

Sept. 21, 1954

A. E. RINEER
COLLATOR

2,689,727

Filed Jan. 4, 1946

5 Sheets-Sheet 1

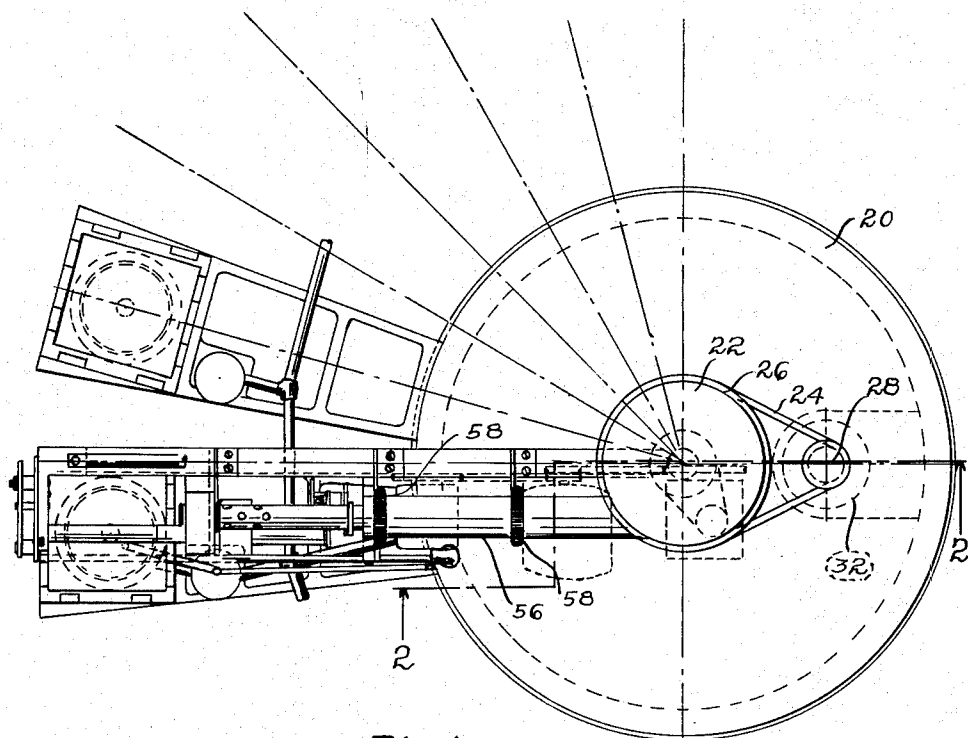


Fig. 1

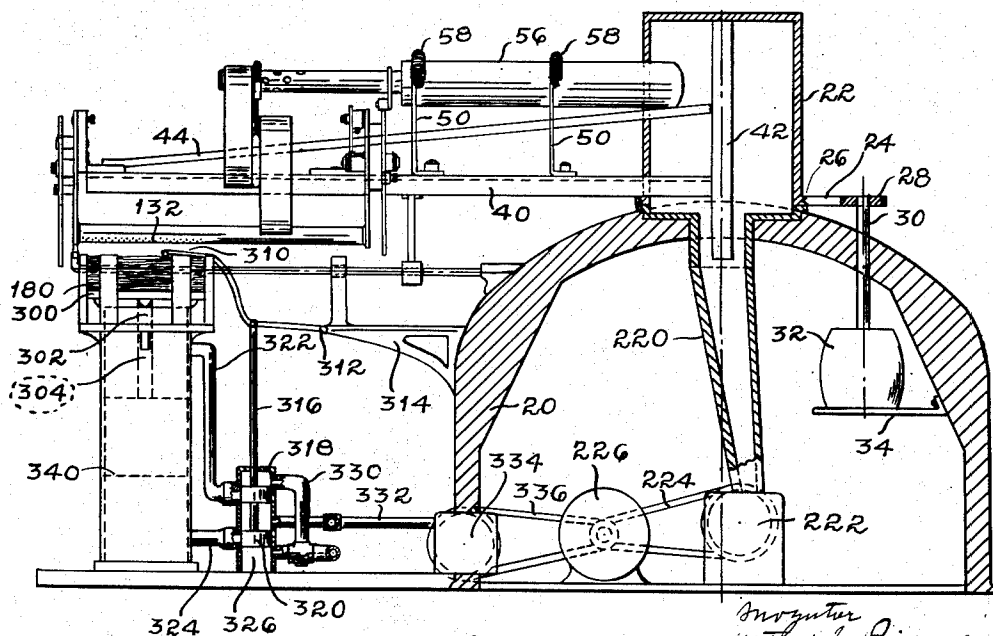


Fig. 2

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5 Sheets-Sheet 2

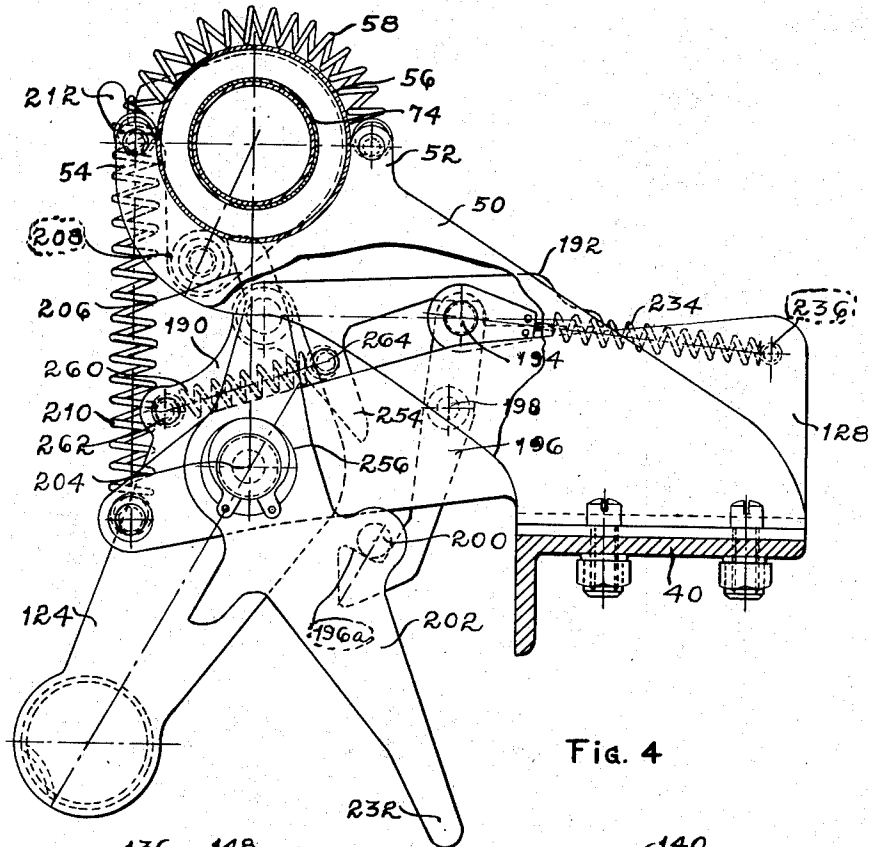


Fig. 4

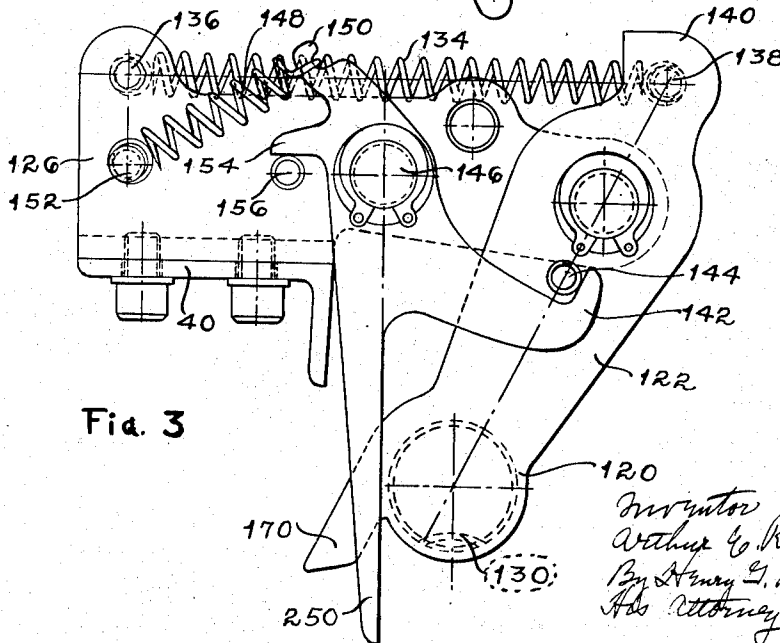


Fig. 3

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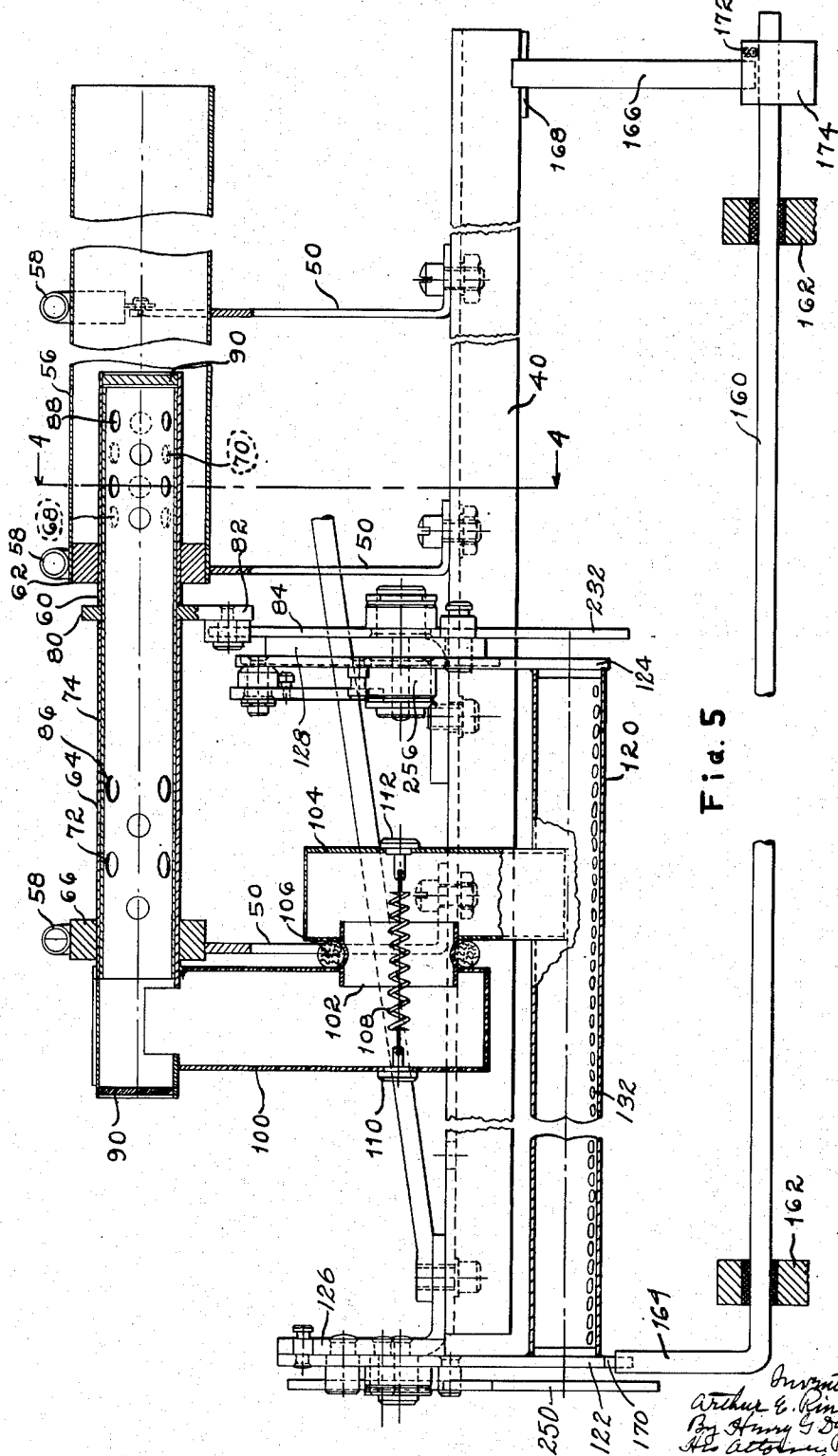
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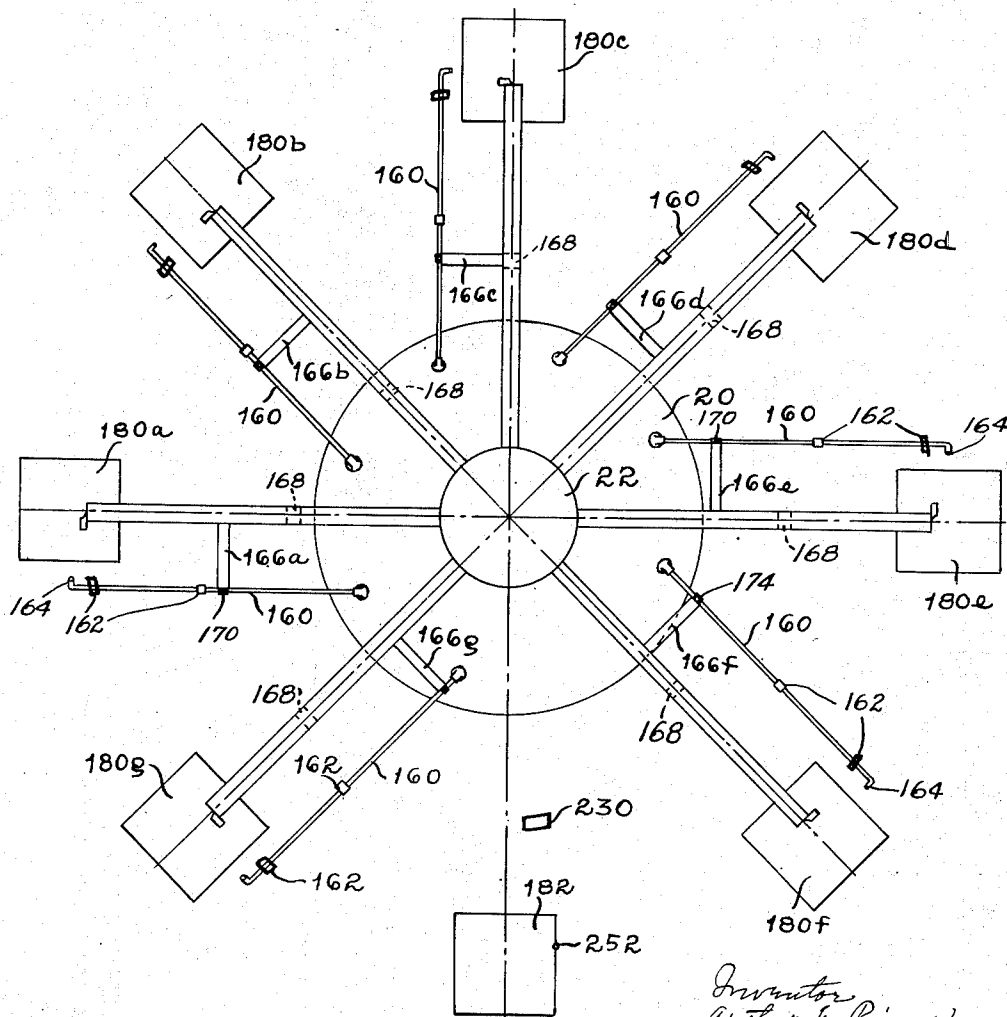


Fig. 6

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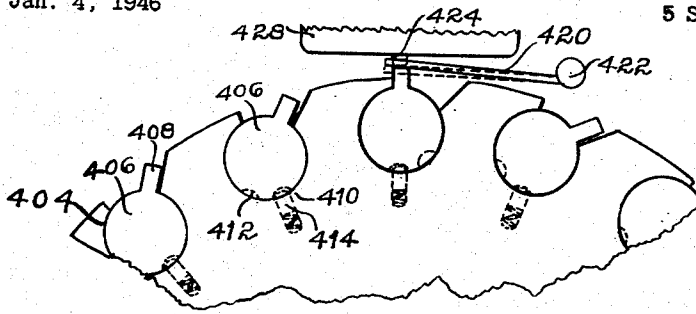


FIG. 7

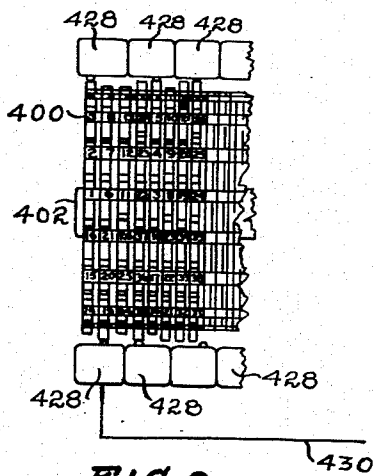


FIG. 8

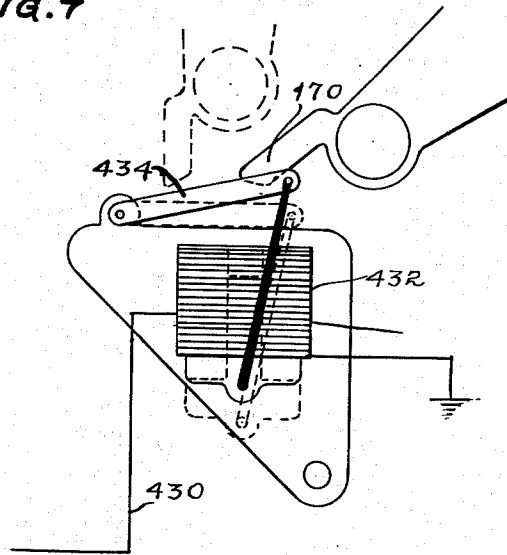


FIG. 9

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UNITED STATES PATENT OFFICE

2,689,727

COLLATOR

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Application January 4, 1946, Serial No. 639,095

17 Claims. (Cl. 270—58)

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This invention relates to a collating machine and more particularly to a collating machine for stacking sheet material in a predetermined order.

In the manufacture of pads consisting of blanks in job printing establishments, the blanks are usually selected from stacks manually and then bound. Although great efficiency has been acquired by the stackers, the operation has proved rather expensive.

An object of this invention is to provide a collating machine for assembling blanks of various types, some of which may be printed or have other symbols or designations thereon, others may be plain, functioning either as a copy receiving blank, as a copy transfer, standard forms or as a page for instructions, et cetera.

Another object of this invention is to provide a collating machine that picks up blanks from various stacks and stacks these blanks or pages in a predetermined order upon an assembly stack.

Another object of this invention is to provide a collating machine having a pneumatic pick-up for removing sheets from predetermined piles in a predetermined order and depositing the sheets in a stack, the stack receiving the assembled sheets being adjusted automatically into proper height in proportion to the removal of the sheets from the supply stacks, the supply stacks being raised to compensate for the removed sheets, so as to maintain the supply stack on a uniform level.

Another object of this invention is to provide a plurality of collating units operating in seriatim, each of said collating units being adapted to pick up sheets of material from predetermined stacks and deposit the sheets of material in seriatim upon a stack, each of said collating units being adjustable so as to remove sheets from preselected stacks.

Other objects and advantages reside in the construction of parts, the combination thereof and the mode of operation, as will become more apparent from the following description.

Referring to the drawings, Figure 1 shows a top plan view with one collating unit completely shown, one shown in part and the remaining units omitted.

Figure 2 is a cross sectional view of the frame taken substantially on the line 2—2 of Figure 1, and a front elevational view of one of the collating units.

Figure 3 is an end elevational view of a portion of a collating unit, as viewed from the left of Figure 2.

Figure 4 is a fragmentary, cross sectional view

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taken substantially on the line 4—4 of Figure 5.

Figure 5 is an enlarged front elevational view of a collating unit showing the pneumatic system in cross section.

Figure 6 is a schematic top plan view of a collating unit to illustrate the arrangement of the tripping mechanism.

Figure 7 is a fragmentary end view of a control drum.

Figure 8 is a fragmentary top plan view of the drum shown in Figure 7.

Figure 9 discloses a control relay.

In the drawings, the reference character 20 indicates a hollow base. The base 20 is stationary and may be any suitable shape adapted to support the weight of the mechanism associated with the collating units. The base 20 supports a hollow cylindrical drum 22 mounted for rotation. The drum 22, together with the parts mounted thereon, is rotated by means of a V-belt 24 seated in a V-groove 26 fixed to the drum 22 and driven by a V-pulley 28 keyed to a shaft 30 driven by an electric motor 32 that may be mounted upon a bracket 34 fixedly secured to the interior of the base 20. The motor 32 need not necessarily be mounted in the base, it may be mounted upon the base or elsewhere. Instead of using a V-belt drive, the drum 22 may be driven by the motor 32 through any other suitable driving mechanism.

The drum 22 is provided with a plurality of recesses receiving angle irons or arms 40 extending radially from the drum and having the ends of the angle irons within the drum 22 fixedly attached to a vertically disposed core member 42 mounted within the center of the drum 22. Each angle iron 40 has its outer end supported by a brace 44, having the inner end attached to the member 42. The braces 44 are preferably provided with turnbuckle adjustment, not shown, so as to raise the outer ends of the angle irons 40 to the proper level. The adjusting mechanism for the braces 44 has not been shown, as any suitable adjusting mechanism may be used within the purview of this invention. Each angle iron 40 provides support for a collating unit which will now be described.

Each of the collating units is provided with means for picking up a sheet of paper or other sheet material mounted upon stacks located in a circular row underneath the collating units. The sheet material is preferably picked up by suction means and subsequently deposited upon a stack of material, where the sheets are assembled in predetermined order. The control means for

instituting the operation of a collating unit and for discharging the sheets at the proper station will be described after the details of the collating unit have been described.

As may best be seen by referring to Figure 4, the angle iron 40 supports a pair of brackets 50, each terminating in a bifurcated portion having a pair of furcations 52 and 54 joined by a semi-spherical slot supporting a hollow tube 56 held in position by a helical spring 58.

The tube 56 has its inner end connected to the cylindrical drum 22. The cylindrical drum 22 is provided with suitable apertures for receiving the ends of the tubes 56, so that the passages in the tubes 56 communicate with the hollow cylindrical cavity in the cylindrical drum 22. The springs 58 provide a flexible support for the tubular member, so that as the drum 22 and the arms 40 rotate about the vertical axis of the drum 22, the springs 58 permit a certain amount of give or yield, so as to remove the strains and stresses that would otherwise be set up in the tubes 56.

The outer end of each tubular member 56 supports a valve mechanism which includes a tubular member 60 held in position on the end of the tubular member 56 by a suitable sealing ring 62 that is fixedly secured between the outer end of the tube 56 and the tube 60. A second tubular member 64 is mounted in a collar 66 and supported upon another bracket 50 and held in position by another tension spring 58, substantially identical to the structure described in connection with the tubular member 56. The tubular member 60 is provided with a plurality of apertures 70 and the tubular member 64 is provided with a plurality of apertures 72.

A third tubular member 74 is located within the tubular members 60 and 64. The tubular member 74 has fixedly attached thereto a collar 80 provided with a stud and roller 82 engaging a trigger arm 84, which will be described more fully later. The tubular member 74 is provided with a plurality of apertures 86 and 88. When the tubular member is located in the position shown in Figure 5, the apertures 86 register with the apertures 72 in the tubular member 64. The apertures 88 are out of registry with the apertures 70. Disc-like sealing members 90, one in the end of the tube 60 and the other in the end of the tube 64, seal the ends of the tubes. When tubular member 74 is in the position shown in Figure 5, the interior of the tubular members, or the valve mechanism, is open to the atmosphere surrounding the device. The function of this valve mechanism will be described more fully later. Suffice to say at this time that the collar 80 may be oscillated so as to cause the apertures 88 to register with the apertures 70, at which time the apertures 72 are out of registry with the apertures 86, which results in the interior of the tubular members communicating with the interior of the drum 22 and being sealed from the atmosphere surrounding the collating unit.

A suitable conduit 100 is connected to the outer end of the tubular member 64 and communicates with a tubular sleeve 102 communicating with the cavity in a second conduit 104. A suitable packing gasket or gland 106 is mounted between members 100 and 104 and around member 102, so as to seal the connection between the two conduits. In order to exert pressure upon packing gland or gasket 106, a suitable helical spring 108 is mounted between a pair of studs 110 and 112, so as to compress the gasket 106 to insure a tight fit.

The lower end of the conduit 104 communicates with the interior of a pick-up tube 120 mounted at its ends to a pair of brackets 122 and 124, each of which is pivotally mounted to stationary brackets 126 and 128 suitably attached to the angle iron 40. The pivots of the brackets 122 and 124 lie in a common center, so as to permit the pick-up member 120 to oscillate from operative position shown in Figure 3 to inoperative position shown in Figure 4. The tubular pick-up member 120 is provided with a concave groove or recess 130 in the lower edge thereof. This recess 130 extends throughout the operative range of the tubular pick-up member 120. A plurality of small suction apertures 132 extend throughout the length of the concave groove or recess 130. A helical spring 134 mounted in tension has one end fixed to a stud 136 mounted in the stationary bracket 126 and the opposite end engaging a stud 138 located in portion 140 forming an extension to the supporting bracket 122. The spring 134 at all times biases the brackets 122 and 124 into the inoperative position unless it is prevented from doing so by a latch 142 engaging a pin 144 in member 122 and pivotally mounted at 146 and normally urged into latching position by a spring 148 engaging an extension 150 of the latch 142 and a stud 152 fixedly attached to the bracket 126. An extension 154 engages a stop 156 in member 126, so as to limit the counterclockwise movement of the latch 142, as viewed in Figure 3. When the pick-up tube 120 is located in the inoperative position, the latch 142 is out of engagement with the pin 144. The mechanism for actuating the pick-up tube from the inoperative to the operative position will now be described.

Referring to Figures 5 and 6, the base 20 supports a plurality of substantially radially disposed arms or shafts 160 that may be supported in bearings 162, shown schematically in Figure 5. Each of these arms has the outer end 164, providing a stop, formed at right angles to the longitudinal axis of arm 160. Adjustably supported upon the rocker arm or shaft 160 is a contact arm 166 that has a length such that it clears the angle iron 40 as the angle iron 40 rotates above it. A contact element 168 is adjustably mounted underneath the angle iron 40, so that when the angle iron, provided with the contact element 168, sweeps over member 166, it oscillates member 166 about the axis of arm 160, so as to cause the stop 164 to raise into the "up" position shown in Figure 5, when it engages an extension 170 integral with the bracket 122. As the extension 170 engages the stop, the bracket 122, the bracket 124 and the paper-lifting tubular member 120 are adjusted from the inoperative position to the operative position causing the latch 142 to engage the pin 144 to hold the paper-lifting tubular member 120 in this relative position with respect to the unit. This operation takes place when the pick-up unit passes over a stack of sheet material to be assembled in a predetermined order at some assembly station.

A vacuum or suction is created in the tubular member 120, so as to suck the paper and hold the paper in contact with the tubular member as the arm continues its rotation. It can readily be seen that when the extension 170 engages the stop 164, the tubular member 120 oscillates about the pivot, but does not move to any great extent relative to the underlying stack of sheet material to be assembled, excepting that it does advance downwardly so as to exert a pressure on the stack

to insure a good contact, so as to obtain the most effective use of the suction in the pick-up unit, which suction is supplied to the pick-up unit at the proper time through a suitable valve control mechanism that causes the vacuum to be supplied to the tubular member 120 at the proper instant of time, which valve control mechanism will now be described.

As can best be seen by referring to Figure 6, the contact arms 166 are not equally spaced radially. Some are much closer to the center of the axis of rotation of the drum 22 than are others. These may be adjusted outwardly or inwardly by means of an adjusting screw 172 mounted in a hub or collar 174 forming the inner support of the contact arm 166. The contact elements 168 are so positioned underneath the angle irons 40 that the contact arm 166a, shown in Figure 6, engages the contact element 168 under one of the angle irons 40. Contact arm 166b may be so positioned that it is engaged by the same contact element 168. It may be readily seen that contact arm 166c is closer to the drum and will engage some other contact element 168 located in proper position underneath the angle iron 40. Contact arms 166d, 166e, 166f and 166g are progressively located closer to the center of the axis of rotation of the drum 22.

Stacks of material 180a, b, c, d, e, f and g represent stacks of sheet material to be assembled and deposited in predetermined order upon a stacking station 182.

Valve control mechanism

The valve control mechanism can best be seen by referring to Figures 2, 4 and 5. The bracket 124 has an upwardly extending projection 190 that has pivotally attached thereto a releasing lever or link 192 that is provided with a notch engaging a stud 194 fixedly mounted to a lever 196 pivoted at 198 to the bracket 128 and having its lower end provided with a latch portion 196a engaging a fixed pin 200 carried upon a rocker arm 202 pivoted upon a pivot 204 that is common to the pivot of the bracket 124. This rocker arm 202 has an upwardly extending projection or pawl 206 engaging a roller 208 fixedly attached to a lug 82 integral with the collar 80 fixedly mounted upon perforated tubular member 74.

A tension spring 210 engages an extension 212 integral with the collar 80, which tension spring will rapidly rotate the perforated tubular member 74 in a counterclockwise direction, as viewed in Figure 4. It can readily be seen that as the bracket 124 is rotated in a counterclockwise direction, as viewed in Figure 4, the link 192 actuates the lever 196 in a counterclockwise direction, so as to cause the latch portion 196a to disengage the pin 200, thereby permitting the rocker arm 202 to rotate in a clockwise direction by virtue of the force exerted by the roller 208 engaging the upper projection 206 of member 202, which roller is carried on the bracket 82 on collar 80 actuated by the spring 210, so as to move the apertures 86 out of registry with the apertures 72 and cause the apertures 88 to register with the apertures 70. In so doing, it connects the interior of the tubular member 120 through conduit 104, tubular sleeve 102, conduit 100, the tubular member 64, the tubular member 74, the tubular member 60 and the hollow tube 56 to the interior of the hollow drum 22 that is connected through a suitable conduit 220 to a vacuum pump 222 driven by a suitable V-belt 224 by an electric motor 226. This supplies a vacuum to pick-up tube

120, causing a suction through the suction apertures 132 in the groove that has been pressed downwardly against the underlying stack of sheet material 180 supported upon an adjustable support, which will be described more fully later.

The sheet that has been picked up by the collating unit is held by suction against the tubular member until the collating unit holding the particular sheet advances over the assembly stacking station 182. As it advances over this station, a stop 230 engages the lower end 232 of the rocker arm 202, causing the rocker arm 202 to rotate in a counterclockwise direction, as viewed in Figure 4, thereby oscillating the collar 80 and the tubular member 74, to cause the valve mechanism to advance the apertures 86 into registry with the apertures 72 and move the apertures 88 out of registry with the apertures 70. This does two things. In the first place, it shuts off the vacuum passage extending from the vacuum pump to the pick-up tube 120. At the same time, it admits air through the apertures 72 and 86, so as to cause the vacuum in the pick-up tube 120 to be broken and this pick-up tube to be filled with in-rushing air, thereby causing the sheet to be deposited upon the sheets found in the stacking station 182.

As the rocker arm 202 is rotated in a counterclockwise direction, as viewed in Figure 4, a spring 234, having one end attached to a stud 236 carried by the bracket 128, and the opposite end connected to the stud 194, holds the lever 196 which has the latch portion 196a in engagement with the pin 200 on the rocker arm 202, so as to prevent the rocker arm from returning in a counterclockwise direction. In other words, the latch portion 196a engages the pin 200, preventing return movement of the rocker arm 202 and preventing the tension spring 210 from contracting, thereby holding the valve in the position into which it has been adjusted.

As the collating unit advances beyond the stacking station 182, a downwardly projecting extension 250 engages a fixed stop 252 located at the edge of the stacking station 182, causing the latch 142 to disengage the pin 144, so as to permit the tension spring 134 to snap the tubular member 120 from operative position into inoperative position. In so doing, the lever or link 192, which has raised into dot-dash position by virtue of the coaction of the extension 254 engaging a suitable collar 256 surrounding the pivot 204 and the spring 260 having one end attached to the bracket 124 at 262 and the opposite end connected by a stud at 264 to the extension 254, is then permitted to move down into the position shown in Figure 4. This causes the lever or link 192 to latch the stud 194 integral with the lever 196 in position to again release the valve when the brackets 122 and 124 are oscillated so as to move the tubular pick-up tube 120 from the inoperative position to the operative position.

It is quite desirable that the stack of material at each of the supply stations be maintained at the proper level, so that the top of the stack of materials to be collated is located at the proper height for the pick-up unit to properly engage the top sheet. This has been accomplished hydraulically by a mechanism that will now be described.

Referring particularly to Figure 2, a stack 180 has been shown. It is mounted on an adjustable table or support 300, supported on a piston rod 302 projecting into a cylindrical cavity 304. Hydraulic fluid holds the ram at the proper height,

In order to control the supply of hydraulic fluid, a sensitive finger or feeler 310 is pivotally mounted at 312 to a bracket 314 attached to the side of the hollow base 20. As the sheets are removed from the stack 180, the finger or feeler 310 moves downwardly, so as to actuate a rod 316 connected to a pair of valves 318 and 320 communicating with a pair of conduits 322 and 324. A cylindrical cavity 326, having mounted therein the piston-like valve members 318 and 320, is connected by an exhaust conduit 330 to a suitable hydraulic fluid reservoir, not shown. A supply conduit 332 is connected to an electrically driven hydraulic pump 334, driven from the electric motor 226 through a V-belt 336. Pressure is at all times maintained in the conduit 332. This conduit 332 empties into the cylindrical cavity 326 between the two piston-like valve members 318 and 320. It can be readily seen that as the rod 316 moves downwardly, the valve member 318 opens the port communicating with the conduit 322 connected to the fluid above the piston 340 connected to the rod 302. The port in the wall of the cavity 326 communicating with the conduit 324 is then uncovered by the valve 320, which is lowered. Whenever this takes place, the fluid under pressure in the conduit 332 is used in supplying pressure to the hydraulic fluid located in the conduit 324 communicating with the cylindrical cavity below the piston 340, thereby causing the piston 340 to raise, and with it the stack of paper 180, until the sensitive finger 310 closes the valve members, thereby arresting further upward movement of the piston and thereby arresting the exhaust of the hydraulic fluid from the cavity above the piston.

The exhaust fluid may be utilized in controlling the height of the stack of papers located at the collating station. This is accomplished by supplying the exhausted hydraulic fluid to a similar piston located underneath the stack of material that is being accumulated in the proper order. By this arrangement, as the stacks of supply material are diminished, the cumulative effect thereof is transmitted to the collating station, so as to lower the piston in this station, to thereby maintain the stack material at the proper height.

In the modification disclosed in Figures 8 and 9, an electric control mechanism for controlling the various collating units has been shown. This electric control mechanism includes a drum 400 mounted for rotation about an axis 402 driven in synchronism with the rotation of the collating units, so that the drum 400 makes one revolution for every revolution of the collating machine. The drum 400 is provided with a plurality of cylindrical cavities 404, having mounted therein a cylindrical member 406 provided with an arm or extension 408. The cylindrical member 406 is provided with a pair of semispherical cavities 410 and 412, engaged by a cylindrical plunger 414 spring-urged upwardly. When member 406 is mounted in such a position that the plunger 414 engages the cavity 410, the extension 408 lies substantially within the surface of the drum. When the cylindrical member 406 is adjusted in the cavity so that the cylindrical plunger 414 engages the cavity 412, the extension 408 projects outwardly in a radial direction from the surface of the drum. There are a number of members 406 having extensions 408. These are arranged in rows and tiers, as clearly shown in the portion of the drawing shown in Figure 8.

As the drum rotates, the extensions 408 pass an arm 420 pivoted at 422, each arm 420 being

arranged so as to engage a movable switch member 424 controlling an electric switch 428. Due to the fact that the switches are larger than the distance between rows of extensions 408, the switches have been arranged in groups or rows parallel to the axis of rotation of the drum. For example, four rows may be used, only two of which have been shown in Figure 8. Each switch is connected by a suitable lead or conductor 430 to its relay 432 that may be mounted in the path of the extension 170, so that when the relay is energized, it raises a stop member 434 so as to trip the extension, thereby actuating the mechanism controlled thereby. The relays are mounted so that there is one relay for each collating station and elsewhere as may be required.

Whenever the collating machine is to be used, the proper extensions 408 are adjusted from the inoperative position to the operative position, or vice versa, so as to control the proper stations, thereby controlling the collating unit from a central control station.

Although the preferred embodiment of the device has been described, it will be understood that within the purview of this invention various changes may be made in the form, details, proportion and arrangement of parts, the combination thereof and mode of operation, which generally stated consist in a device capable of carrying out the objects set forth, as disclosed and defined in the appended claims.

Having thus described my invention, I claim:

1. A collating machine for stacking various types of sheets in predetermined order upon a common stack, said collating machine including a support, means for supporting a plurality of stacks of various types of sheets, a plurality of sheet pick-up units traveling in a path overlying said series of supply stacks of various types of sheets to be assembled into the common stack, means for causing the pick-up units to move into engagement with predetermined supply stacks for picking up sheets, said means including a rotatably mounted drum, outwardly projecting arms mounted in the periphery of the drum and electrical means responsive to the arms passing a predetermined position for controlling the pick-up units, means for actuating the drum in synchronism with the pick-up units, and means for causing said pick-up units to deposit said sheets in predetermined order upon the common stack.

2. A collating machine for stacking various types of sheets in predetermined order upon a common stack; said collating machine including a support; means for supporting a plurality of stacks of various types of sheet material; rotatable means mounted upon said support; a plurality of collating units radially mounted upon said rotatable means so as to rotate therewith; said collating units traveling in a circular path overlying a plurality of stacks of various types of sheet material; means for causing predetermined collating units to move into engagement with selected stacks; said means including a drum rotating in synchronism with the movement of the collating units, a plurality of electric switches mounted in proximity to the drum, and means selectively positioned on the drum for actuating said switches, means responsive to the switches being actuated for controlling the movement of the collating units; and means for causing the collating units to deposit said sheets in predetermined order upon the common stack.

3. A collating machine for stacking various

types of sheets in predetermined order upon a common stack; said collating machine including a support; means for supporting a plurality of stacks of various types of sheet material; rotatable means mounted upon said support for rotation in a horizontal plane; a plurality of collating units radially mounted upon said rotatable means so as to rotate therewith; said collating units traveling in a circular path overlying a plurality of stacks of various types of sheet material; means for causing predetermined collating units to move into engagement with selected stacks; said means for causing the collating unit to move into contact with selected stacks including a plurality of radially disposed rocker shafts one for each of the collating units, a plurality of rocker arms one for each of the shafts, said rocker arms being adjustably mounted upon the rocker shafts so as to permit the rocker arms to be located in various radial positions, contacts adjustably mounted on the collating units and arranged to engage certain rocker arms to actuate the same when the collating unit supporting a contact is in position for picking up a sheet from a predetermined stack; and means responding to the movement of the rocker arms for causing the collating units to pick up sheets from the stacks.

4. A collating machine for stacking various types of sheets in predetermined order upon a common stack; said collating machine including a support; means for supporting a plurality of stacks of various types of sheet material; rotatable means mounted upon said support for rotation in a horizontal plane; a plurality of collating units radially mounted upon said rotatable means so as to rotate therewith; said collating units traveling in a horizontally disposed circular path overlying a plurality of stacks of various types of sheet material; means for causing predetermined collating units to move into engagement with selected stacks; said means for causing the collating unit to move into contact with selected stacks including a plurality of radially disposed rocker shafts one for each of the collating units, a plurality of rocker arms one for each of the shafts, said rocker arms being adjustably mounted upon the rocker shafts so as to permit the rocker arms to be located in various radial positions, contacts adjustably mounted on the collating units and arranged to engage certain rocker arms to actuate the same when the collating unit supporting a contact is in position to pick up a sheet from a predetermined stack; means responding to the movement of the rocker arms for causing the collating units to pick up sheets from the stacks; and means for causing the collating units to deposit the sheets in predetermined order upon the common stack.

5. A collating machine for stacking various types of sheets in predetermined order upon a common stack; said collating machine including a support; means for supporting a plurality of stacks of various types of sheet material; rotatable means mounted upon said support for rotation in a horizontal plane; a plurality of collating units radially mounted upon said rotatable means so as to rotate therewith; said collating units traveling in a horizontal plane circular path overlying a plurality of stacks of various types of sheet material; means for causing predetermined collating units to move into engagement with selected stacks; said means for causing the collating units to move into contact

with selected stacks including a plurality of radially disposed rocker shafts one for each of the collating units; a plurality of rocker arms one for each of the shafts; said rocker arms being adjustably mounted upon the rocker shafts so as to permit the rocker arms to be located in various radial positions, said rocker arms being adjusted into radial positions to cause the proper collating unit to pick up a sheet from a predetermined stack of sheet material; means moving with the collating units and arranged to engage certain rocker arms to actuate the same; and means responding to the movement of the rocker arms to cause the collating units to pick up sheets from the stacks.

6. A collating machine for stacking various types of sheets in predetermined order upon a common stack; said collating machine including a support; means for supporting a plurality of stacks of various types of sheet material; rotatable means mounted upon said support for rotation in a horizontal plane; a plurality of collating units radially mounted upon said rotatable means so as to rotate therewith; said collating units traveling in a horizontally disposed circular path overlying a plurality of stacks of various types of sheet material; means for causing predetermined collating units to move into engagement with selected stacks; said means for causing the collating units to move into contact with selected stacks including a plurality of radially disposed rocker shafts one for each of the collating units; a plurality of rocker arms one for each of the shafts; said rocker arms being adjustably mounted upon the rocker shafts so as to permit the rocker arms to be located in various radial positions, said rocker arms being adjusted into radial positions to cause the proper collating unit to pick up a sheet from a predetermined stack of sheet material; means moving with the collating units and arranged to engage certain rocker arms to actuate the same; means responding to the movement of the rocker arms to cause the collating units to pick up sheets from the stacks; and means for causing the collating units to deposit the sheets in predetermined order upon the common stack.

7. A collating machine for stacking various types of sheets in predetermined order upon a common stack; said collating machine including a support; means for supporting a plurality of stacks of various types of sheet material; rotatable means mounted upon said support; a plurality of collating units radially mounted upon said rotatable means so as to rotate therewith; said collating units traveling in a circular path overlying a plurality of stacks of various types of sheet material; means for actuating the collating units into engagement with selected stacks; said means including rocker arms pivotally mounted upon fixed pivots, contacts carried by the collating units in the path of one or more of the rocker arms, there being one rocker arm for each stack; means responding to the movement of the rocker arms for initiating the movement of the collating units towards the selected stacks; means for causing the collating units to deposit the sheets in predetermined order upon the common stack, said last mentioned means including a common stop causing each succeeding collating unit to deposit its sheet upon the common stack when the collating unit passes over said common stop; a fixed stop mounted in fixed relation with respect to the support, said fixed stop being located beyond said common stop; and a re-set member

carried by the collating unit engaging the fixed stop to cause the collating units to move into the initial position in readiness for a succeeding cycle.

8. A collating machine for stacking various types of sheets in predetermined order upon a common stack; said collating machine including a support; means for supporting a plurality of stacks of various types of sheet material; rotatable means mounted upon said support; a plurality of collating units radially mounted upon said rotatable means so as to rotate therewith; said collating units traveling in a circular path overlying a plurality of stacks of various types of sheet material; means for causing predetermined collating units to move into engagement with selected stacks; said means for causing the collating units to move into contact with selected stacks including a plurality of radially disposed rocker shafts one for each of the collating units, a plurality of rocker arms one for each of the shafts, said rocker arms being adjustably mounted upon the rocker shafts so as to permit the rocker arms to be located in various radial positions; means moving with the collating units and arranged to engage certain rocker arms to actuate the same; means responding to the movement of the rocker arms to cause the collating units to pick up sheets from the stacks; means for causing the collating units to deposit the sheets in predetermined order upon the common stack, said last mentioned means including a common stop causing each succeeding collating unit to deposit its sheet upon the common stack when the collating unit passes over said common stop; a fixed stop mounted in fixed relation with respect to the support; said fixed stop being located beyond said common stop; and a re-set member carried by the collating unit engaging the fixed stop to cause the collating units to move into the initial position in readiness for a succeeding cycle.

9. A collating machine for stacking various types of sheets in predetermined order upon a common stack, said collating machine including a support, means for supporting a plurality of stacks of various types of sheet material, rotatable means mounted upon said support, a plurality of collating units radially mounted upon said rotatable means so as to rotate therewith, said collating units traveling in a circular path overlying a plurality of stacks of various types of sheet material, a plurality of stop means mounted upon the fixed support, there being one of said stop means for each of the stacks, said stop means including an adjustably mounted member adjustable radially so as to vary the radial distance of said adjustable members, adjustable means carried by the collating units, said adjustable means being adjustable radially into alignment with selected members so that as the adjustable means on the collating units engages the adjustable member the stop means is actuated from an inoperative position to an operative position, and means carried by the collating unit for engaging said stop means when in operative position to cause the corresponding collating unit to pick up a sheet from the stack.

10. A collating machine for stacking various types of sheets in predetermined order upon a common stack, said collating machine including a support, means for supporting a plurality of stacks of various types of sheet material, rotatable means mounted upon said support, a plurality of collating units radially mounted upon

said rotatable means so as to rotate therewith, said collating units traveling in a circular path overlying a plurality of stacks of various types of sheet material, a plurality of stop means mounted upon the fixed support, there being one of said stop means for each of the stacks, said stop means including an adjustably mounted member adjustable radially so as to vary the radial distance of said adjustable members, adjustable means carried by the collating units, said adjustable means being adjustable radially into alignment with selected members so that as the adjustable means on the collating units engages the adjustable member the stop means is actuated from an inoperative position to an operative position, means carried by the collating unit for engaging said stop means when in operative position to cause the corresponding collating unit to pick up a sheet from the stack, and means for causing the collating units to deposit the picked up sheets on the common stack.

11. A collating machine for stacking various types of sheets in predetermined order upon a common stack, said collating machine including a support, means for supporting a plurality of stacks of various types of sheet material, rotatable means mounted upon said support, a plurality of collating units radially mounted upon said rotatable means so as to rotate therewith, said collating units traveling in a circular path overlying a plurality of stacks of various types of sheet material, means for causing the collating units to pick up sheets from said plurality of stacks of sheets in predetermined order and deposit the sheets upon said common stack, and hydraulic means for automatically raising each of said plurality of stacks as sheets are removed therefrom so as to maintain the height of the stack substantially constant, and means for supplying exhausted hydraulic fluid to the hydraulic means controlling the height of the common stack so that said hydraulic means lowers said common stack in proportion to the raising of said several stacks of said plurality of stacks.

12. A collating machine for stacking various types of sheets in predetermined order upon a common stack, said collating machine including a support, means for supporting a plurality of stacks of various types of sheet material, rotatable means mounted upon said support, a plurality of collating units radially mounted upon said rotatable means so as to rotate therewith, said collating units traveling in a circular path overlying a plurality of stacks of various types of sheet material, means for causing the collating units to pick up sheets from said plurality of stacks of sheets in predetermined order and deposit the sheets upon said common stack, hydraulic means for automatically raising each of said plurality of stacks as sheets are removed therefrom, said hydraulic means including a plurality of sensitive feelers one for each of said plurality of stacks, said feelers being mounted in contact with the top of their respective stacks, and control means for the hydraulic means responsive to the movement of the sensitive feelers for causing the stacks to be raised as the sheets are withdrawn, and means for lowering the common stack in proportion to the raising of said several stacks of said plurality of stacks, said last mentioned means including means for supplying exhausted hydraulic fluid to the hydraulic means controlling the height of the common stack so that said hydraulic means lowers said

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common stack in proportion to the raising of the said several stacks.

13. A collating machine for stacking various types of sheets in predetermined order upon a common stack, said collating machine including a support, means for supporting a plurality of stacks of various types of sheet material, rotatable means mounted upon said support, a plurality of collating units radially mounted upon said rotatable means so as to rotate therewith, said collating units traveling in a circular path overlying a plurality of stacks of various types of sheet material, means for causing the collating units to pick up sheets from said plurality of stacks of sheets in predetermined order and deposit the sheets upon said common stack, hydraulic means for automatically raising each of said plurality of stacks as sheets are removed therefrom, said hydraulic means including a plurality of sensitive feelers one for each of said plurality of stacks, said feelers being mounted in contact with the top of their respective stacks, control means for the hydraulic means responsive to the movement of the sensitive feelers for causing the stacks to be raised as the sheets are withdrawn, and means responsive to the raising of said plurality of stacks for lowering the common stack in proportion.

14. A device for controlling the height of a plurality of stacks of sheet material having sheets removed therefrom, said device including hydraulic means for raising each of said stacks as sheets are removed therefrom, said hydraulic means including a plurality of sensitive feelers one for each of said stacks, said feelers being mounted in contact with the top of their respective stacks, control means for causing the hydraulic means to raise the stacks having sheets removed therefrom in response to the movement of the sensitive feelers for causing the tops of the stacks to be maintained at a uniform height, and means responsive to said hydraulic means for lowering the common stack in proportion to the raising of the several stacks having sheets removed therefrom.

15. In a control mechanism a cylindrical drum provided with peripherally located grooves extending axially, said grooves including cylindrical portions, a plurality of cylindrical members adjustably mounted in the grooves, said cylindrical members upon being positioned in the grooves forming rows extending parallel to the longitudinal axis of the cylindrical drum, the cylindrical members being arranged in parallel tiers lying in parallel planes normal to the axis of rotation, each of said cylindrical members being provided with a projection, said projection having an inoperative position when the projection is located substantially within the periphery of the cylindrical drum and an operative position when the projection projects beyond the cylindrical drum, and means for holding the cylindrical members in adjusted position.

16. A collating machine for stacking various types of sheet material in predetermined order upon a common stack; said collating machine including a support, means for supporting a plurality of stacks of various types of sheet material; rotating means mounted upon said support rotating in a horizontal plane; a plurality of collating units radially mounted upon said rotating means so as to rotate therewith; said collating units traveling in a horizontally disposed circular path overlying said plurality of stacks of various types of sheet material; means for caus-

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ing predetermined collating units to move into engagement with selected stacks, said means for causing the collating units to move into engagement with the selected stacks including a plurality of rocker shafts, said rocker shafts being journaled in fixed bearings, said rocker shafts being equally spaced from the center of said rotating means, a plurality of arms, there being one arm adjustably mounted upon each rocker shaft, there being at least one rocker shaft for each of said aforementioned stacks, said arms being adjustably mounted upon said rocker shafts in unequal distances from the center of rotation of said rotating means; a plurality of contact members adjustably mounted upon the collating units, there being one contact member for each collating unit, said contact members being unequally spaced from the center of rotation of the rotating means, each contact member engaging at least one arm while rotating with the collating unit through one revolution so that as the contact member engages an arm the arm is rocked and with it the rocker shaft, a plurality of stops mounted upon the rocker shafts, there being one stop for each rocker shaft, said stops being actuated from an inoperative position into an operative position in response to movement of the arm on the shaft, means carried by each of the collating units engaging the stop that has been actuated into operative position by the contact member for causing each of the collating units to move into contact with its selected stack, means for causing the collating units to pick up a sheet of material from said supply stack, and means for causing the collating unit to deposit the picked up sheets in predetermined order upon the common stack, the order being determined by the adjustment of the arms and the contact members.

17. In a collating machine and in combination, a rotary collector head, means for rotating said head, a plurality of vertically movable arms connected to said collector head, extending radially therefrom and rotating therewith, a vacuum actuated sheet pick-up element carried on each of said arms, a source of vacuum communicating with each of said pick-up elements, sheet-stack tables and a sheet receiving table arranged circumferentially of said collector head, each of said tables being positioned below and in the orbit of said pick-up elements means for lowering and raising said pick-up elements when in position above the sheet-stack tables, vacuum control means effective upon said sheet pick-up elements to cause them to pick up the uppermost sheets on said stacks when in lowered sheet-engaging position, and to release said sheets for deposit upon the sheet receiving table.

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