Nov. 27, 1956 C. THUMIM 2,771,948

CUTTING KNIFE-STACK SUPPORT

Filed Dec. 12, 1952 4 Sheets-Sheet 1

FIG. 1

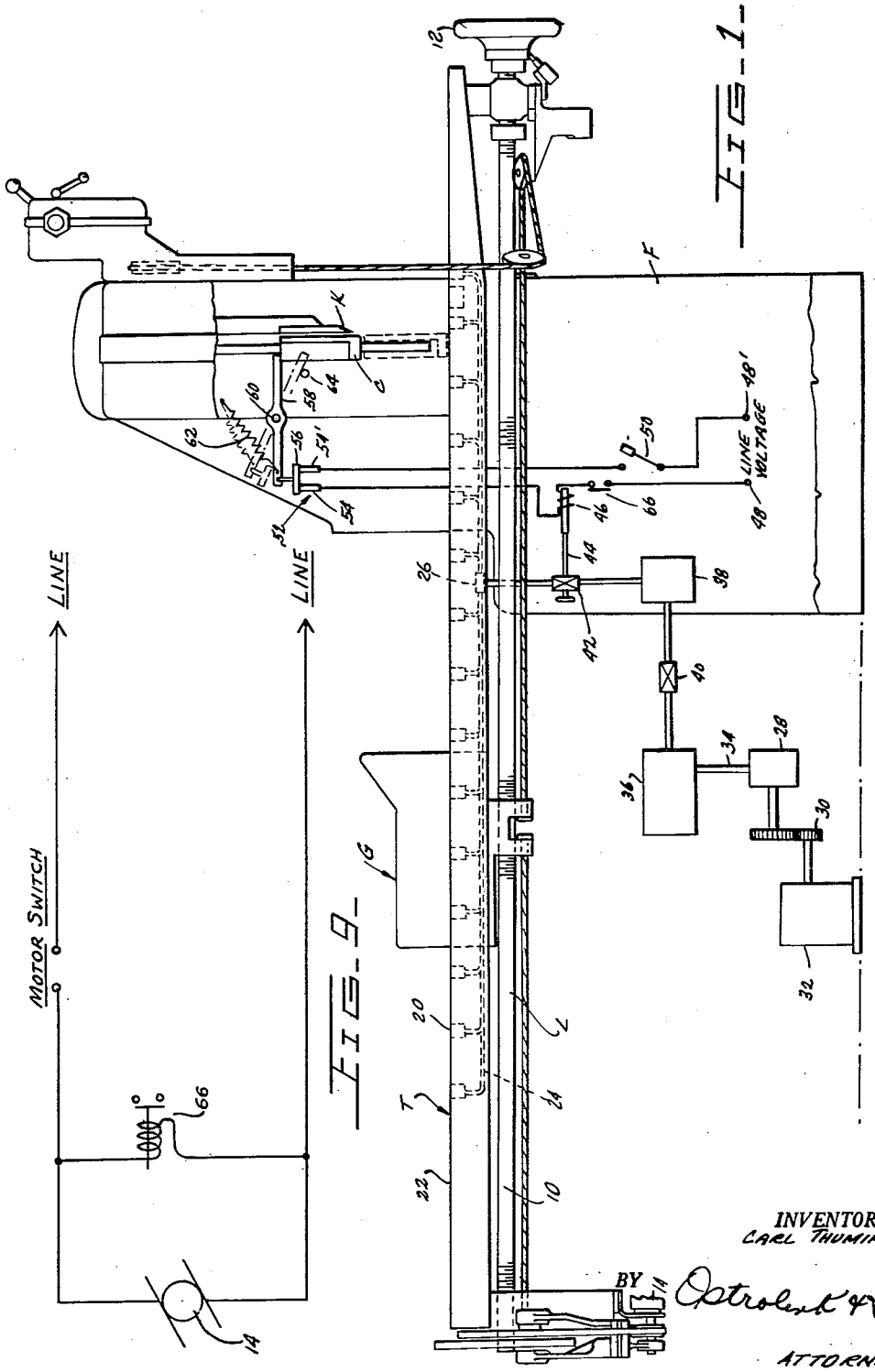


FIG. 2

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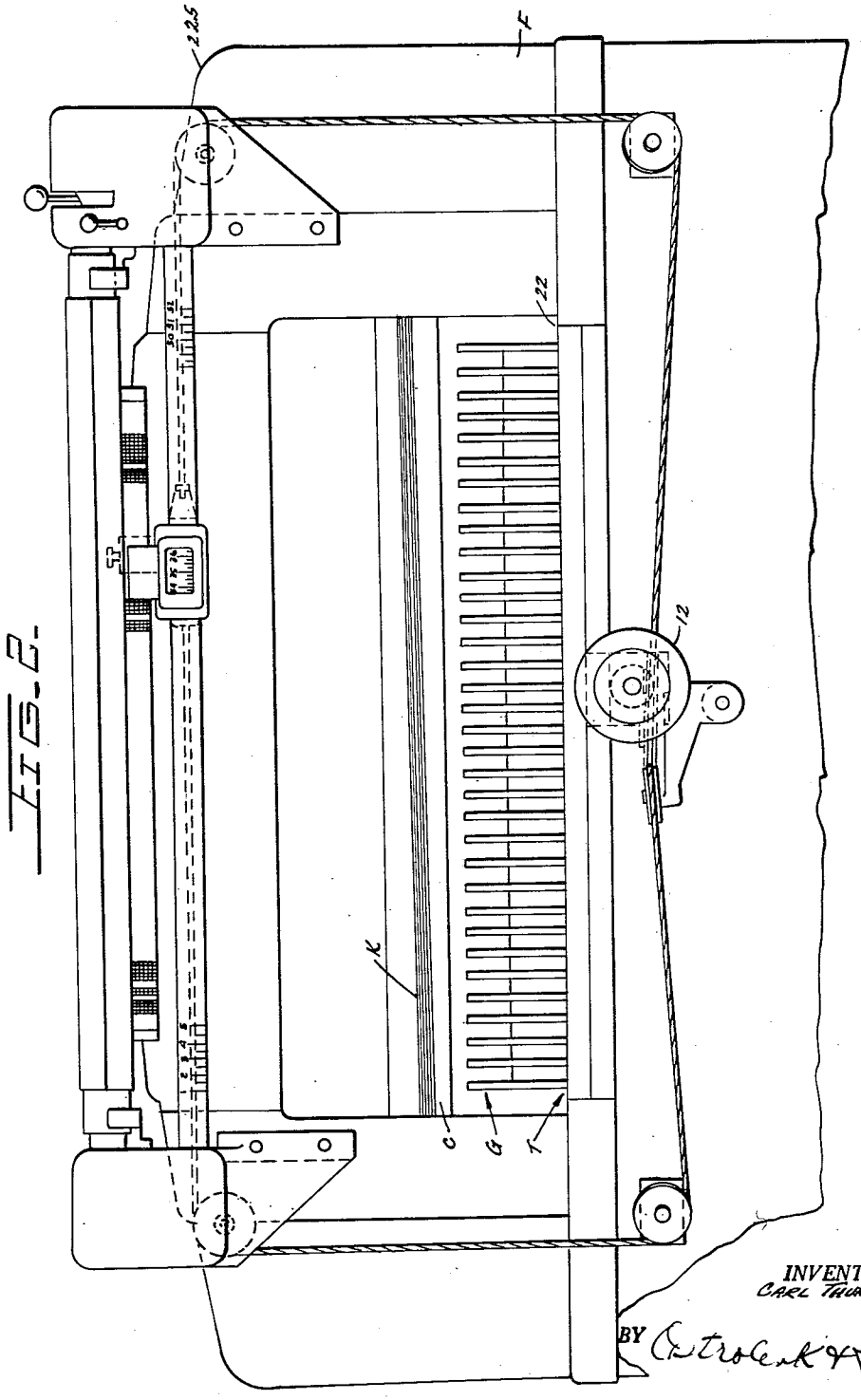


FIG. 2.

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CUTTING KNIFE-STACK SUPPORT

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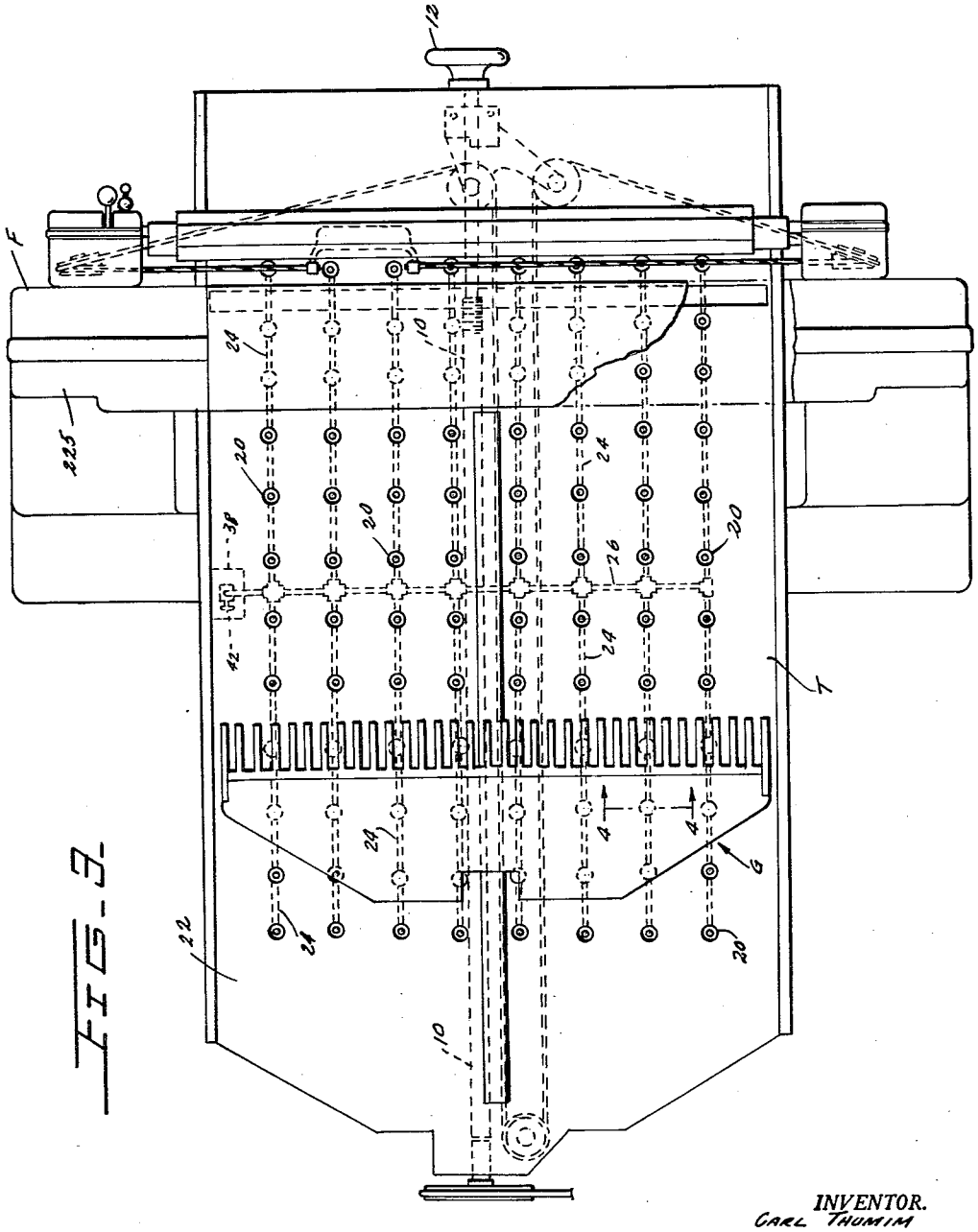


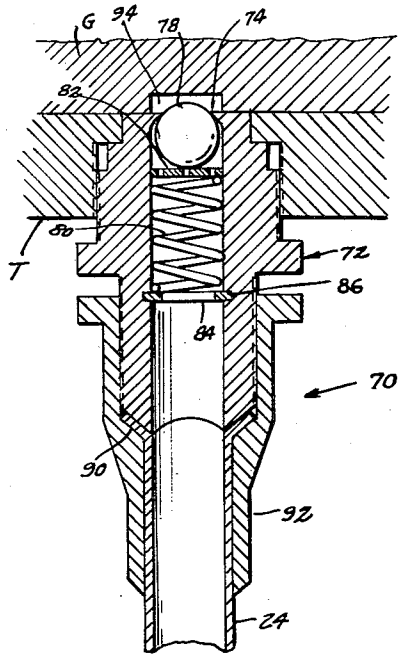
FIG. 3

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FIG. 4.



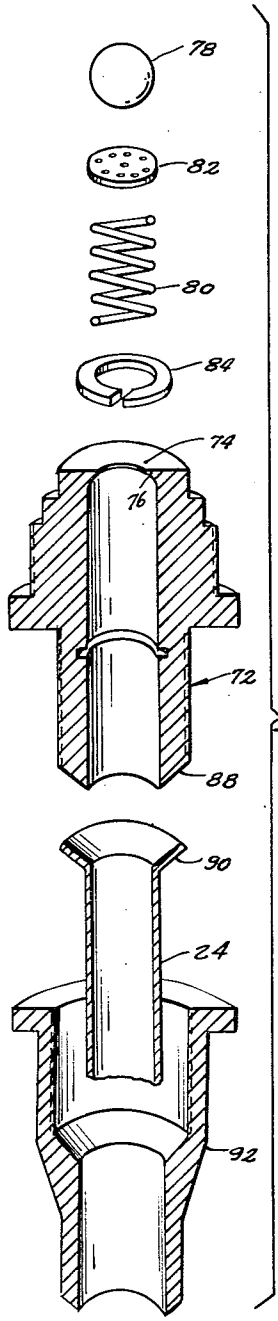


FIG. 5.

FIG. 6.

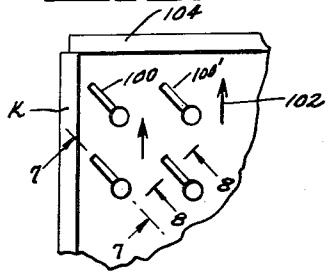


FIG. 7.

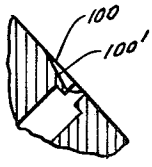
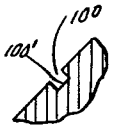


FIG. 8.



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CUTTING KNIFE-STACK SUPPORT

Carl Thumim, Lansdowne, Pa., assignor to E. P. Lawson Co., Inc., New York, N. Y., a corporation of New York

Application December 12, 1952, Serial No. 325,625

4 Claims. (Cl. 164—51)

This invention relates to cutting machines of the type which are used for severing heavy stacks of paper sheets, known as guillotine type paper cutters, and more particularly to a novel table which renders manual handling of paper thereon easier and more convenient.

In general, when a stack of paper is to be severed at predetermined lines, each severance requires the entire stack to be moved by the back gauge. Since a stack of paper may weigh upwards of a hundred pounds or more, it will be readily apparent that maneuvering of the paper stack to locate it properly with respect to the back gauge or to remove it from the table is tiring to an operator.

My present invention is intended to reduce the force necessary for sliding or maneuvering a paper pile resting on a cutting machine table and has for its objects the provision of means which are easily manufactured and readily incorporated in a cutting machine.

A further object of my invention is to provide means for minimizing the force necessary to maneuver a pile of paper which means is of a relatively simple nature and usable with a minimum of operating expense as well as being rugged and dependable over a long period of time without maintenance and repair difficulties.

Briefly, my invention comprises the provision of a plurality of ports in the cutting table surface underlying paper normally stacked thereon. The ports are connected with a source of compressed air controllable either automatically or at the will of an operator and whereby a film of air is forced between the lowermost sheet of the pile and the table surface. The effect is analagous to placing a lubricant film between two heavily engaged surfaces. Thus, the entire pile, heavy though it may be, is much more readily shifted to predetermined positions for cutting purposes below the knife.

Specifically, my construction comprises ports arranged in a symmetrical pattern of generally, but not necessarily, rectangular configuration and having a few inches of spacing between them. Each port is provided with a valve operator element that protrudes slightly above the table surface. When a stack of paper is on the table, the weight thereof is sufficient to press down on the operator elements so as to permit egress of air from the respective ports. Thus, compressed air is fed only to ports covered by the paper stack and finds access therethrough to the bottom surface of the paper stack for the purpose set forth.

My invention will now be described in conjunction with the accompanying drawing in which:

Figure 1 is a side elevational view of a novel paper cutting machine embodying features of the present invention.

Figure 2 is a front elevational view of the paper cutting machine of Figure 1 showing the back gauge, cable attachment and controlled carriage of the automatic spacer cutting machine.

Figure 3 is a plan view of the machine of Figure 1

showing such elements as are essential to an understanding of the present invention.

Figure 4 is an enlarged fragmentary detail taken along line 4—4 of Figure 3.

Figure 5 is an exploded perspective view, with parts sectioned, of one of the valves used to control air to the plurality of ports.

Figure 6 is a fragmentary top plan view of a modified table top embodying further features of the present invention.

Figure 7 is a sectional view taken along line 7—7 of Figure 6 and looking in the direction of the arrows.

Figure 8 is a sectional view taken along line 8—8 of Figure 6 and looking in the direction of the arrows, and

Figure 9 is an electrical diagram showing the mode of connecting certain components of the invention.

My present invention is illustrated as used in conjunction with a cutting machine having the construction disclosed in the co-pending application of Frederick W. Seybold and Nicholas Herman for Automatic Back Gauge Spacer, Serial No. 200,013, filed December 9, 1950, now Patent No. 2,737,158,

Referring now to the drawings, there is shown as much of the construction of the above-identified cutting machine as is necessary to render the description of the present invention clear and lucid. Briefly, the illustrative cutting machine includes a main frame F carrying a horizontally extending cutting table T, a vertically displaceable cutting knife K, a paper clamp C arranged rearwardly of the cutting knife K and lowered against the paper lift with pressure prior to cutting and a back gauge G selectively positioned on the cutting table T to move the paper lift into position for cutting. The back gauge G is driven toward and away from the knife K by a lead screw **10** in threaded engagement with an integral head on the back gauge G, the lead screw **10** being coupled to a hand wheel **12** adjacent the forward end of the machine and to a drive motor **14** adjacent the rearward end of the machine.

The operating mechanism for generally moving the back gauge G, the clamp C and the cutting knife K form no part of the present invention and accordingly their descriptions will be limited to features related to the present disclosure, for the purposes of clarity and simplicity.

In accordance with the present invention, the table T is provided with a plurality of rows of spaced ports or air exits **20**, distributed uniformly about the paper supporting surface **22** of the table T. The number of ports **20** is selected in accordance with the floating action required as will subsequently become apparent. The respective ports are interconnected by internal tubes or passageways **24** in the table T to a common tube or inlet **26** adapted to be connected to a suitable source of air under pressure.

Specifically, an air pump **28** constructed and arranged in accordance with principles well understood per se is connected via appropriate gearing **30** to a drive motor **32**. The high pressure outlet **34** of the pump **28** is connected to a high pressure reservoir **36** and then to a low pressure reservoir **38** via a reducing valve **40**. The low pressure reservoir is connected to the air inlet **26** by an electrically operated three-way valve **42** normally closed and illustrated as a solenoid controlled valve having a solenoid plunger **44** arranged in controlled relation relative to the solenoid coil **46**.

A suitable source of line potential **48**, **48'** is provided for the solenoid coil **46** which forms part of a control circuit arranged to coordinate the admission of air to the ports **20** in dependence upon operation of the back gauge G, the clamp C, and the cutting knife K. Specifically,

when the clamp C is brought into contact with the paper prior to operation of the cutting knife K, it is undesirable to admit air to the inlet 24 via the normally closed air inlet valve 42, since this might result in sidewise displacement of the paper upon engagement therewith of the clamp C. Accordingly, in circuit with a manual operator's switch 50, the closing of which would normally complete the energizing circuit for the solenoid coil 46, there is provided a circuit breaker 52 including fixed contacts 54, 54' and a movable bridging contact 56 supported on one end of a rocking lever 58 pivoted on a pin 60. A spring 62 is connected to the lever 58 and normally biases the same to the position indicated by the broken lines of Figure 1 wherein the circuit breaker 52 is open.

The end of the lever 58 remote from the connection to biasing spring 62 is arranged to overlie the pin 64. Therefore, as the clamp assembly moves from the inoperative or retracted position illustrated by the full lines of Figure 1 to the clamping or extended position illustrated by the broken lines, the lever 58 rocks in the counterclockwise direction due to the bias of spring 62 to open the circuit breaker 52. Since the clamp C moves downwardly just prior to a cutting operation, it follows that air supply to the ports 20 will be precluded during cutting as well as clamping. Of course, return of the clamp C to the retracted or inoperative position results in a closing of the circuit breaker 52 and return to control by the manual switch 50.

A further instance when it is necessary to preclude air supply to the ports 20 is when the back gauge G is in motion to position the paper relative to the knife C. At such times, floating of the paper might cause an overtravel of the paper relative to the adjusted position to which the paper is brought by the back gauge G. To obviate this difficulty, a further switch 66 is connected in the solenoid control circuit, this switch being connected in controlled relation to the back gauge motor 14, i. e., in electrical parallel therewith as shown in Fig. 9, precluding the possibility of activating the solenoid coil 46 when the back gauge G is being adjusted. As a further feature, the three-way valve 42 is arranged to open the air inlet 26 to the atmosphere whenever the supply from the low pressure reservoir 38 is cut off, thereby releasing any lifting pressure which might be available at the ports 20 of the table T as a result of prior introduction of air under pressure to the table T.

Reference will now be made to Figures 4 and 5 wherein the details of air release valves for the respective ports on air exits 20 are shown. The purpose of the valves 70 is to release air only under the paper stack, operation of the valves in predetermined areas of the table T being brought about by the paper being supported thereon. Specifically, each valve 70 is partially recessed upwardly in a complementary cut-out in the table T and includes an externally stepped bushing 72 having a circular open upper end 74 defining a port 20 and formed with a coaxial ball valve seat 76. Within the bushing 72 is an operator element in the form of a ball valve 78 biased against the seat 76 by a spring 80 bearing against a perforated insert 82 and restrained by a split lock ring 84 fitting into an annular depression 86 provided in the bushing 72. As is apparent to those skilled in the art, the diameter of the ball valve 78 is somewhat greater than that of the port defining opening 74. The lower end of the bushing 72 is upwardly and outwardly flared at 88 to receive a complementary flange 90 on the adjacent air tube 24, a suitable pressure coupling 92 providing an air-tight seal therebetween. Accordingly, as the pile proper is brought into position over a predetermined area of the cutting table T, the weight of the pile will depress the operator elements 78 thereunder to release air through the open ports to achieve the desired cushioning effect.

As best seen in Figure 4, the back gauge G is longitudinally slotted in its under surface coextensive with the rows of ports 20, as indicated at 94, to preclude depressing the underlying ball valves 74, thereby avoiding unnecessary loss of air at locations which are not immediately beneath the pile proper.

In Figures 6 to 8, inclusive, there is shown a modified table construction in which each of the ports 20 is provided with an air-directing or channeling slot 100 angularly related to the position of the cutting knife K and the direction of the cutting knife shear. In the illustrative arrangement of Figure 6, the slots 100, including inclined floors 100' merging into the table surface, are directed to the left at an acute angle relative to the direction of cutting shear indicated by the arrows 102. Since the cutting shear of knife K will always tend to push the paper against the adjacent side guard 104, there will be no waste of air which is likewise directed generally toward the guard 104 and the location of the cutting knife K'.

In the foregoing I have described my invention solely in connection with specific illustrative embodiments thereof. Since many variations and modifications of my invention will now be obvious to those skilled in the art, I prefer to be bound not by the specific disclosures herein contained but only by the appended claims.

I claim:

1. A cutting machine comprising a table for supporting paper stock to be cut, said table having a plurality of spaced ports for admission of compressed air to the surface thereof below a quantity of stock thereon, a movable back gauge for said table and a motor for operating said back gauge, means for admitting air to said ports and means for automatically precluding admission of air to said ports operative in response to operation of said back gauge motor.

2. In a cutting machine including a table for supporting paper stock to be cut, a clamp and cutting knife movable independently toward and away from a supporting surface of said table, a back gauge adjustable along said table relative to said knife, said supporting surface being provided with air admission ports adapted to supply an air cushion beneath paper stock supported thereover, a valve including a depressible operating member projecting above said supporting surface and normally constricting each of said ports, a source of air under pressure, a conduit system interconnecting said source and the respective ports, a normally closed, electrically operated, air admission valve in said conduit system, and an energizing circuit for said air admission valve including disabling means operative in response to movement of either said clamp or said back gauge and precluding opening of said normally closed air admission valve.

3. A cutting machine comprising a table for supporting paper stock to be cut, said table having a plurality of spaced ports in the supporting surface thereof for egress therethrough of air under pressure, respective valve means normally constricting each of said ports and each including an operator element projecting above said supporting surface and arranged to open said valve means upon depression by contact with a quantity of stock on said supporting surface, a source of air under pressure for supplying said ports, and a conduit system interconnecting said source and said ports, a clamp movable toward and away from said table, a normally closed air control valve in said conduit system, and disabling means operative in response to movement of said clamp toward said table for precluding opening of said normally closed air control valve.

4. A cutting machine comprising a table for supporting paper stock to be cut, said table having a plurality of spaced ports in the supporting surface thereof for egress therethrough of air under pressure, respective valve means normally constricting each of said ports and each including an operator element projecting above said supporting surface and arranged to open said valve means upon depression by contact with a quantity of stock on said supporting surface, a source of air under

pressure for supplying said ports, and a conduit system interconnecting said source and said ports, a back gauge adjustable along said supporting surface of said table, a drive operatively connected to said back gauge for displacing same into an adjusted position, a normally closed air supply control valve in said conduit system, and disabling means operative in response to operation of said drive for precluding opening of said normally closed air control valve.

References Cited in the file of this patent

UNITED STATES PATENTS

629,140	Vollkommer	July 18, 1899
1,900,781	Wardley	Mar. 7, 1933
2,117,797	Flynn et al.	May 17, 1938
2,314,645	Duda	Mar. 23, 1943
2,366,443	Deans	Jan. 2, 1945
2,538,972	Magnani	Jan. 23, 1951
2,651,549	Ross	Sept. 8, 1953

FOREIGN PATENTS

17,472	Great Britain	1902