Sept. 29, 1953 W. M. KELLY 2,653,627

DEVICE FOR AUTOMATICALLY CONTROLLING AIR ACTUATED MECHANISMS OF MACHINES

Filed Jan. 7, 1948 3 Sheets-Sheet 1

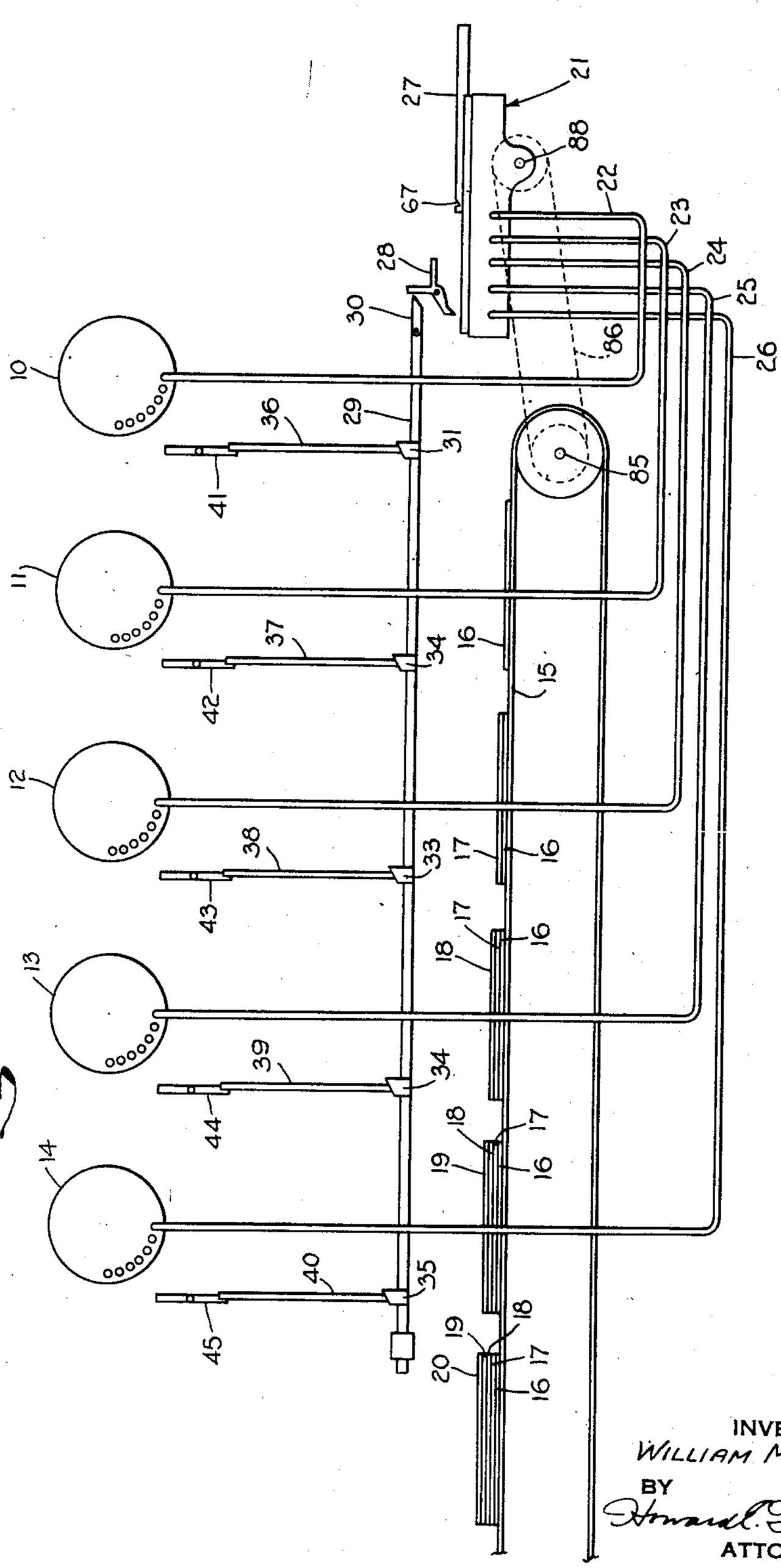

Fig. 1.

INVENTOR
WILLIAM M. KELLY
BY
Howard C. Thompson
ATTORNEY

Sept. 29, 1953

W. M. KELLY

DEVICE FOR AUTOMATICALLY CONTROLLING AIR ACTUATED MECHANISMS OF MACHINES

2,653,627

Filed Jan. 7, 1948

3 Sheets--Sheet 2

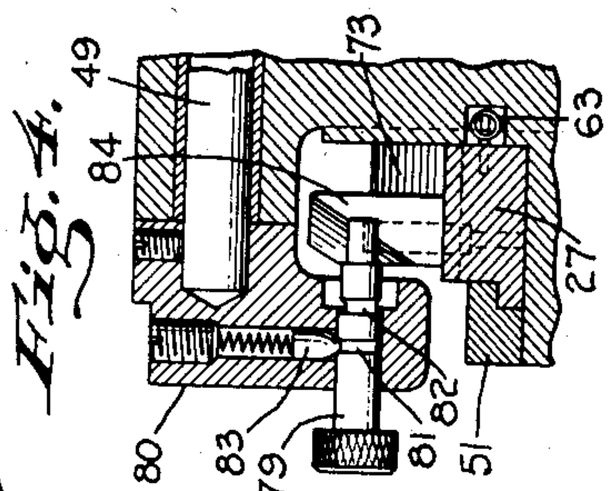

Fig. 4.

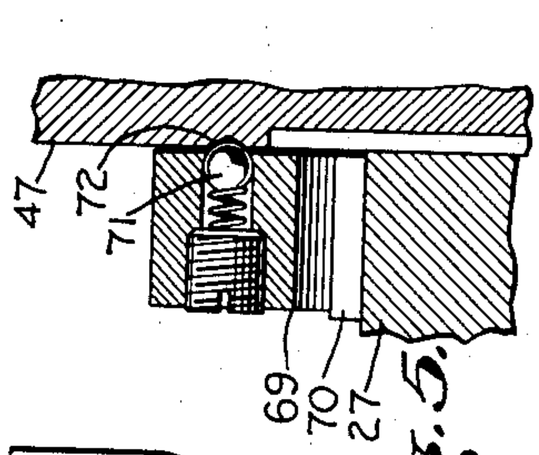

Fig. 5.

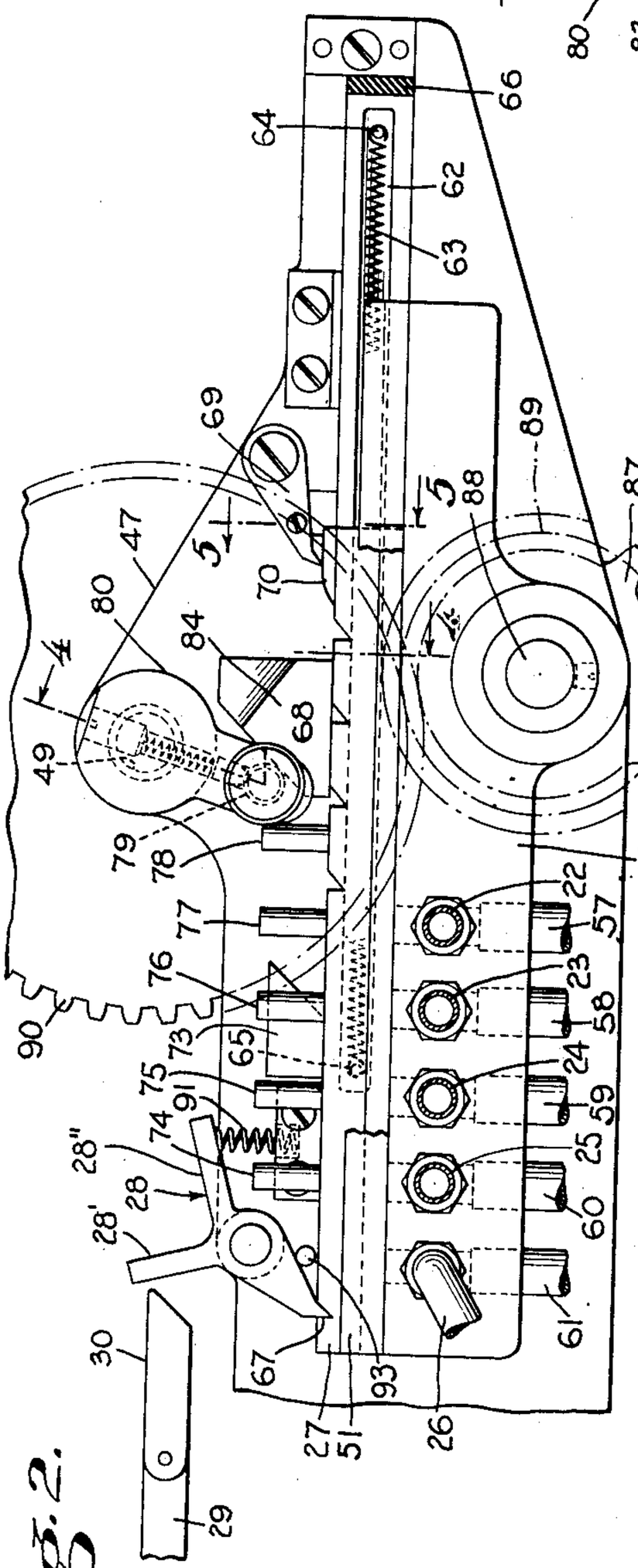

Fig. 2.

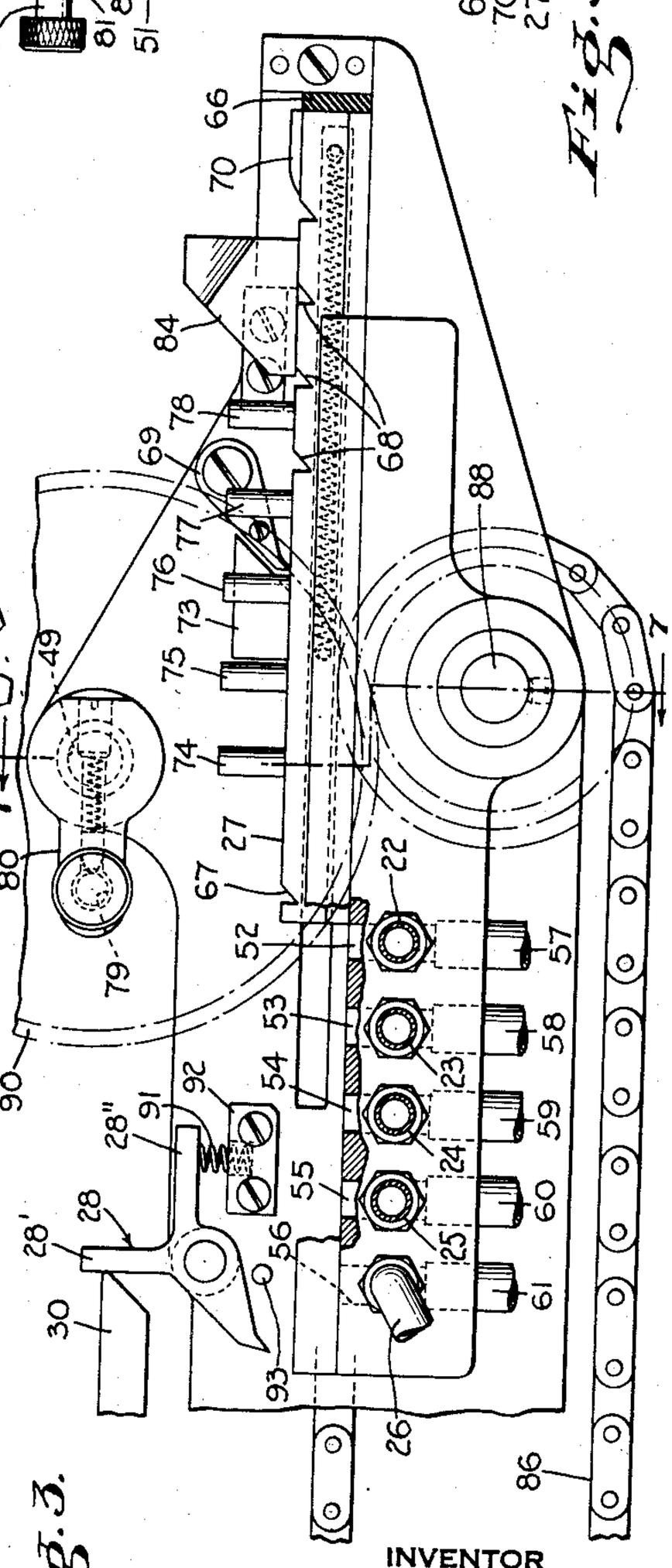

Fig. 3.

INVENTOR
WILLIAM M. KELLY
BY
Howard C. Thompson
ATTORNEY

Sept. 29, 1953 W. M. KELLY 2,653,627

DEVICE FOR AUTOMATICALLY CONTROLLING AIR ACTUATED MECHANISMS OF MACHINES

Filed Jan. 7, 1948 3 Sheets--Sheet 3

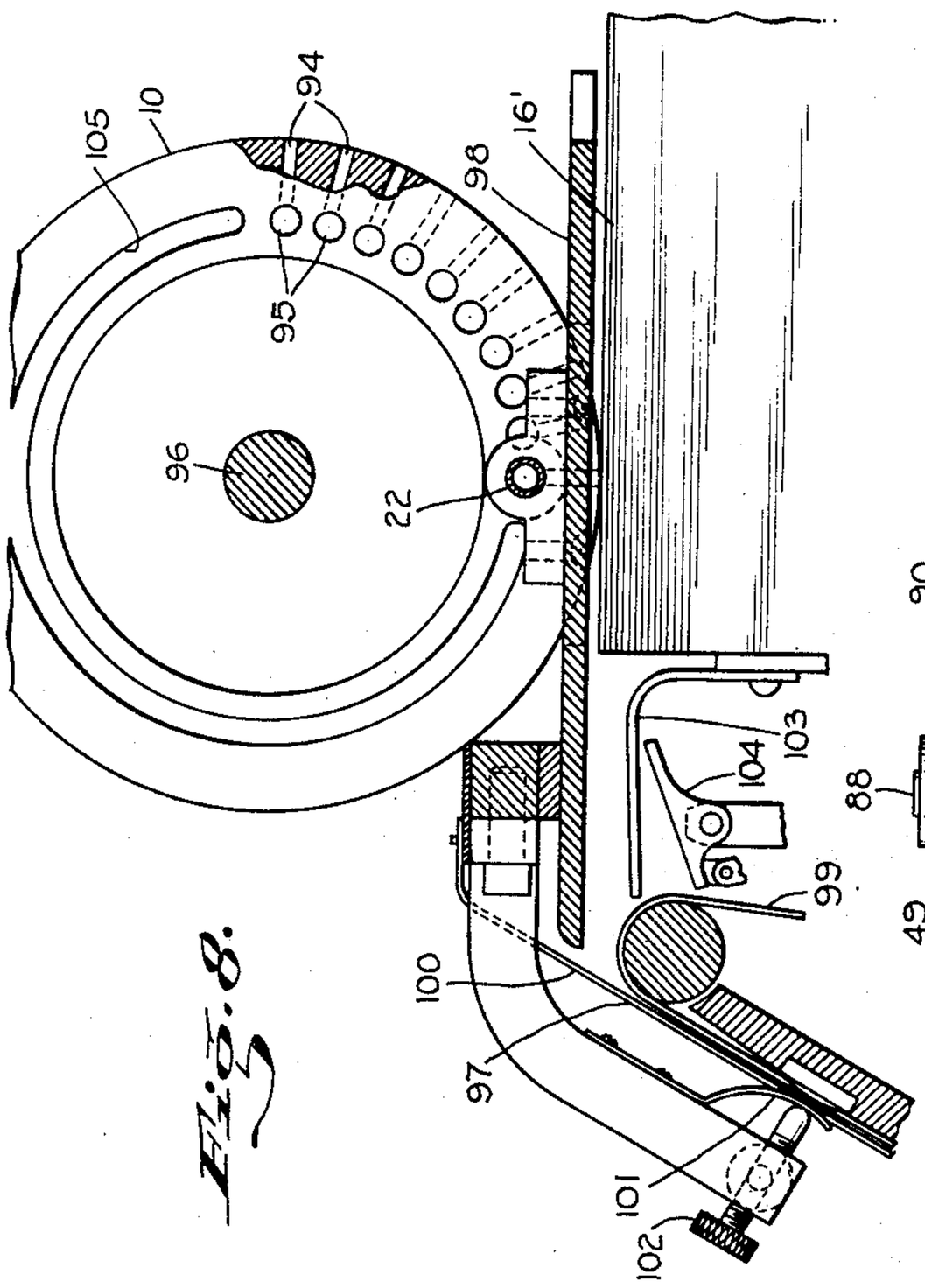

Fig. 8.

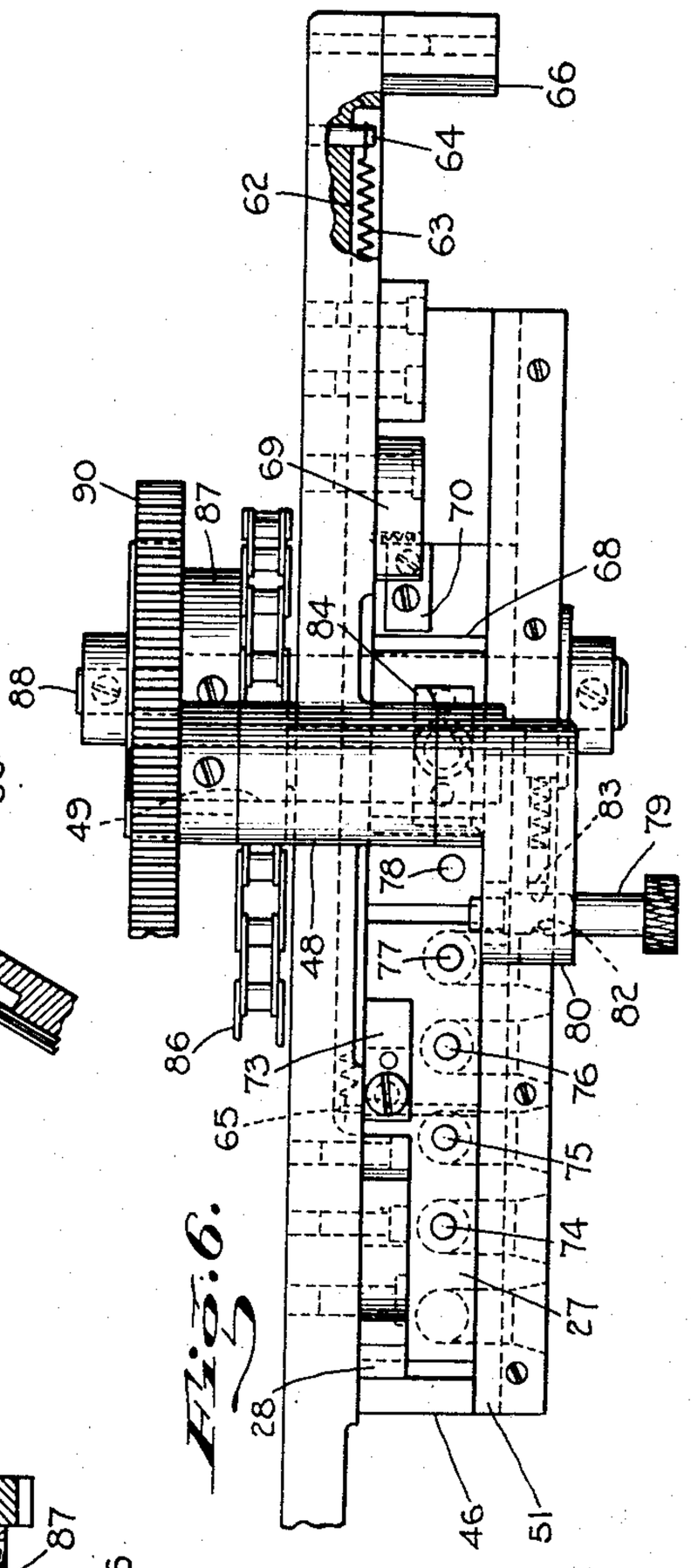

Fig. 6.

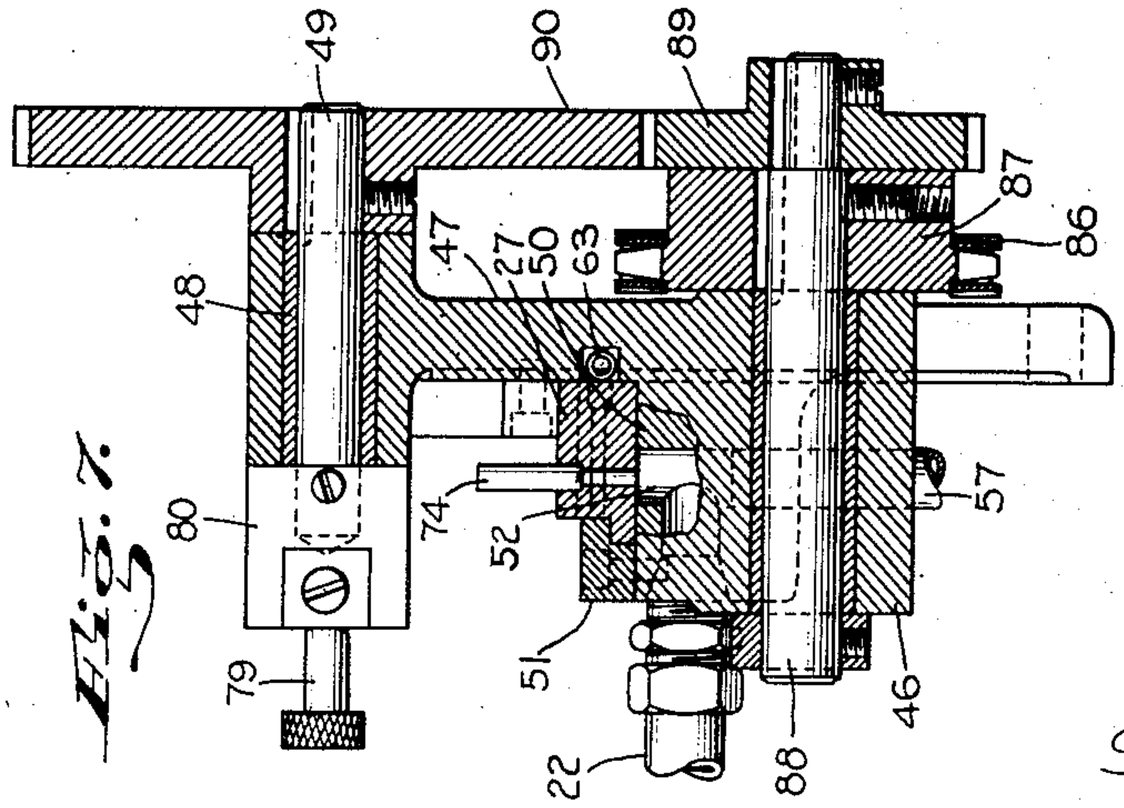

Fig. 7.

INVENTOR
WILLIAM M. KELLY
BY
Howard Thompson
ATTORNEY

Patented Sept. 29, 1953

2,653,627

UNITED STATES PATENT OFFICE

2,653,627

DEVICE FOR AUTOMATICALLY CONTROLLING AIR ACTUATED MECHANISMS OF MACHINES

William M. Kelly, Westfield, N. J., assignor to John Confort, New York, N. Y.

Application January 7, 1948, Serial No. 864

10 Claims. (Cl. 137—633)

1

This invention relates to devices or apparatus for use in conjunction with machines having air controlled or actuated mechanisms or operating units. More particularly, the invention deals with an automatically actuated mechanism controlling actuation of said units, primarily in maintaining constant synchronized operation of all units of the machine, and whereby in the event that one unit fails to perform its normal function, the operation of all units will be discontinued. Still more particularly, the invention deals with a control mechanism of the character described for automatically and successively starting operation of the units of the machine.

The novel features of the invention will be best understood from the following description when taken together with the accompanying drawings, in which certain embodiments of the invention are disclosed, and in which the separate parts are designated by suitable reference characters in each of the views; and in which:

Fig. 1 is a diagrammatic view illustrating a control mechanism as applied to five units of a collating machine.

Fig. 2 is a detailed side view of the control mechanism diagrammatically outlined in Fig. 1, with parts of the construction broken away and with parts in section.

Fig. 3 is a view similar to Fig. 2, showing the parts in a different position.

Fig. 4 is a section on the line 4—4 of Fig. 2.

Fig. 5 is a section on the line 5—5 of Fig. 2.

Fig. 6 is a plan view of the structure as shown in Fig. 2, with parts of the construction in a different position.

Fig. 7 is a section on the broken line 7—7 of Fig. 3, with part of the construction broken away; and

Fig. 8 is an enlarged sectional detailed view of part of one of the machine units, indicating the method of sheet pick-up and delivery of the suction wheel of the unit and to the delivery mechanism of the machine.

In illustrating one adaptation and use of my invention, I have shown the same applied to a collating machine, as more fully and completely described in my prior application Ser. No. 785,020, filed November 10, 1947, now Patent No. 2,634,972 issued April 14, 1953. To diagrammatically illustrate the operation of my improved automatic control mechanism, I have indicated in Fig. 1 of the drawing, at 10, 11, 12, 13 and 14, the suction sheet or workpiece pick-up wheels of five units of the machine, to deliver onto a constantly driven belt or conveyor 15, collated sheets. The first unit

2

of the machine delivering a sheet, as at 16, the second unit delivering a sheet, as at 17, upon a previously delivered sheet 16, a sheet 18 delivered upon the previously delivered sheet 17, a sheet 19 upon a previously delivered sheet 18, and finally a sheet 20 upon a previously delivered sheet 19, so that the conveyor will deliver from the end of a machine onto a suitable receiver, five sheets, disposed one upon the other.

At 21, I have diagrammatically outlined in Fig. 1 of the drawing, my automatic control mechanism, which is shown more in detail in Figs. 2 to 8 inclusive, the mechanism 21 having five suction pipes or tubes 22, 23, 24, 25 and 26, directed to the suction wheels 10 to 14 inclusive of the respective units. At 27, in Fig. 1, I have diagrammatically shown the control or slide valve of the mechanism 21, which is held and released by a pawl 28, the latter being tripped by a trip rod 29, having at the end adjacent the pawl 28, a swingable finger 30 which is raised to inoperative position in setting the machine in operation and then lowered to the operated position, shown in Fig. 1. Spaced along the rod 29, at each of the machine units, controlled by the wheels 10 to 14 inclusive, are bevelled blocks 31, 32, 33, 34 and 35, engaged by actuating plungers 36, 37, 38, 39 and 40 respectively, the latter being controlled by dogs 41, 42, 43, 44 and 45, operated through sheet delivery mechanism of the separate units of the machine, so that as each unit delivers its sheet, the dogs are moved into an inoperative position with respect to said plungers, but should a sheet fail to be delivered by any one of the units, the dog will assume the full line position as shown, and be moved downwardly to move the bar 29 to the right, tripping the pawl 28 to release or free the slide valve 27. All of this operating mechanism, which is only diagrammatically shown in Fig. 1, is fully and completely disclosed in the application hereinbefore mentioned. It will here be understood that my improved control mechanism is adapted for use in controlling any type and kind of machine operation where a plurality of units are employed, each unit having air actuated means under the control of the mechanism employed.

Turning now to Figs. 2 to 8 inclusive, it will appear that the mechanism 21 comprises a suitable block or frame 46, having a raised wall portion 47, in which is arranged a bearing 48 for a crank shaft 49. The block or frame, forwardly of the raised portion has an elongated flat platform 50, to the outer edge portion of which is secured a flanged channel forming rail 51, forming an elon-

gated channel on the platform for guiding the slide valve 27 thereover. The block or frame 46 has at one end portion thereof, five equally spaced apertures opening through the platform 50, these apertures being shown at 52, 53, 54, 55 and 56, in Fig. 3 of the drawing. The pipes or tubes 22 to 26 communicate with said apertures successively, as will clearly appear in said figure, and also communicating with said apertures are suction tubes leading to independent suction creating devices, not shown, the latter tubes being shown at 57, 58, 59, 60 and 61, in Fig. 3.

At this time, it will be apparent that in Fig. 3, the slide valve 27 is shown in its inoperative position, exposing all of the apertures 52—56, thus no suction will prevail in the tubes 22 to 26 respectively. However, as each aperture 52—56 is successively closed by the slide valve, in operation thereof as later described, suction will be created in the successive pipes or tubes 22 to 26 to automatically put the suction wheels 10—14 into operation, thereby starting sheet pick-up operation of each unit of the machine.

Considering Fig. 6 of the drawing, it will appear that the surface of the frame, or part of the frame, has an elongated recess 62 in which is arranged a spring 63 secured to a post 64 at one end of the recess and to the slide 27, as indicated at 65. The spring 63 normally supports the slide 27 in inoperative position shown in Fig. 3, with one end of the slide up against a cushioning stop 66. The upper surface of the slide has at one end, a notch 67 adapted to be engaged by the pawl 28, to hold the slide in operative position, as seen in Fig. 2, and a series of other notches 68 are provided in the surface of the slide to be engaged by a gravity actuating catch 69 in holding the slide in position in each step-by-step movement thereof from the inoperative to the operative position. The catch 69 is moved into a raised inoperative position by a cam portion 70 on the slide when the slide reaches the position shown in Fig. 2, and in this position, the catch is supported by a spring pressed ball 71, operating in a recess 72 in the frame, as clearly seen in Fig. 5 of the drawing. The catch 69 is released from this raised position and moved into its free gravity operating position on movement of the slide from the operative, to the inoperative position by a cam or trip device 73, secured to the slide, and which will appear from a consideration of Fig. 3 of the drawing.

Suitably spaced, and projecting from the upper surface of the slide 27, are a plurality of feed pins 74, 75, 76, 77 and 78. In the inoperative position of the slide, the pin 74 is in a position adapted to be engaged by a manually and automatically operated control pin 79, movably supported in a crank 80, secured to the shaft 49. The pin 79 has two annular grooves 81 and 82 adapted to be engaged by a spring actuated button or finger 83, in supporting the pin 79 in the operative position shown in Fig. 4, as well as in the inoperative position shown in Fig. 6.

In starting the machine, the pin 79 is moved inwardly by hand to the operative position shown in Fig. 4, then upon each complete revolution of the crank 80, the pin 79 will engage successive pins 74 to 78, advancing the slide step-by-step in successively closing the aperture 52—56 and successively causing suction to be created in the tubes 22—26 in starting sheet pick-up operation of the wheels 10—14. When the slide reaches its fully operated position, as seen in Fig. 2, a cam block 84, on the slide, is brought into position to be

engaged by the pin 79 to automatically move the pin from the operative position shown in Fig. 4, to the inoperative position shown in Fig. 6, thus moving the pin out of the path of the pins 74—78 and allowing the latter, including the slide 27, to move from the position of Fig. 2, to the position of Fig. 3, notwithstanding the constant rotation of the crank 80.

Returning for a moment to Fig. 1 of the drawing, here is diagrammatically indicated at 85, the main drive shaft of a machine, from which the belt 15 is driven, as well as the various mechanisms of the respective units of the machine, and also driven from the shaft 85 through a chain indicated in dot and dash lines at 86 in Fig. 1, and shown in full lines in Fig. 3, passes over a sprocket 87 on a driven shaft 88. The shaft 88 is mounted in the block or frame 46 and on this shaft is a gear 89 which meshes with a gear 90 on the crank shaft 49, as most clearly shown in Fig. 7 of the drawing.

The pawl 28 has two extending fingers or arms 28′ and 28″, the first being adapted to be engaged by the trip or release rod 29, or the extension 30 thereon, and the latter being engaged by the spring 91, suitably supported in the frame, as seen at 92. The spring 91 normally supports the pawl in an operative position, as seen in Fig. 2, in engagement with the notch 67 or against a suitable stop, as at 93.

Turning now to Fig. 8 of the drawing, here is shown somewhat more in detail, part of one of the units of the machine, for example, the unit having the suction wheel 10. Each wheel has a series of suction passages 94 opening through the periphery thereof, which communicate with corresponding passages 95 opening through one side of the wheel and adapted to register with the respective tubes, as for example, the tube 22. The wheels, as at 10, are mounted on shafts 96 suitably driven from the drive shaft 85, so as to operate one revolution in each complete revolution of the machine or of the crank 80. Arranged adjacent each wheel is means for supporting a stack or pile of sheets, as at 16′, in Fig. 8, so as to constantly maintain uppermost sheets of the pile in close proximity to the wheel 10 to be picked-up by suction through the passages 94 and feeding the sheets one at a time to sheet delivery means partially shown at 97 in Fig. 8. At 98 is shown a guide plate against the undersurface of which the sheet is fed to the delivery 97 to pass down over a delivery belt 99 and guided onto the belt, as well as over the belt by a finger 100. At 101 is shown a spring finger controlled by a manually adjusted screw 102 to gauge thickness of a sheet passed through the delivery 97 for ultimate transmission or placement onto the conveyor 15. The delivery 97 also includes other means, not shown, which controls operation of the dog 41, so that if a sheet is not delivered by the delivery 97 onto the conveyor 15, the dog will be maintained in its full line position shown in Fig. 1, causing the pawl 28 to be tripped and the slide 27 released for automatic movement from the position shown in Fig. 2, to that shown in Fig. 3. Of course, each unit of the machine is of similar construction, and therefore, no further detailed description or showing is necessary. The sheets from the pile are further guided to the belt 97 by a series of guide fingers 103, note Fig. 8, and adjacent the guide fingers is part of an air blast nozzle 104 for fluttering the uppermost sheets to facilitate pick-up by the wheel 10. The number of suction passages 94 provided in the periphery of the wheel 10

is sufficient to pick-up and feed an uppermost sheet to a point of engagement by the delivery 97, thereafter a blank surface of the wheel will prevail and the suction tube 22 will be exposed to atmosphere in registering with a circumferential exhaust passage 105 in the surface of the wheel. It will be apparent that in the rotation of each wheel, a single sheet is picked-up and then delivered onto the conveyor, thus producing the result which is diagrammatically illustrated in Fig. 1, the belt or conveyor 15 being actuated at such speed as to bring successive sheets in position to receive the deposit of sheets of the next adjacent unit travelling from right to left, as appearing in Fig. 1.

My improved control mechanism provides a simple and substantially foolproof means for controlling operation of a machine employing a predetermined number of air or pneumatically actuated or controlled units, and is particularly applicable to machines such as collating machines, wherein it is desirable to stop operation of the machine when any unit of the machine fails to perform its intended function or operation. In an instant, the controlling element or slide valve of the mechanism is released, thus stopping operation of each unit of the machine. At the same time, the drive mechanism of the machine is not necessarily stopped, so that the instant the particular unit of the machine is rendered operable, by an operator, the continued operation of the machine can be performed without any appreciable delay in machine operation. This latter is extremely desirable where output of the machine is an important factor.

Aside from the manual operation of the pin 79 and of the extension finger 30, the control mechanism is automatic in operation. The extension finger 30 is employed so as to facilitate successive starting of units of the complete machine and to avoid tripping of the pawl, particularly when the slide reaches its last stage of operation, as shown in Fig. 2.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A control device for mechanism of the class described, said device comprising a frame having a plurality of spaced pneumatic passages, suction tubes communicating with said passages, each of said passages being normally open to atmosphere, a control valve mounted in said frame, means actuating said valve intermittently to close said passages successively, means retaining the valve in successive passage closing positions, means engaging the valve to hold the same in operative position for closing all of said passages, and tripping means for causing said valve holding means to be withdrawn, thereby releasing said valve for movement into inoperative position for opening all of said passages to atmosphere simultaneously.

2. A control device for mechanism of the class described, said device comprising a frame having a plurality of spaced pneumatic passages, suction tubes communicating with said passages, each of said passages being normally open to atmosphere, a control valve mounted in said frame, means actuating said valve intermittently to close said passages successively, means retaining the valve in successive passage closing positions, means engaging the valve to hold the same in operative position for closing all of said passages, tripping means for causing said valve holding means to be withdrawn, thereby releasing said valve for movement into inoperative position for opening all of said passages to atmosphere simultaneously, and means moving and holding the valve normally in inoperative position.

3. A control device for mechanism of the class described, said device comprising a frame having a plurality of spaced pneumatic passages, suction tubes communicating with said passages, each of said passages being normally open to atmosphere, a control valve mounted in said frame, means actuating said valve intermittently to close said passages successively, means retaining the valve in successive passage closing positions, means engaging the valve to hold the same in operative position for closing all of said passages, tripping means for causing said valve holding means to be withdrawn, thereby releasing said valve for movement into inoperative position for opening all of said passages to atmosphere simultaneously, means moving and holding the valve normally in inoperative position, and means moving the first named valve retaining means into inoperative position on completion of movement of the valve into final operative position.

4. A control device for mechanism of the class described, said device comprising a frame having a plurality of spaced pneumatic passages, suction tubes communicating with said passages, each of said passages being normally open to atmosphere, a control valve mounted in said frame, means actuating said valve intermittently to close said passages successively, means retaining the valve in successive passage closing positions, means engaging the valve to hold the same in operative position for closing all of said passages, tripping means for causing said valve holding means to be withdrawn, thereby releasing said valve for movement into inoperative position for opening all of said passages to atmosphere simultaneously, means moving and holding the valve normally in inoperative position, means moving the first named valve retaining means into inoperative position on completion of movement of the valve into final operative position, and manually actuated means controlling operation of said second named means.

5. A control device for mechanism of the class described, said device comprising a frame having a plurality of spaced pneumatic passages, suction tubes communicating with said passages, each of said passages being normally open to atmosphere, a control valve mounted in said frame, means actuating said valve intermittently to close said passages successively, means retaining the valve in successive passage closing positions, means engaging the valve to hold the same in operative position for closing all of said passages, tripping means for causing said valve holding means to be withdrawn, thereby releasing said valve for movement into inoperative position for opening all of said passages to atmosphere simultaneously, means moving and holding the valve normally in inoperative position, means moving the first named valve retaining means into inoperative position on completion of movement of the valve into final operative position, manually actuated means controlling operation of said second named means, and means on said valve automatically moving said manually actuated means into inoperative position upon movement of the valve into its final operative position.

6. A valve control station for mechanisms of the class described, said station having a series of passages normally exposed to atmosphere, suction tubes communicating with said passages, a valve disposed for travel from an inoperative

position step by step to successive positions covering said passages one after another until said valve occupies a final operative position in which all of said passages are covered and closed to atmosphere, means for holding said valve at rest in said operative position, tripping means for releasing said holding means, and means to then move the valve in a single motion to its inoperative position for opening all of said passages to atmosphere simultaneously.

7. A valve control mechanism having a series of passages normally exposed to atmosphere, said mechanism comprising a frame in which said passages are arranged, suction tubes coupled with the frame and communicating with said passages, a slide valve mounted in the frame and movable from an inoperative position step by step to successive positions covering said passages one after another until said valve occupies a final operative position in which all of said passages are covered, a crank shaft rotatably mounted in the frame, a crank on said shaft, a plurality of projections spaced longitudinally of said valve, a pin on said crank adapted to be manually moved into position to engage the projections on the valve in the step by step movement of the valve into operative position, and means engaging the valve to hold the same in operative position.

8. A valve control mechanism having a series of passages normally exposed to atmosphere, said mechanism comprising a frame in which said passages are arranged, suction tubes coupled with the frame and communicating with said passages, a slide valve mounted in the frame and movable from an inoperative position step by step to successive positions covering said passages one after another until said valve occupies a final operative position in which all of said passages are covered, a crank shaft rotatably mounted in the frame, a crank on said shaft, a plurality of projections spaced longitudinally of said valve, a pin on said crank adapted to be manually moved into position to engage the projections on the valve in the step by step movement of the valve into operative position, means engaging the valve to hold the same in operative position, tripping means to release said holding means, and means to then move the valve in a single movement into inoperative position for opening all of said passages to atmosphere simultaneously.

9. A valve control mechanism having a series of passages normally exposed to atmosphere, said mechanism comprising a frame in which said passages are arranged, suction tubes coupled with the frame and communicating with said passages, a slide valve mounted in the frame and movable from an inoperative position step by step to successive positions covering said passages one after another until said valve occupies a final operative position in which all of said passages are covered, a crank shaft rotatably mounted in the frame, a crank on said shaft, a plurality of projections spaced longitudinally of said valve, a pin on said crank adapted to be manually moved into position to engage the projections on the valve in the step by step movement of the valve into operative position, means engaging the valve to hold the same in operative position, and means on said valve for movement of the manually actuated pin of said crank into inoperative position with respect to the valve projections upon completion of movement of the valve into operative position.

10. A control device for mechanisms of the class described, said device comprising a frame having spaced suction tubes, the frame having passages in communication with said suction tubes, said passages being normally exposed to atmosphere through a straight flat surface of said frame, means slidably mounted on said flat surface for covering said passages one at a time until the passages communicating with all of said tubes are closed in the final operative position of said means, and means releasing said covering means for movement into inoperative position, opening all of said passages to atmosphere.

WILLIAM M. KELLY.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
806,692	Meyersberg	Dec. 5, 1905
1,600,022	Van Heek	Sept. 14, 1926
1,655,423	Juengst	Jan. 10, 1928
1,741,848	Kelly	Dec. 31, 1929
1,752,744	King	Apr. 1, 1930
1,763,728	Turner	June 17, 1930
1,801,181	Troyer	Apr. 14, 1931
1,920,949	Herrmann	Aug. 1, 1933
2,020,321	Kleineberg	Nov. 12, 1935
2,145,520	McFarlane	Jan. 31, 1939
2,167,470	West	July 25, 1939