

Sept. 3, 1940.

J. W. LEE ET AL.

2,213,674

PAPER DRILLING MACHINE

Filed Nov. 8, 1939

5 Sheets-Sheet 1

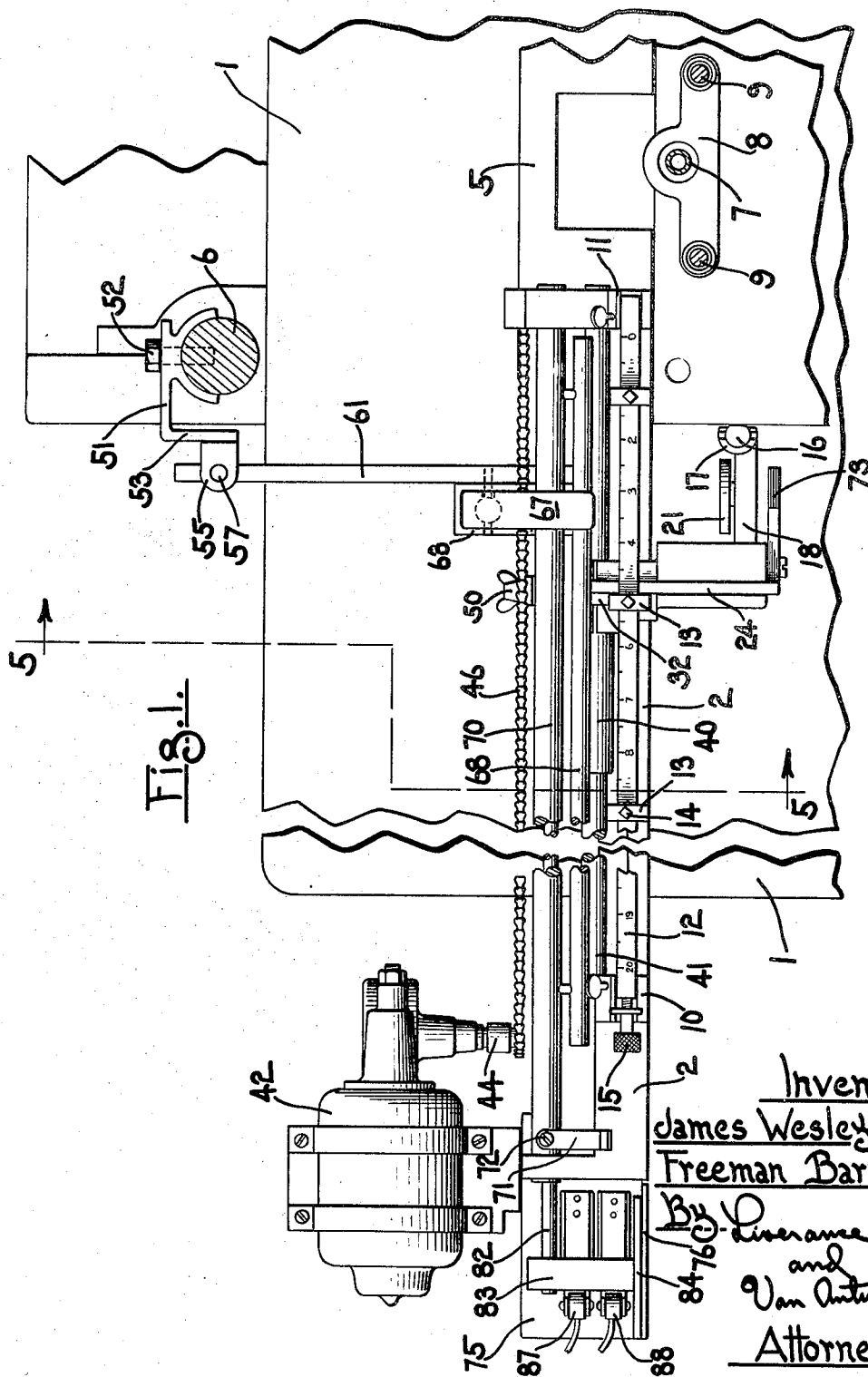


Fig. 1.

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5 Sheets-Sheet 2

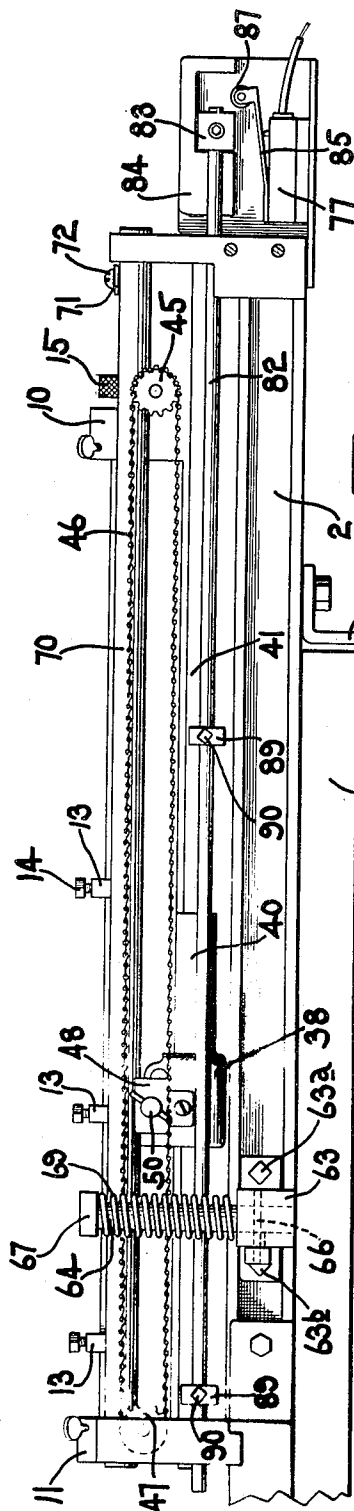


Fig. 2.

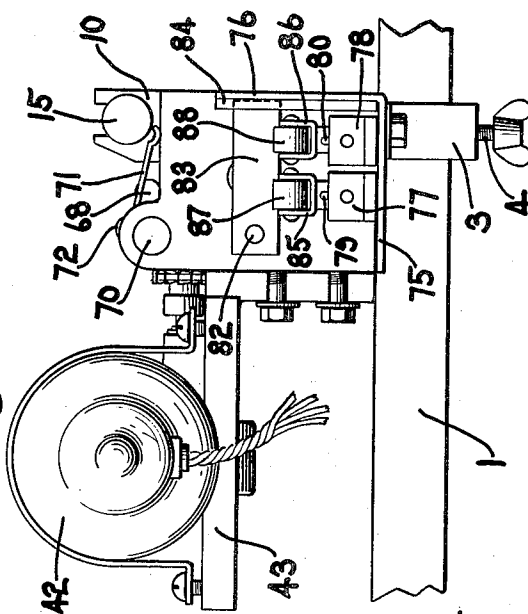


Fig. 3.

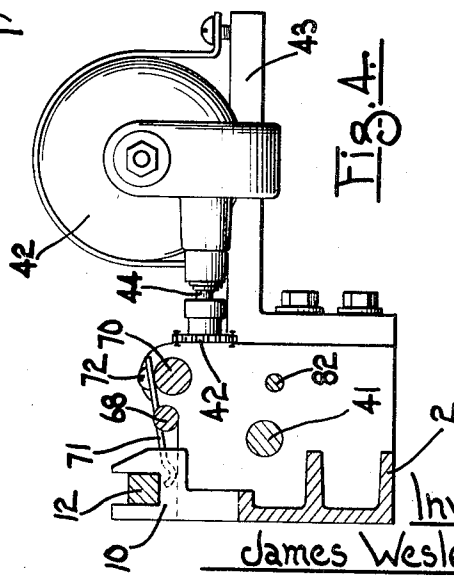


Fig. 4.

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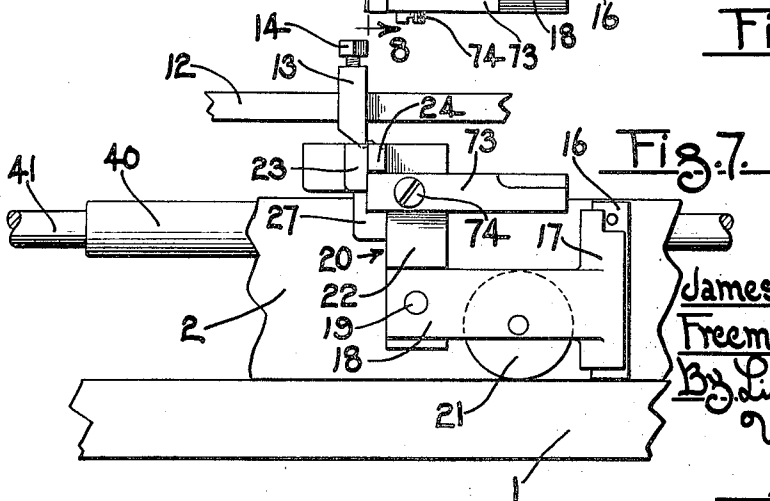
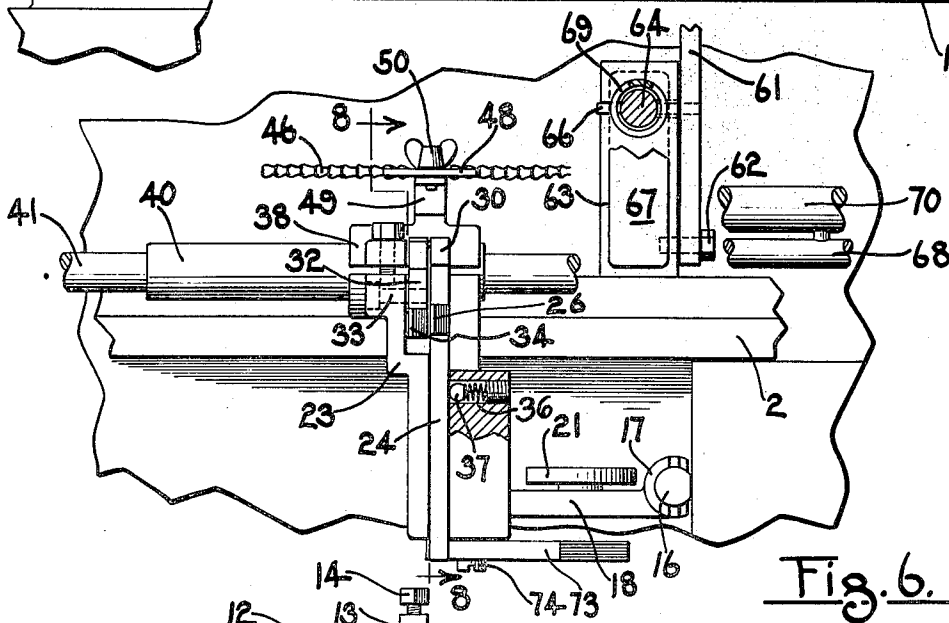
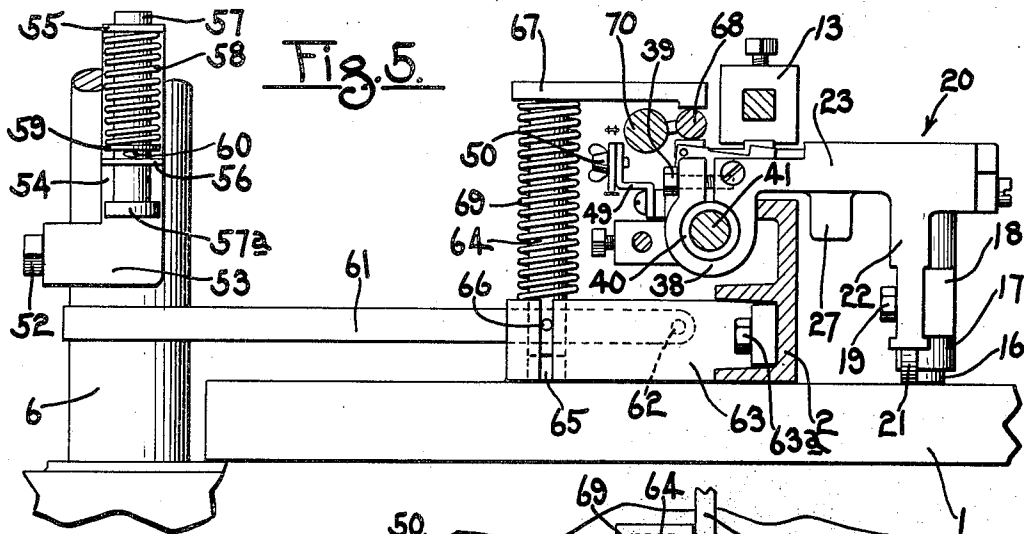
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2,213,674

PAPER DRILLING MACHINE

Filed Nov. 8, 1939

5 Sheets-Sheet 3



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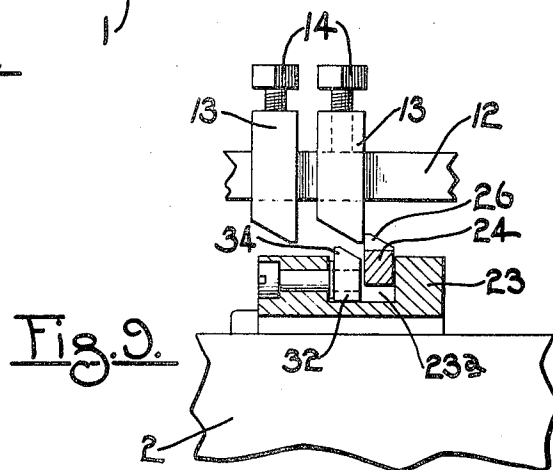
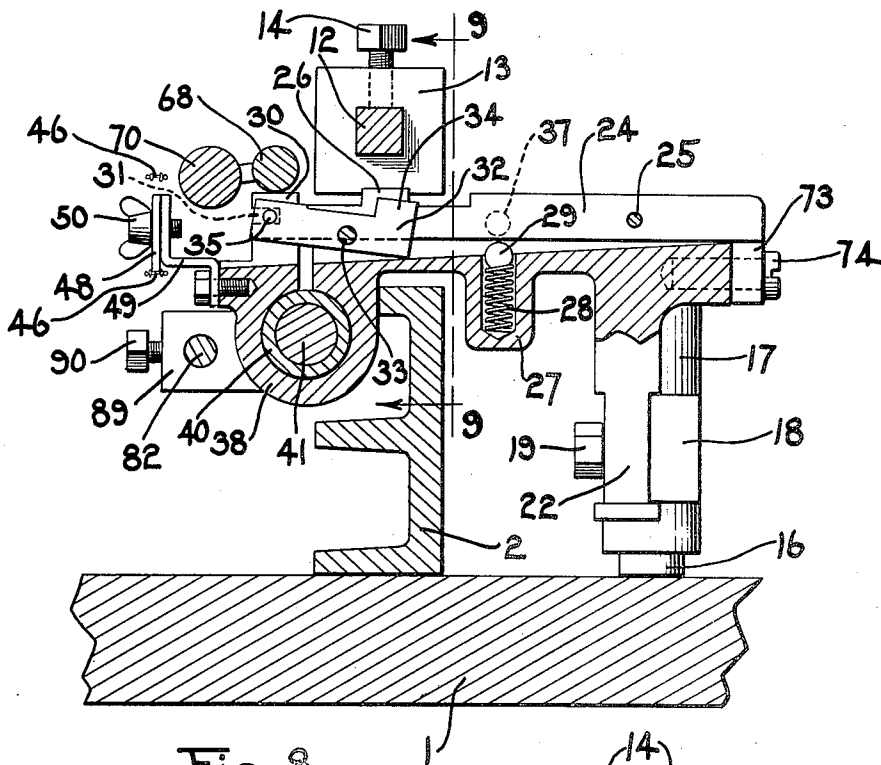
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PAPER DRILLING MACHINE

Filed Nov. 8, 1939

5 Sheets-Sheet 4



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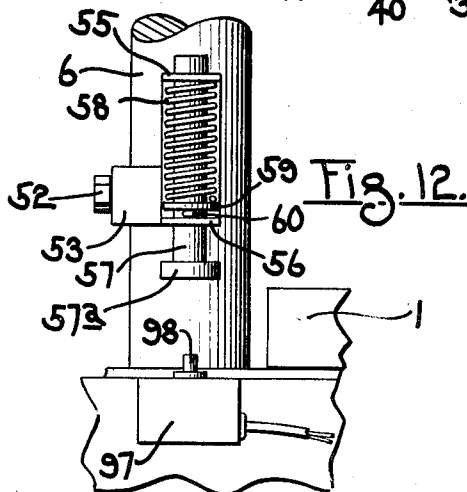
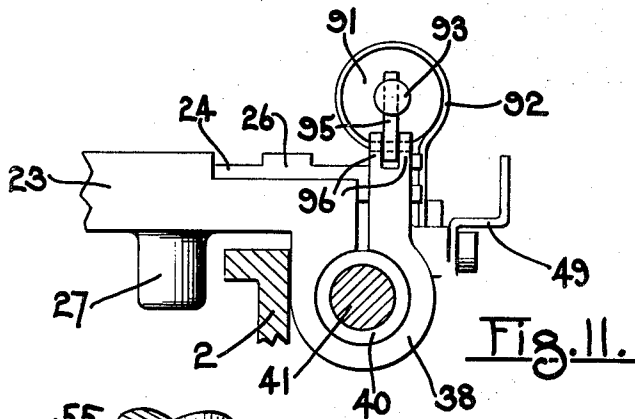
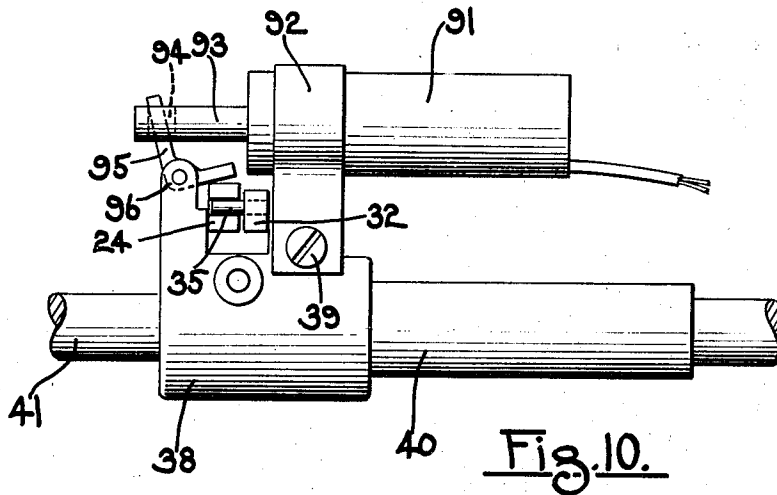
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5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

2,213,674

PAPER DRILLING MACHINE

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Application November 8, 1939, Serial No. 393,375

21 Claims. (Cl. 164—86)

This invention relates in general to paper drilling machines and it has for its particular object the provision of a construction for automatically changing the position of a side gauge or guide for a pack of paper sheets to new positions against which the pack may be moved, whereupon in each position a drilling operation may be made to drill holes through the several sheets in the sheet pack.

Another object of the invention is to provide means which, after a pack of paper sheets has had all of the desired holes drilled therethrough, will automatically reset the side gauge to a predetermined initial position at which the first hole through a pack of paper sheets may be drilled, followed by a repetition of the automatic movement of the sheet pack locating means to other positions and other holes to be drilled.

With this construction, packs of paper sheets, the sheets generally being of the same size in all packs, or at least of the same width, will be very rapidly and efficiently drilled, one pack of paper sheets after the other being operated upon by the machine and each pack removed when the desired number of holes therethrough have been made.

Our invention is applied to paper drilling machines upon which the pack of paper sheets to be drilled is placed on a horizontal table against a longitudinal back gauge secured over the table and also against a side gauge which is mounted for movement with reference to the back gauge and adapted to be stopped and held at a number of predetermined positions with reference to said back gauge. The drill is moved vertically in a downward direction to and passes through the sheet pack, thereby drilling holes in the several sheets located one over the other. The back gauge in operation is fixed with respect to the table, and the side gauge is adjustable to several different predetermined positions for the proper locating of the sheet pack in several different positions under the drill for drilling several holes, usually two or more, through the pack of paper sheets and through a large number of packs of paper sheets one after the other.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawings and following description set forth in detail certain means and several modes of carrying out the invention said means constituting, however, but a few of the various

ways in which the principle of the invention may be employed.

In said annexed drawings, wherein like reference numerals refer to like parts throughout the various views:

Fig. 1 is a fragmentary plan view of a paper drilling machine equipped with our invention.

Fig. 2 is a rear elevational view.

Fig. 3 is a fragmentary enlarged end elevation looking toward the left hand end of the machine of Fig. 1.

Fig. 4 is a sectional view taken on a vertical plane near the left hand end of Fig. 1, looking in a direction opposite to that of Fig. 3.

Fig. 5 is a fragmentary enlarged sectional view taken substantially on the plane of line 5—5 of Fig. 1 looking in the direction indicated by the arrows.

Fig. 6 is a fragmentary enlarged plan view, showing parts in section, of the central portion of Fig. 1, showing more clearly the construction of the side gauge and its associated parts.

Fig. 7 is a fragmentary front elevational view of the side gauge and one of the stop blocks.

Fig. 8 is a vertical section taken substantially on the plane of line 8—8 of Fig. 6.

Fig. 9 is a vertical section taken substantially on the plane of line 9—9 of Fig. 8.

Fig. 10 shows a modification of the means for releasing the side gauge from engagement with the stop blocks.

Fig. 11 is an end elevational view of the modification shown in Fig. 10, and

Fig. 12 shows a modification of the means actuated by a downward movement of the drill head for operating the modified structure of Figs. 10 and 11.

Our device is adapted to be applied to the well known type of paper drilling machine which has a horizontal table 1 located at the proper height above and carried upon a lower housing. A back gauge 2 extends lengthwise of the table and has a vertical front face against which the rear edges of the sheets of paper in a pack of sheets are placed. The back gauge 2, while fixed and held in fixed position while the machine is in use, is adjustable to different positions toward or away from the front edge of the table 1 by releasable clamping means at each end thereof, one of which is shown in Fig. 2, and consists of a bracket 3 through which a clamping screw 4 passes upwardly and is adapted to contact the underside of the table 1.

Adjacent the position of but back of the drill the back gauge 2 has a rearwardly offset por-

tion 5. At the upper part of the machine the usual drilling head is positioned (not shown). Positioned rearwardly of the drilling head are two vertically movable posts 6, one of which is shown in Fig. 1. These posts reciprocate vertically with the drill and drilling head. This portion of the machine is old and well known and is shown in the application of Freeman Barney, Serial No. 180,818, filed December 20th, 1937.

The machine is provided with the usual hollow drill 7 which, through suitable intervening mechanism is driven by an electric motor carried by the drilling head. The drill 7 comes to and passes through the sheet pack on the vertical downward movement of the posts 6 and is provided with the usual presser foot 8, vertically slidable rods 9 suitably mounted at the front end of the drilling head to carry the presser foot, and compression springs for forcing the presser foot downwardly. Also in accordance with old and well known practice the table 1 is provided immediately below the end of the drill 7 with an inset of a block of material such as wood, fiber or the like to prevent injury to the drill should it come to and slightly penetrate such block. This portion of the construction is well known and need not be shown nor further described.

At one end of the back gauge and beyond the adjacent end of the table 1 a supporting bracket 10 is bolted or otherwise permanently connected. A second supporting bracket 11 connects to and extends rearwardly from the back gauge 2 adjacent the point where the rearwardly offset section 5 is located. Said brackets have slotted upwardly extending lugs to receive the ends of a bar 12. On this bar 12 is positioned a plurality of adjustable stop blocks 13 adapted for longitudinal movement thereon and provided with set screws 14 to secure them in place at any desired predetermined points along the length of the bar. The bar 12 at its upper side carries a lineal scale preferably marked in inches and fractions thereof and at its outer end is provided with an adjusting screw 15 for minor adjustments which may be desired. The bar 12 is readily removable but in service is held in place by set screws as clearly shown in Fig. 1.

The side gauge which is movable with respect to the back gauge 2 consists of a vertical rod 16 which, at its lower end, rests on the upper surface of the table 1, and has a flat face at one side thereof, as shown in Figs. 1 and 6, against which the side edges of the sheets of paper in the paper pack are adapted to abut for positioning the pack for a drilling operation. The vertical rod 16 is partially surrounded by the vertically extending member 17 which has integral therewith a horizontal portion 18 to the opposite end of which is attached, by means of the bolt 19, or any other desired permanent means, a member generally indicated at 20. A wheel 21 is rotatably mounted on the horizontal portion 18 and is adapted to ride on the table 1 to lessen the friction. The member 20 consists of a vertical portion 22 and an upper horizontal rearwardly extending portion 23 (Fig. 5). Within the portion 23 of the member 20 is an elongated slot 23a (Fig. 9) adapted to receive a pivotally mounted arm 24 which is pivoted within the slot at 25 (Fig. 8). The arm 24 extends rearwardly and has a dog 26 extending upwardly therefrom and adapted to normally lie in the path of the stop blocks 13. The portion 23 of the member 20 is provided with a depending part 27 which has a hole therein adapted to receive a compression

spring 28 at the upper end of which is a ball, or other suitable means 29, adapted to come against the bottom edge of the bar 24 to maintain said bar normally in an upper position as shown in Fig. 8. The bar 24 extends rearwardly beyond the rear vertical edge of the stop member 13 and terminates in a second upwardly extending portion 30 which is provided with an inwardly extending slot 31, the purpose of which will be presently described.

Adjacent the rear end of the bar 24 is a shorter member 32 pivotally mounted in the upper rearwardly extending portion 23 by means of the pivot pin 33. The arm 32 is provided at its forward end with an upwardly extending dog 34, and at its rear end with a pin 35 which enters the slot 31 at the rearmost end of the bar 24 so that a counter-clockwise rotative movement of the arm 24 about its pivotal point 25 takes place to disengage the dog 26 from the stop member 13. counter-clockwise rotation of the member 32 will also take place about its pivotal point 33 which will simultaneously raise its dogging member 34 in the path of a succeeding stop member 13. The purpose of this double dogging action is to accommodate the automatic feature of the machine when the stop blocks 13 are unusually close together as shown in Fig. 9. When this situation occurs, it may be that the pulling action on the side gauge is such that it would be impossible for the arm 24 to again be raised to engage the next succeeding stop block before it reaches that point. To obviate such difficulty, the second or auxiliary member 32 with its dogging element 34 will be immediately raised in the path of the next succeeding stop block to prevent the side gauge from being moved past its next stopping place. However, after the side gauge has been stopped by the dog 34, the dog 26 will again be raised thus lowering the dog 34 to permit the dog 26 to engage against the next succeeding stop member in order that the pack of paper sheets may be properly positioned for drilling the next hole.

There must necessarily be a certain amount of play in the slot which receives the arm 24 so that it may be freely moved about its pivotal point, and to insure the proper location of the side gauge each time a stop block is reached, a horizontal opening is provided in the upper portion 23 of the member 20 (Fig. 6) within which a compression spring 36 is located which is provided with a ball 37 at its outer end, adapted to bear against a side of the arm 24 to force it in the direction of movement of the side gauge.

The rear of the member 20 is provided with a split bearing 38 which is adjustable for tightening by means of the bolt 39 and which has a circular opening therein adapted to receive the elongated sleeve 40, which is in turn adapted to receive the elongated rod 41. This rod is supported between the rearwardly extending portions of the bracket 11 and the left hand end of the back gauge 2. Movement of the side gauge will also cause a movement of the sleeve 40 longitudinally of the rod 41, the long sleeve 40 being necessary to prevent any lateral movement of the side gauge.

A continuously running motor 42 is secured to and above a supporting platform 43 at the rear of the machine and to one side of the table. The motor 42 drives a shaft 44 which is located at right angles to the length of the back gauge bar 2. Suitable reduction gearing is interposed between the motor shaft and driven shaft 44, such

reduction gearing being suitably housed and need not be here specifically shown or described. At the front end of the shaft 44 is secured a sprocket wheel 45 around which passes a sprocket chain 46 which has horizontal upper and lower runs. The chain also passes around an idle sprocket wheel 47 at the opposite side of the machine mounted upon the bracket 11 (Fig. 2). The lower run of the chain 46 has secured to the upper side thereof by means of welding, or any other suitable means, a plate 48 which is adapted to be secured to the bracket 49 by means of the wing nut 50. The bracket 49 is also secured to the split bearing 38 as clearly shown in Figs. 5 and 8.

A slip fraction clutch of the usual and well known character is provided in a housing adjacent the motor 42 so that when the side gauge comes against a stop block and remains stationary during a drilling operation, the motor continues to run but the clutch will slip until the dog 26 is disengaged from the stop block whereupon the shaft 44 will again be rotated, moving the chain 46 and causing further movement of the side gauge until it reaches the next succeeding stop block.

Having specific regard now to the mechanism which actuates the arms 24 and 32, partially surrounding the vertically reciprocating post 6 is a bracket 51 secured thereto by means of a bolt 52. The bracket 51 has a horizontal arm 53 at right angles thereto and which is provided with an upwardly extending member 54 (Fig. 5). To this vertical portion 54 of the bracket is secured another bracket which has upper and lower ears 55 and 56 respectively. These ears are provided with openings through which a vertically movable rod 57 passes and has at its lower end an enlarged base portion 57a. Surrounding the rod 57 and extending between the ears 55 and 56 is a compression spring 58 which, at its lower end, abuts against a plate 59 underneath which is a cotter pin 60 extending horizontally through the rod 57.

Positioned below the rod 57 is the free end of a horizontal pivotally mounted bar 61 which is pivoted at its forward end by means of the pivot 62 to a block 63. The block 63 is secured to the rear side of the back gauge 2 by the bolts 63a and 63b (Fig. 2) and is provided near its rear end with a vertical opening adapted to receive a vertically reciprocable rod 64. Vertical slots 65 are also provided at each side of the block 63 in said opening adapted to receive a horizontal pin 66 which passes through the rod 64 and is secured to the bar 61. A horizontal opening is also located through the block 63, as clearly shown in Fig. 5, to limit the upward and downward movements of the rod 64 by the pin 66 coming against the upper and lower sides thereof.

To the upper end of the rod 64 is a horizontal forwardly extending arm 67 which is terminated in a downwardly extending portion immediately above an elongated rod 68. Between the bar 67 and the upper surface of the block 63 a compression spring 69 is positioned to maintain the rod 64 and the arm 67 in an upward position. It will be evident that a lowering of the rear free end of the bar 61, whereby it will pivot in a counter-clockwise direction about its pivotal point 62 (Fig. 5), will cause a lowering of the pin 66, which passes through the lower end of the rod 64, thereby causing also a lowering of said rod and its associated arm 67. The limit to which the rod 64 can be lowered will be determined by the diame-

ter of the horizontal hole through which it and the pin 66 pass.

The rod 68 is secured at any desired number of points along its length to a rock shaft 70 which is supported between the bracket 11 at one end and the rearwardly extending portion of the back gauge 2 at its other end. The rod 68 is positioned immediately above the upwardly extending portion on the rearmost end of the bar 24 so that a lowering of said bar 68 will depress the back end of the bar 24 causing it to pivot about its pivotal point 25 disengaging the dog 26 from one of the stop blocks 13. The lowering of the bar 68 is caused by a depression of the horizontal arm 67 secured to the rod 64, which action will take place when the drilling head has been lowered a sufficient amount to cause pressure on the free end of the bar 61 by contact with the lower end of the rod 57. As above pointed out, the bar 61 is limited in its downward movement and if, for any reason, the drilling head is lowered a greater distance than the movement of the bar 61 will permit, the rod 57 will be forced upwardly, but will be forced to return to its initial position after pressure on the bar 61 has been released due to the action of the compression spring 58.

It is necessary to maintain the rod 68 in an upper or raised position out of contact with the end of the arm 24 except when it becomes necessary to move the side gauge to a next succeeding stop member and to accomplish this purpose a leaf spring 71 is provided as shown in Figs. 1, 3 and 4, which is secured to the upper side of the rod 70 near one end thereof by means of the bolt 72. This leaf spring 71 extends downwardly at an angle as shown in Figs. 3 and 4 and is adapted to rest at the under side of its outer free end on the upper side of the back gauge 2. Thus, when the rod 68 is lowered, the rock shaft 70 will be rotated in a clockwise direction as viewed in Fig. 2, which places a tension on the spring 71. Immediately upon release of the pressure on the shaft 68, the tension of the spring 71 will force the rock shaft 70 to be rotated in a counter clockwise direction whereupon the shaft 68 is raised permitting the spring 28 to force the arm 24 upwardly into its normal position for engagement against one of the stop blocks 13.

At times a release of the dog 26 from a stop block 13 with which it is engaged may be desired, and this can be accomplished manually. A short arm 73 is pivotally mounted by means of a bolt 74 to the front vertical face of the portion 22 of the member 20 on the side gauge. The arm 73 has a free end extending beyond its pivotal point and beneath the outer free end of the bar 24 with which the dog 26 is integral. A rotation of the arm 73 about its pivotal point 74 in a clockwise direction will raise the outer free end of the bar 24 causing a counter-clockwise rotation thereof, as viewed in Fig. 8, about its pivotal point 25 thus lowering the dog 26 and disengaging it from the stop block 13.

As pointed out previously, the motor 42 is reversible and is running continuously throughout the operation of the machine. To one end of the back gauge 2 is secured a supporting member having a horizontal base portion 75 and a vertical portion 76 (Figs. 2 and 3). To the base 75 are secured housings 77 and 78. Extending upwardly through the upper side of each of these housings are the switch pins 79 and 80. Extending from the outer ends of the housings 77 and 78 are wires which provide suitable electrical connections to the motor 42 so that the motor will normally run

in a direction to move the side gauge to the left as viewed in Fig. 1, but will be reversed in its rotation to move the side gauge toward the right when the switch pins 79 and 80 are depressed. Upon a release of the switch pins the direction of rotation of the motor 42 will again be reversed to move the side gauge toward the left of the machine when free to do so.

Slidably mounted, one end through the rearwardly extending portion of the bracket 11 and the other end through the rearwardly extending portion of the opposite end of the back gauge 2, is a rod 82 provided at one end thereof with a block 83. The inner side of the vertical member 76 is provided with a plate 84 which has a recess therein adapted to receive one side of the block 83, thus providing a guideway therefor. To the upper side of each of the housings 77 and 78 and at one end thereof are secured the spring arms 85 and 86, the outer free ends of which are provided with upwardly extending ears between which are pivotally mounted the rollers 87 and 88. It will be evident that a depression of the spring arms 85 and 86 will also cause a depression of the switch pins 79 and 80 thereby closing the circuit for reversing the direction of the motor 42. A depression of the spring arms 85 and 86 is caused when the rod 82 is moved toward the right, as viewed in Fig. 2, since the block 83 will contact the rollers 87 and 88 and force the spring arms in a downward direction. The arms will remain in this position, keeping the circuit closed, until the rod 82 is moved longitudinally in the opposite direction.

The rod 82 is provided with stop blocks 89 which have therein set screws 90 to secure the blocks in any desired position along the length of the rod 82. The rod and the blocks 89 are so positioned with respect to the split bearing 38 on the side gauge as to be in the path thereof when it is moved longitudinally along the rod 41. The blocks 89 are set on the rod 82 in such position that after the last hole has been drilled in a pack of paper sheets and the dog 26 has been released from the last stop block 13, a further movement of the side gauge toward the left as viewed in Fig. 1, or toward the right as viewed in Fig. 2 will take place; the split bearing 38 will engage a side of a stop block 89 to move the rod 82 longitudinally, whereby the block 83 on the end thereof will depress the switch pins 79 and 80 through the action of the spring arms 85 and 86 to reverse the direction of rotation of the motor 42 and, consequently, will reverse the direction of movement of the lower run of the sprocket chain 46 to move the side gauge back to its original position. When the side gauge has returned to a point beyond the position of the first stop block 13, which is located to retain the side gauge in a position to drill the first hole in a pack of paper sheets, the split bearing 38 will engage against a side of the other stop member 89 to longitudinally move the rod 82 in a direction for releasing the spring arms 85 and 86, thus breaking the circuit and again reversing the direction of rotation of the motor whereby the side gauge will be urged toward the left of the machine as viewed in Fig. 1. The side gauge being beyond the first of the stop blocks 13 at this point, and the dog 26 being in its normal raised position, engagement will be made against a side of a stop block 13 to hold the gauge in position during the drilling of the first hole.

It is to be noted that the lower edges of the stop blocks 13 and the upper edges of the dogs 26 and 34 are beveled in opposite directions (Fig. 9).

This is done so that after the side gauge has reached its position for drilling the last hole and the direction of the motor has been reversed, the side gauge may be returned freely to its initial position. In the return movement of the side gauge the dogs 26 and 34 will be automatically forced downwardly each time a stop block 13 is reached because of the beveled surfaces thereon, thus obviating any necessity for other mechanism for moving the respective dogging elements out of the path of the stop blocks when the side gauge is returned to its initial position.

The modification of the automatic means shown in Figs. 10, 11, and 12 comprises a solenoid 91 mounted in parallel relation to the rod 41 on the split bearing 38 by means of a clamping strap 92. Extending outwardly from one end of the solenoid is an armature plunger 93 which is provided near its outer end with a slot or opening 94. Extending upwardly through the opening is one arm of a bell crank lever 95, the other arm of which extends over the upwardly extending portion at the rear of the bar 24. The bell crank lever 95 is pivoted between two ears 96 extending upwardly from and integral with the split bearing 38.

The elements shown in Fig. 12 are similar to those shown in Fig. 5 except that the bar 57 and its associated parts are mounted in a lower position on the post 6. Immediately below the lower end of the rod 57 in Fig. 12, is a switch housing 97 provided at the upper side thereof with the switch button 98. A suitable electric circuit is provided between the switch 98 and the solenoid 91. When a drilling operation is performed and the drilling head is lowered the bottom portion 57a of the rod 57 will engage against the switch button 98 thus energizing the solenoid 91 whereupon the armature plunger 93 will be drawn inwardly or moved in a direction toward the right as viewed in Fig. 10. This movement of the armature plunger causes a clockwise rotation of the bell crank lever 95 whereupon the dog 26 will be released from engagement with a stop block 13.

In this modification the rock shaft 70 and its connected shaft 68 are omitted together with all of the essential elements which actuate said shafts.

Operation

The operation of the machine is as follows:

Assuming the back gauge to be in its proper adjusted position, and the side gauge having its dogging element 26 against a side of the first stop block 13, a pack of paper sheets is placed against the back and side gauges beneath the drill 7 in readiness for drilling the first hole. It is assumed that all previous adjustments have been made up to this point, the number of holes to be drilled, the positions of the first and last holes and the distances between each of the holes having been determined and the stop blocks 13 set in their desired predetermined positions. As the drill and drilling head are lowered for the first operation the rod 57 on the post 6 will also be lowered so that when the hole has been drilled through each sheet in the pack of paper sheets the bottom of the bar 57 will contact either the outer free end of the rod 61 or the switch button 98. Through the mechanism previously described the latching dog 26 will be removed from the path of the first stop block 13 and the slip friction drive associated with the motor will take hold to cause a movement of the sprocket chain 46, and the side gauge will be moved until the latching dog 26 comes against a side of the next succeeding stop block

13. The dog 26 will obviously be raised to its normal position immediately upon raising the drill and drilling head. The pack of paper sheets is then moved so that the edges of the sheets of paper will come against the side gauge in its new position whereupon the pack of paper sheets will be properly located for drilling the second hole.

This operation is repeated until the last hole is drilled whereupon, after the dog 26 has been released from the last stop block 13, one of the stop blocks 89 is engaged by the split bearing 38 to longitudinally move the rod 82, whereupon the direction of rotation of the motor is reversed and the side gauge is moved back to its original starting position. At this point the machine is in readiness for placing a second pack of paper sheets in position for again drilling a series of holes similar to those drilled in the first pack.

It is of course to be understood that the number of holes to be drilled through a sheet pack may be varied and the holes may be drilled different distances apart. This is controlled by the number of stop blocks 13 placed upon the bar 12 and the distance which said blocks are set from each other. The bar 12 is readily removable so that the stop blocks 13 may be taken off or put on the bar, as many as may be wanted being kept on the bar and set at desired distances apart for the holes which are to be drilled. The construction is one by means of which the sheet packs may be drilled very quickly and accurately. Large quantity production is the feature of the machine.

Other modes of applying the principle of our invention may be used instead of the one here explained, change being made as regards the mechanism herein disclosed provided, however, that the means stated by any of the following claims or the equivalent of such stated means be employed.

We claim:

1. A paper drilling machine having a horizontal table and a drilling head thereover adapted to be vertically reciprocated, a back gauge bar mounted on and over the table, a side gauge mounted to be moved lengthwise of the back gauge, a plurality of stop blocks to hold the side gauge in different predetermined positions, means for moving the side gauge in one direction and holding it successively against said stop blocks, means for releasing the side gauge from a stop block with which it is engaged on downward movement of said drilling head to a predetermined position, whereupon the side gauge is moved to the next adjacent stop block, and automatic means to return said side gauge to its starting position.

2. The elements in combination defined in claim 1 combined with means to adjust the point from which said side gauge is returned to its starting position.

3. In a drilling machine, a horizontal table, a vertically movable drilling head carrying a paper drill, said drilling head being adapted to be moved downwardly for paper drilling and upwardly after said paper is drilled, a back gauge bar located over the table, a side gauge mounted to move lengthwise of the back gauge bar, a plurality of stop blocks carried by said back gauge bar, said blocks being located at preselected spaced distances from each other, a movable member carried by said side gauge adapted to come against a side of a stop block to hold the side gauge against movement in one direction, continuously operating means acting upon said side gauge tending to move it in said direction beyond the

stop block with which it is engaged, and means rendered effective on the downward movement of the paper drill and said drill head to a predetermined lower position for automatically moving said movable member on the side gauge to thereby release it from a stop block with which it is engaged, whereupon it is moved by said continuously operating means beyond the stop block with which it was engaged to the next succeeding stop block, as specified.

4. In a paper drilling machine, a horizontal table and a vertically reciprocable drill, a back gauge mounted above the table, a side gauge mounted on the back gauge for lengthwise movement thereon, a plurality of stops located in spaced apart relation with reference to the length of the back gauge, a releasable latch carried by the side gauge and projecting therefrom to successively engage against each of said stops to thereby hold the side gauge in predetermined selected positions, continuously operated means connected with the side gauge tending to move it in a direction away from the drill until stopped by a stop block, and means for releasing said latch upon the completion of a downward movement of said drill and drill head whereupon said side gauge is moved away from the drill until said latch engages with the next succeeding stop block away from said drill.

5. The elements in combination defined in claim 4 combined with automatic means to return said side gauge to its starting position.

6. A paper drilling machine comprising a table, a vertically positioned paper drill, means carrying said drill adapted to be moved downwardly for drilling paper and moved upwardly after the paper has been drilled, a back gauge bar above the table, a side gauge mounted for movement lengthwise of the back gauge bar located at one side of the drill, a plurality of adjustable stops carried by the back gauge bar in spaced relation to each other, one stop being nearest the drill and the others at predetermined spaced positions farther away from the drill, a movable member on said side gauge having a part thereof extending into a position such that it engages against a side of a stop when the side gauge is moved in a direction away from the drill, an electric motor adapted to be continuously operated, slip friction drive means connecting said motor with the side gauge tending to move the side gauge away from the drill until stopped by a stop, and means for withdrawing said movable member upon completion of a downward drilling movement of said drill to release the side gauge from a stop which has held it in position, whereupon the side gauge is moved until said member engages against a side of the next succeeding stop away from the drill.

7. A paper drilling machine having a horizontal table and a drilling head thereover which carries a vertical drill, said drilling head and drill being adapted to be vertically reciprocated, a back gauge bar positioned over the table, a side gauge mounted for movement lengthwise of the back gauge, stops on the back gauge to position the side gauge in different selected positions, continuously operating means connected with the side gauge tending to move it in one direction and hold it against a stop to which it comes, and means for releasing the side gauge from a stop with which it is engaged on downward movement of said drilling head and drill to a predetermined position, whereupon the said continuously operating means moves said side gauge until it is stopped by the next succeeding stop.

8. In a paper drilling machine having a horizontal table and a drilling head carrying a vertical drill thereover, said drilling head and drill being adapted to be moved downward for drilling paper and upward after a drilling operation has been performed, a back gauge bar mounted on, over and lengthwise of the table, a side gauge mounted to be moved lengthwise of the back gauge, stops carried by the back gauge in spaced apart relation at one side of the drill, continuously operating means tending to move the side gauge in one direction away from the drill, releasable means on said side gauge adapted to come against a stop block to which it is moved and thereby position said side gauge in a predetermined position, means for operating said releasable means to disengage the side gauge from a stop substantially upon completion of a downward drilling movement of the drill, whereupon the side gauge is moved away from the drill to the next succeeding stop and stopped thereby, and means for reversing said continuously operating means to return the side gauge to its initial position after release of the side gauge from the stop farthest away from the drill, and returning it to a position where it is stopped by the stop block nearest said drill.

9. A construction containing the elements in combination defined in claim 4, combined with manually operable means connected with said releasable latch for manually releasing said latch, as and for the purposes specified.

10. A paper drilling machine having a horizontal table and a vertically reciprocable drill, a back gauge mounted above and lengthwise of the table, a side gauge mounted on the back gauge for lengthwise movement thereon, a plurality of stops located in spaced relation with reference to the length of the back gauge, a releasable latch carried by the side gauge and successively engaging each of said stops to hold the side gauge in predetermined selected positions, an electric motor, an endless chain driven by the electric motor, means connecting the chain to the side gauge, said, driving means between the motor and chain being of a slip friction type which permits rotation of the motor with the chain held against movement, and means for releasing the latch and freeing the side gauge from a stop block rendered effective upon completion of a downward drilling movement of the drill, whereupon the chain is moved by said electric motor to carry the side gauge to a next succeeding block against which the latch engages, as specified.

11. A construction containing the elements in combination defined in claim 10, combined with means for reversing the motor after the side gauge has been released from the last of said stop blocks, to thereby return said side gauge in a reverse direction of movement, to a predetermined position and then again reverse the motor to bring the latch of said side gauge against the first of said stop blocks, said latch and stop blocks having coacting surfaces for causing an automatic retraction of the latch as it comes against the opposite sides of said side blocks during the reverse operation of said motor.

12. In a construction of the class described, a back gauge bar adapted to be located above a horizontal table upon which paper to be drilled may be placed, a plurality of stops carried by said back gauge at spaced apart distances in the length thereof, a side gauge mounted on said back gauge for movement lengthwise thereof, a re-

leasable latch carried by said side gauge and normally positioned to come against a side of a stop block when the side gauge is moved in one direction, an electric solenoid motor, an electric circuit in which the solenoid is included, means operated by said solenoid motor upon closing the electric circuit for releasing the latch to free the side gauge from a stop block and permit its movement lengthwise of the back gauge to a position where its latch will engage another of said stop blocks.

13. In a construction of the class described, an elongated stop gauge bar adapted to be located over a paper supporting table, a scale bar carried by and lengthwise of the back gauge bar, a plurality of stop blocks mounted upon said scale bar and adjusted to and held at predetermined selected spaced apart positions thereon, a side gauge movably mounted on the back gauge for movement in the direction of the length thereof, a releasable latch on the side gauge, said stop blocks being in the path of movement of said latch whereby the latch comes against a stop block when moved in one direction and is held against further movement until the latch is released, an electric solenoid motor, an electric circuit in which the motor is included, and means operated by said solenoid motor and connected with the latch whereby the latch is released when said circuit is closed.

14. A construction containing the elements in combination defined in claim 13, combined with manually operable means mounted on said side gauge and connected with the latch for manually releasing said latch, as specified.

15. A paper drilling machine comprising a table, a vertically reciprocating drill and drilling head thereover, a back gauge bar mounted on and over the table, a side gauge movable lengthwise of the back gauge, a plurality of stop blocks, releasable latch means on said side gauge adapted to successively come against said stop blocks to hold the side gauge in different predetermined positions, an elongated rod associated with said latch means adapted to release them, and means to actuate said rod when said drilling head has reached a predetermined lower position, whereby said rod will release said latching means to allow movement of said side gauge to the next succeeding stop block.

16. The combination of elements defined in claim 15, combined with a continuously operating motor, and slip friction drive means connecting said motor with the side gauge tending to move the side gauge away from the drill until stopped by a stop block.

17. The combination of elements defined in claim 15 combined with a continuously operating motor and slip friction drive means connecting the motor with the side gauge tending to move the side gauge away from the drill until stopped by a stop block and means for automatically reversing the direction of rotation of the motor after the side gauge has passed the last stop block whereby said side gauge will be returned to its initial position.

18. A paper drilling machine comprising a table, a vertically reciprocating drill and drill head thereover, a back gauge bar, a side gauge movable longitudinally of said back gauge bar, a plurality of stop blocks, releasable latch means on said side gauge adapted to successively engage the stop blocks to hold the side gauge in different predetermined positions, a horizontally mounted rod located above said latch means, a pivotally

mounted bar extending rearwardly of said back gauge, means associated with said last named bar adapted to lower said horizontal rod when said bar is lowered to release said latch means from a stop block, and means associated with said drill head to lower said pivotally mounted bar when said drill head has reached a predetermined lower position, whereby the side gauge will be moved to the next succeeding stop block.

19. In a paper drilling machine having a table, a back gauge, a side gauge, and a plurality of stop blocks, latch means on said side gauge to come against a stop block to hold the side gauge in one position during a drilling operation, a second latch means normally out of the path of said stop blocks, and means whereby the removal of the

first latch means from the path of one stop block will place the second latch means in the path of the next succeeding stop block, to prevent the side gauge from moving past said succeeding stop block.

20. The elements defined in claim 19 combined with power means for automatically moving said side gauge.

21. The elements in combination defined in claim 19 combined with automatic means to re- turn the second latch out of the path of the stop blocks and to move the first latch into the path of the stop blocks.

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