also connected by flexible conduits to the sucker members.

A still further object of the present invention is the provision of a new and improved sheet feeder, as noted

hereinabove, wherein a camshaft extends intermediate the pair of shafts having the parallel relationship, and carries cams to effect pivoting movement of the lever members for operating the suckers and also effects rotation of a rotor member of the timing valve mechanism.

Another object of the present invention is the provision of a new and improved sheet separator, as noted in the next preceding paragraph, wherein the separator unit is adjustably mounted to effect movement of the sucker members, camshaft, and timing valve, relative to the back edge of the pile, and wherein the drive for the camshaft is constructed so as to permit ready adjustment of the sheet separator unit relative to the back edge of the pile of sheets.

Further objects and advantages of the present invention will be apparent to those skilled in the art to which it relates from the following detailed description of a preferred embodiment thereof made with reference to the accompanying drawings forming a part of this specification and in which:

FIG. 1 is a perspective view of a sheet separator embodying the present invention;

FIG. 2 is a top elevational view of the sheet separator shown in FIG. 1;

FIG. 3 is a side elevational view of the sheet separator shown in FIG. 2, looking at the sheet separator of FIG. 2 as indicated by the line 3—3;

FIG. 4 is a fragmentary sectional view of the sheet separator of FIG. 1 with parts removed and taken approximately along the section line 4—4 thereof;

FIG. 5 is a fragmentary sectional view of the sheet separator of FIG. 2 with parts removed, taken approximately along the section line 5—5 of FIG. 2;

FIG. 6 is a fragmentary view of a portion of the separator shown in FIG. 2, taken approximately along the line 6—6 of FIG. 2 and with parts removed;

FIG. 7 is a fragmentary sectional view of the sheet separator shown in FIG. 1, taken approximately along the section line 7—7 of FIG. 1 and with parts removed;

FIG. 8 is a view of the apparatus shown in FIG. 7, taken approximately along the line 8—8 of FIG. 7;

FIG. 9 is a view of a valve housing embodied in the sheet separator of FIG. 1;

FIG. 10 is a view illustrating a portion of the valve mechanism utilized in the sheet separator mechanism of FIG. 1; and

FIG. 11 is a side elevational view of a rotor embodied in the timing valve used in the separator of FIG. 1.

The present invention provides an improved sheet separator mechanism of the type which includes raising suckers which moves in a generally vertical direction to engage the topmost sheet of a pile and raise at least a portion of the sheet from the pile, and forwarding suckers which receive a sheet from the raising suckers and move the sheet generally forwardly of the pile. A sheet separator embodying the present invention is of a practical, durable, and compact construction and is efficient in operation.

As representing the preferred embodiment of the present invention, the drawings illustrate a sheet separator mechanism **10**. The sheet separator mechanism **10** includes raising sucker means which comprises a pair of raising suckers **11, 12** which move generally vertical with respect to a pile of sheets **13**. The raising suckers **11, 12**, when moved vertically, engage the topmost sheet of the pile **13**, shear the rear edge thereof, and raise the rear edge thereof substantially vertically. The sheet separator **10** also includes forwarding sucker means which comprises a pair of forwarding suckers **14, 15** which move in a generally horizontal arc and receive the trailing edge of the sheet from the raising suckers **11, 12** and move the

sheet generally forwardly relative to the pile for advancement from the pile 13.

The raising suckers 11, 12 which are moved in a generally vertical direction are supported at one end of lever members 20, 21, respectively (see FIGS. 2 and 4). The lever member 21 at its other end is fixedly secured for rotation with a shaft member 25. The lever member 20 at its other end is also fixedly secured for rotation with the shaft member 25. The lever member 20 includes a portion which projects substantially vertically from the shaft 25, as shown in FIG. 4, and which carries a cam follower 27. The cam follower 27 cooperates with a cam 28 carried on a camshaft 29.

A spring member 30 biases the cam follower 27 into engagement with the outer periphery of the cam 28. The spring 30 acts between a pin member 31 carried by the portion 26 of the lever 20 and a pin member 32 which is carried by a side frame support member 35. The shaft 25 extends between the side frame support member 35 and a side frame support member 35 spaced therefrom. From the above, it should be apparent that upon rotation of the cam 28, the lever members 20, 21 are pivoted about the axis of the shaft 25 and the raising and lowering sucker members 11, 12 are moved in a substantially vertical direction thereby.

The sucker members 11, 12 are associated with the levers 20, 21 in substantially identical manners and therefore only the association of the sucker member 11 with the lever 20 will be described in detail. The sucker member 11 is carried by a block member 36*a* which, in turn, is pivotally carried by the lever member 20 and specifically is carried for pivotal movement about an axis 37 relative to the lever 20. The block member 36*a* has a rigid vacuum conduit 38 projecting therefrom and which extends through an opening in a noddle pin 39 which is carried in the side frame support member 35. Upon pivotal movement of the lever 20, the noddle pin 39 guides the block member 36*a* for substantially vertical movement, with the result that some pivoting movement of the block member 36*a* relative to the lever 20 results.

The suction which is applied to the suction members 11, 12 is delivered thereto through the conduits 38, one of which is associated with each of the sucker members 11, 12. The conduits 38 at their upper ends are connected with flexible hoses 40, 41, respectively. The flexible hoses communicate with a hollow passageway 45 in the shaft 25. The hollow passageway 45 communicates with a valve mechanism, generally designated 50, which delivers vacuum thereto, as will be described hereinbelow, to provide a vacuum in the passageway 45 and in the conduits 38 and which vacuum is delivered to the sucker members 11, 12 through the block members 36*a* which are of conventional construction.

The forwarding suckers 14, 15 which receive the sheet from the lifting suckers 11, 12 and move the sheet forwardly relative to the pile 13 are moved in timed relation to the raising and lowering movement of the suckers 11, 12. The forwarding suckers 14, 15 are carried at opposite ends of a bar 60 (see FIG. 6). Intermediate the ends of the bar 60, the bar 60 is connected to a substantially vertically extending bell crank lever member 61. The bell crank lever member 61 is suitably connected to the bar 60 in any suitable manner so as to effect movement of the bar 60 upon movement thereof.

The bell crank lever member 61 at its upper end is clamped by a suitable clamp mechanism 62 to a shaft member 63 which extends between the side frame support members 35, 36 and substantially parallel to the shaft 25 and camshaft 29. The shaft 63 is supported by the side frame support members 35, 36 for rotation relative thereto. The bell crank lever member 61 has a portion 64 which projects outwardly from the shaft 63 and which carries a cam follower 65. The cam follower 65 cooperates with a cam 66 carried on the camshaft 29. Upon rotation of the camshaft 29, the cam 66 is rotated and the cam follower 65 is moved through an arc which effects movement of the forwarding suckers 14, 15 through an arc having a generally horizontal extent. The cam follower 65 is held in engagement with the cam 66 by a spring 70 which extends between a plate member 71 associated with the clamp mechanism 62 and a rod member 72 to which the other end of the spring is adjustably secured by means of an adjustable connection 73.

Suction is delivered to the sucker members 14, 15 through flexible conduits 74, 75, respectively. The flexible conduits 74, 75 are connected at one end to the sucker members 14, 15 and at their other end are connected by a suitable connection to the shaft 63. The shaft 63 has a fluid conducting passageway 78 therein similar to the passageway 45 in the shaft 25. The passageway 78 communicates at one end, as will be described hereinbelow, with the valve mechanism 50, and is provided with vacuum during operation of the valve mechanism 50 and delivers vacuum to the flexible conduits 74, 75 and the sucker members 14, 15. It should be apparent from the above that there is no relative rotation between the shaft 63 and the sucker members 14, 15 and, therefore, there is no constant flexing of the hoses 74, 75 during pivoting movement of the sucker members 14, 15.

The sheet separator 10 also includes a presser foot 100, see FIG. 7. The presser foot 100 operates in a conventional manner and senses the top of the pile of sheets 13 and controls the operation of a hoist mechanism which effects raising of the pile of sheets 13 during the operation of the separator 10. The presser foot 100 is carried on one end of a lever member 101. The lever member 101 is pivoted intermediate its ends to a bell crank lever member 102 for rotation relative thereto about an axis 103.

The lever member 101 at its end opposite the end connected to the presser foot 100 carries a follower member 104 which is received in a slot 105 formed in a bracket member 106. The bracket member 106 is suitably secured by fasteners 108 to a rear plate 110 of the separator mechanism 10. The lever member 102 is supported on the shaft 25 and for rotation relative to the shaft 25 about the axis thereof. Upon rotation of the lever member 102 about the axis of the shaft 25, the member 101 is moved in a generally arcuate direction, as controlled by the slot 105 in which the follower member 104 moves. In this manner, the path of movement of the presser foot 100 is controlled.

The lever member 102 is pivoted about the axis of the shaft 25 by a cam member 111 which is carried by the camshaft 29. The cam 111 cooperates with a cam follower 112 which is carried on a projecting portion 113 of the bell crank lever 102. The cam 111 as it rotates effects movement of the follower 112 and pivoting movement of the lever 102 about the axis of the shaft 25.

The follower 112 is biased into engagement with the cam 111 by a spring 115 which is connected at one end to a pin member 116 carried by the portion 113 of the lever 102. The spring 115 at its other end is connected to the end frame member 110 by a suitable adjustable connection 117 which provides for adjusting of tension in the spring 115.

From the above, it should be apparent that as the presser foot moves in a generally vertical direction under the action of the cam 111, if the presser foot 100 engages the top surface of the pile of sheets, the presser foot 100 cannot be moved downwardly any further and the cam 111 will merely move away from the follower 112 without any more movement of the presser foot 100 resulting. In this condition, the cam follower 112 cannot follow the cam 111 and a space is created therebetween. This is the normal mode of operation of the presser foot 100 and in the event that the presser foot 100 moves below the normal position thereof, the follower 112 moves further than its normal position and follows the cam 111 to a greater extent. When such occurs, a suitable mecha-

nism is actuated to effect actuation of the hoist mechanism for raising the height of the pile.

The mechanism which is operated to effect actuation of the pile hoist mechanism comprises a switch member **120**. The switch member **120** is secured to the bracket **106** by a suitable fastener **121** which may be loosened to provide for pivoting movement of the switch **120** relative to the bracket **106**. The switch **120** has a trip actuator **122** which is positioned adjacent one end of a rod member **123**. The other end of the rod member **123** is carried by the pin **116** which projects through the portion **113** of the lever member **102**. It should be apparent, therefore, that as the portion **113** of the lever member **102** moves, the rod **123** likewise reciprocates in a direction generally indicated by the arrows designated **127**. The rod member **123** extends through an opening in the outer portion **128** of the bracket member and is guided in its reciprocatory movement by the portion **128** of the bracket.

As the presser foot **100** moves in a vertical direction and engages the top of the pile, the presser foot **100** prevents movement of the portion **113** of the lever member in a direction toward the rear plate **110** of the separator mechanism, and thus the rod member **123** is prevented from reciprocation toward the trip actuator **122**. However, in the event that the presser foot **100** does not engage the top of a pile at its normal position, the presser foot **100** moves beyond its normal position and the rod member **123** moves an extent greater than it normally moves. This greater extent of movement of the rod member **123** effects movement of the trip actuator **122** of the switch **120** and, in turn, effects actuation of the switch **120**.

The switch **120** is wired into a control circuit, not shown, for controlling the operation of a hoist motor. The control circuit and operation of the hoist motor by a switch, such as **120**, is of conventional construction and is well known and will not be described in detail. The hoist motor, when actuated, effects rotation of shaft **130**, see FIG. 1. Shaft **130** carries a pair of spaced chain sprockets **131**, **132** which, upon rotation, effect raising of chains **133**, **134**, respectively. The chains **133**, **134** are connected to the pile support and thereby effect raising movement thereof.

The presser foot **100** is also constructed so as to deliver a blast of air toward the pile of sheets. This air may be called "floating" air or "separating" air and assists in separating the top sheet of the pile from the pile as the raising suckers **11**, **12** operate to effect raising of the top sheet of the pile. The presser foot **100** is timed in its movement to the movement of the raising suckers **11**, **12** so as to move under the topmost sheet of the pile as the topmost sheet is raised by the raising suckers **11**, **12**. At the same time, the blast of separating air is delivered through the presser foot **100** in order to effect and aid in the separation of the topmost sheet from the pile. The air blast which is directed through the presser foot **100** is delivered thereto through a flexible conduit **140** which is connected with the presser foot and with the valve **50** which controls the flow of air to the presser foot **100**.

Air is also directed from the valve **50** through conduit **142** to a distributing valve supported on the support plate **110**. The distributing valve **141** is connected with spaced nozzles **145**, **146** (see FIG. 1), which are in the form of tubes having a plurality of openings spaced along the length thereof. The tubes **145**, **146** deliver air toward the pile at the top edge thereof, which air also assists in separating the top sheet of the pile from the remaining sheets of the pile. The air is delivered to the nozzles **145**, **146** by conduits **147**, **148** (see FIG. 2), respectively, which are connected with the distributing valve **141**. The flow of air through the nozzles **145**, **146** can be controlled by adjustment of the distributing valve **141** which may be adjusted by turning an adjusting knob **149** associated therewith.

The sheet separator mechanism **10** also includes a plurality of brushes **150**, **151**, **152**, and **153** which project over the top of the back edge of the pile of sheets and which are spring-like in construction and assist in separating the top edge of the topmost sheet from the remaining sheets of the pile. As the top sheet clears the brushes on vertical movement with the sucker members **11**, **12**, the brushes **150–153** snap underneath the top sheet, and engage the next sheet to prevent it from being raised along with the topmost sheet of the pile. The brushes **150**, **151** are supported from the side support frame **35** of the separator mechanism **10** by a rod **155** which is secured to a projecting portion **156** of the side support frame **35**. A suitable rear edge aligning pin **158** also is secured to the projecting portion **156** and provides a rear edge stop against which the pile of sheets should be abutted during feeding. The brushes **152**, **153** are likewise supported by a rod member **160** which is suitably secured in a projecting lug portion **161** which extends from the side support frame **36** of the separator unit **10**. An aligning pin **162**, similar to the aligning pin **158**, is also secured to the lug portion **161**.

From the above, it should be apparent that the raising suckers **11**, **12**, the forwarding suckers **14**, **15**, and the presser foot **100** must be moved in timed relation in order to effect the proper handling and feeding of the sheets. To this end, the cam members **28**, **66** and **111**, which control the operation of these elements must be suitably shaped and located on the camshaft **29** in the proper relationship in order to effect the operation on these elements in the desired relationship. Since this merely involves design of cams and relative positioning of cams, such is believed to be well within the domain of one skilled in the art and the specific relationship of the cams and their specific shape will not be described herein in detail. Moreover, it should be apparent that the valve **50** which controls the suction in the sucker members **11**, **12** and also the air blast in the presser foot **100** and nozzle members **145**, **146**, as well, must be operated in timed relationship with the movement of the other parts of the separator. To this end, the valve mechanism **50** is operated in timed relation from the camshaft **29** which effects the operation of the sheet raising suckers **11**, **12**, the forwarding suckers **14**, **15**, and the presser foot **100**.

The valve mechanism **50** comprises a valve housing **200** which is suitably secured on the side frame support member **35** of the separator **10** by suitable fasteners. The housing **200** carries a sleeve member **201** fixed therein and which has openings therein in communicating with various fluid passages in the housing **200**. The sleeve member **201**, see FIG. 10, has a rotor member **202**, FIG. 11, located therein. The rotor member **202**, as it rotates, provides for communication between various input conduits to the valve mechanism **50**, as is well known of this general type.

The rotor member **202** is driven from the camshaft **29** and specifically has a drive slot **205** therein which cooperates with a drive projection **206** on the camshaft **29**. In this manner, the rotor member **202** can be mounted on the camshaft **29** in only one drive position relative thereto. Thus, the rotor member, when secured on the camshaft **29**, will be associated therewith in the proper relationship.

The specific construction of the rotor member **202** and the sleeve member **201** in order to provide the desired timing for the flow of air and vacuum to the various parts of the separator does not form a part of the present invention. The rotor member **202** and sleeve member **201** may have many different configurations and flow passages to provide the desired flow at the proper time with respect to the movement of the sucker members **11**, **12** and **14**, **15** and presser foot **100**. Reference may be made to United States Patent No. 3,226,107 for the particular timing of the air and suction in a cycle of operation relative to the other parts of the separator.

The valve housing **200**, see FIG. 9, includes a pair of inlets **225**, **226** connected with a source of pressure and

vacuum, respectively. The valve housing **200** also has a pair of outlets **227, 228** providing for the separating air for nozzles **145, 146** and air for the presser foot **100**, respectively.

The valve housing **200** is also constructed to deliver fluid to the passageways **78, 45** in the shafts **63, 25**, respectively. In this connection, the housing **200** includes an upper chamber **230** and a lower chamber **231**, both of which communicate with the sleeve member **201**. The chamber **230** delivers vacuum from the sleeve member **201** to the passageway **78** in the shaft member **63**, the shaft member **63** being rotatably supported in the chamber **230**. The chamber **231** delivers vacuum to the passageway **45** in shaft **25** which is rotatably supported in the chamber **231**.

It should be apparent therefore that upon rotation of the rotor member **202**, the valve delivers fluid pressure at the appropriate times to the passageways **45, 78** in the shafts **25, 63** and from those passageways the vacuum is communicated to the raising suckers **11, 12** and the forwarding suckers **14, 15**.

It should be noted from the description hereinabove that all of the operating mechanism of the sheet separator mechanism is supported by the support side frame members **35, 36** and the rear frame member **110**. The side frame support members **35, 36** and the rear frame member **110** form a generally box-like construction, as best shown in FIG. 1. Thus box-like construction is adjustable toward and away from the pile **13** for purposes of adjusting the separator mechanism for handling of different size sheets. To this end, the separator mechanism is supported by a pair of members **250, 251**, FIG. 1. The members **250, 251** have channels **252, 253**, respectively, therein and which receive guide bars **254, 255** which are secured to the side frame support members **35, 36**, respectively. The bars **254, 255** slide in the channels **252, 253** for purposes of adjustment therein. The separator unit may be slid in the channels by the operator who may grip the handle **260** and apply a force to the rear support frame **110** to effect the sliding of the bars **254, 255** in the channels **252, 253**. The unit is secured in position in the support members **250, 251** by a suitable setscrew arrangement generally designated **261**.

The separator unit **10** is supported between main side frame members **270**, only one of which is shown. The main side frame members have projecting support rods **272, 273** which extend therebetween and which extend through the support members **250, 251**. The shaft **130** for the hoist mechanism is also supported by the side frames **270** and is rotatably received in openings in the support members **250, 251**. The support members **250, 251** may be secured in position on the support rods **272, 273** by suitable setscrews associated therewith. Thus, the position of the separator unit **10** laterally with respect to the pile **13** may be adjusted.

The drive, generally designated **275**, for driving the camshaft **29** of the separator unit is constructed so as to permit adjustment of the separator unit **10** both laterally of the pile and longitudinally of the pile, as described hereinabove. The drive **275** includes a pair of universal joints **276, 277**, as well as telescoping drive elements **278, 279**. In this manner, the drive may lengthen or shorten upon movement of the separator unit **10**. The universal joint **277**, of course, is connected with a suitable motor for effecting rotation thereof.

From the above, it should be apparent that applicant has provided a new and improved sheet separator mechanism of simplified compact construction and which is readily adjustable and controlled by the operator in order to provide efficient feeding of the sheets from a pile. Moreover, it should be apparent that certain modifications, changes, and adaptations may be made in the sheet separator mechanism and it is intended hereby to cover all such changes, modifications, and adaptations which fall within the scope of the appended claims.

Having described my invention, I claim:

1. A sheet separator mechanism for feeding sheets from a pile comprising raising sucker means for raising the topmost sheet of the pile, forwarding sucker means for receiving the sheet and moving the sheet forwardly of the pile, means for moving said raising sucker means to effect raising of said sheet including at least one lever member operatively connected with said raising sucker means and mounted on a first shaft for pivotal movement therewith about the axis of said first shaft, means for moving said forwarding sucker means in timed relation with movement of said raising sucker means to effect forwarding movement of said sheet including at least one lever member operatively connected with said forwarding sucker means and mounted on a second shaft for pivotal movement therewith about the axis of said second shaft, said first and second shafts each having a fluid passageway extending axially thereof, first fluid conduit means communicating said fluid passageway in said first shaft with said raising sucker means, said first fluid conduit means having one end portion operatively connected with said first shaft for pivotal movement therewith and an opposite end portion operatively connected with said raising sucker means to thereby tend to minimize flexing of said first fluid conduit means upon pivotal movement of said first shaft and said lever member operatively connected with said raising sucker means, and second fluid conduit means communicating said fluid passageway in said second shaft with said forwarding sucker means, said second fluid conduit means having one end portion operatively connected with said second shaft for pivotal movement therewith and an opposite end portion operatively connected with said forwarding sucker means to thereby tend to minimize flexing of said second fluid conduit means upon pivotal movement of said second shaft and said lever member operatively connected with said forwarding sucker means.

2. A sheet separator mechanism as defined in claim **1** further including a camshaft located intermediate said first and second shafts and extending parallel thereto, and a pair of cams carried by said camshaft for effecting said pivotal movement of said lever members.

3. A sheet separator mechanism as defined in claim **2** further including a timing valve mechanism for communicating said fluid passageways in said shafts with a source of suction, said timing valve mechanism including a valve housing and a rotor member rotatable in said housing, means connecting said rotor member with said camshaft to effect rotation thereof on rotation of said camshaft, and said valve housing having chambers communicating with said passageways in said first and second shafts.

4. A sheet separator mechanism as defined in claim **3** further including a pair of side frame support members which support said first and second shafts, said camshaft and said valve mechanism, and means for supporting said side frame support members for adjusting movement relative to the pile.

5. A sheet separator mechanism as defined in claim **4** further including a drive means for effecting rotation of said camshft, said drive means comprising telescoping parts enabling said adjusting movement of said side frame support members.

6. A sheet separator mechanism as defined in claim **1** further including a presser foot movable beneath the topmost sheet of the pile to engage the next to the topmost sheet of the pile while the topmost sheet is being raised by said raising sucker means, and further including means for moving said presser foot in timed relation with movement of said raising and forwarding sucker means including at least one lever member carried by said first shaft for pivotal movement about the axis of said first shaft.

7. A sheet separator mechanism as defined in claim **6** further including a trip mechanism associated with said means for moving said presser foot and providing a sig-

nal in the event that the presser foot does not engage the top of the pile at the desired time.

8. A sheet separator mechanism as defined in claim 1 further including means for simultaneously adjusting the positions of said forwarding sucker means and said raising sucker means forwardly and rearwardly of the pile to thereby enable said sheet separator mechanism to be used with piles of sheets of different lengths, a timing valve mechanism for communicating said fluid passageways in said shafts with a source of suction, and means for mounting said timing valve mechanism for movement under the influence of said means for simultaneously adjusting said sucker means forwardly and rearwardly of the pile to enable the positions of said sucker means and said timing valve mechanism to be simultaneously adjusted relative to the pile of sheets.

9. A sheet separator mechanism comprising raising sucker means for raising the topmost sheet of a pile, forwarding sucker means for receiving the sheet and moving the sheet forwardly of the pile, means for moving said raising sucker means and said forwarding sucker means in timed relation to effect raising and forwarding of a sheet, said means including at least one lever member operatively connected with one of said sucker means and carried by a first shaft for pivotal movement about the axis of said first shaft, said first shaft having a fluid passageway extending axially thereof, conduit means communicating said passageway with one of said sucker means, a timing valve mechanism, said timing valve mechanism including a valve housing having a portion receiving one end of said first shaft, said valve housing having a chamber therein communicating with said passageway in said first shaft to provide a vacuum therein which is communicated with said one sucker means.

10. A sheet separator mechanism as defined in claim 9 further including a camshaft extending substantially parallel to said first shaft, and said timing valve mechanism includes a rotor member having a driving connection with said camshaft, said driving connection comprising a one-position drive such that said rotor member and said camshaft have one fixed relative driving position.

11. A sheet separator mechanism as defined in claim 9 further including a presser foot movable in timed relation with the movement of said sucker means, and means for moving said presser foot including a lever member carried by said first shaft for pivotal movement about the axis thereof, and a cam member carried by said camshaft for effecting pivotal movement of said presser foot about the axis of said first shaft.

12. A sheet separator mechanism as defined in claim 10 further including means supporting said sucker means, said timing valve, said camshaft and said first shaft for adjustable movement, and further including drive means for effecting rotation of said camshaft and which includes relatively movable parts enabling said adjustable movement.

13. A sheet separator mechanism comprising raising sucker means for raising the topmost sheet of a pile, forwarding sucker means for receiving the sheet and moving the sheet forwardly of the pile, means for moving said raising sucker means to effect raising of said sheet including at least one lever member operatively connected with said raising sucker means and carried by a first shaft for pivotal movement about the axis of said first shaft, means for moving said forwarding sucker means to effect forwarding movement of said sheet including at least one lever member operatively connected with said forwarding sucker means and carried by a second shaft for pivotal movement about the axis of said second shaft, said first and second shafts extending substantially parallel and being spaced both horizontally and vertically, a third shaft lying within an area defined by horizontal and vertical planes extending through said first and second shafts, said third shaft extending substantially parallel to said first and second shafts and comprising a camshaft carrying cams for rotation therewith and which are associated with said lever members to effect pivotal movement of said lever members upon rotation thereof, and a timing valve including a rotor member axially aligned and drivingly connected with said camshaft, said timing valve lying within the area defined by the horizontal and vertical planes extending through said first and second shafts.

14. A sheet separator mechanism as defined in claim 13 wherein said driving connection between said camshaft and said rotor comprises a one-position drive so that said rotor member and camshaft have a single relative position in which said rotor member may be driven by said camshaft.

15. A sheet separator mechanism as defined in claim 13 wherein said first and second shafts have fluid passageways extending therethrough and which communicate with said timing valve and said sucker means.

16. A sheet separator mechanism for feeding sheets from a pile comprising a pair of spaced side frame support members, raising sucker means supported by said side frame support members for raising the topmost sheet of a pile, forwarding sucker means supported by said side frame support members for moving the sheet forwardly of the pile, a camshaft supported by said side frame support members and rotatable relative thereto, means for rotating said camshaft, a timing valve operatively associated with said camshaft and including a valve housing carried by one of said side frame support members and a rotor member axially aligned and drivingly connected with said camshaft and rotatable relative to said housing upon rotation of said camshaft, and means supporting said side frame support members for adjustment relative to the pile to vary the position of said sucker means and said timing valve with respect to said pile.

17. A sheet separator mechanism as defined in claim 16 wherein a first shaft extends between said side frame support members and carries a lever member for pivotal movement about the axis thereof, said lever member being operatively connected with said raising sucker means to effect movement of said raising sucker means upon pivotal movement of said lever, and said first shaft having a fluid passageway therein communicating said raising means with said timing valve.

18. A sheet separator mechanism as defined in claim 17 further including a second shaft extending between said side frame support members and carrying at least one lever member operatively connected with said forwarding sucker means, said second shaft having a fluid passageway therein communicating said forwarding sucker means with said timing valve.

19. A sheet separator mechanism for feeding sheets from a pile comprising a pair of spaced apart support frames, raising sucker means connected to said support frames for raising a topmost sheet of the pile, forwarding sucker means connected to said support frames for moving the sheet forwardly of the pile, means for moving said raising sucker means to effect a raising of the sheet including a first shaft pivotally connected to said support frames and a first lever member secured to said first shaft for pivoting movement therewith relative to said support frames, means for moving said forwarding sucker means to effect forwarding movement of the sheet including a second shaft pivotally connected to support frames and a second lever member secured to said second shaft for pivoting movement therewith relative to said support frames, a cam shaft connected to said support frames, first cam means mounted on said cam shaft and cooperating with said first lever, second cam means mounted on said cam shaft and cooperating with said second lever, drive means for rotating said cam shaft and said first and second cam means to pivot said first and second levers and said first and second shafts to thereby move said sucker means, said first and second shafts each having a fluid passageway extending axially thereof, first fluid conduit means communicating said fluid passageway in said first shaft with

said raising sucker means, second fluid conduit means communicating said fluid passageway in said second shaft with said forwarding sucker means, a timing valve mechanism connected to one of said support frames and located along the longitudinal axis of said cam shaft for communicating said fluid passageways in said first and second shafts with a source of suction, said cam shaft having one end portion drivingly connected with said timing valve mechanism to thereby effect operation of said timing valve mechanism in a predetermined relationship with the movement of said sucker means, and adjusting means for enabling the position of said support frames to be adjusted relative to the pile of sheets in the direction in which the sheets are fed by said separator mechanism to thereby enable the position of said sucker means and said timing valve mechanism to be simultaneously adjusted relative to the pile of sheets so that said sheet separator mechanism can be used for feeding sheets of different dimensions.

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