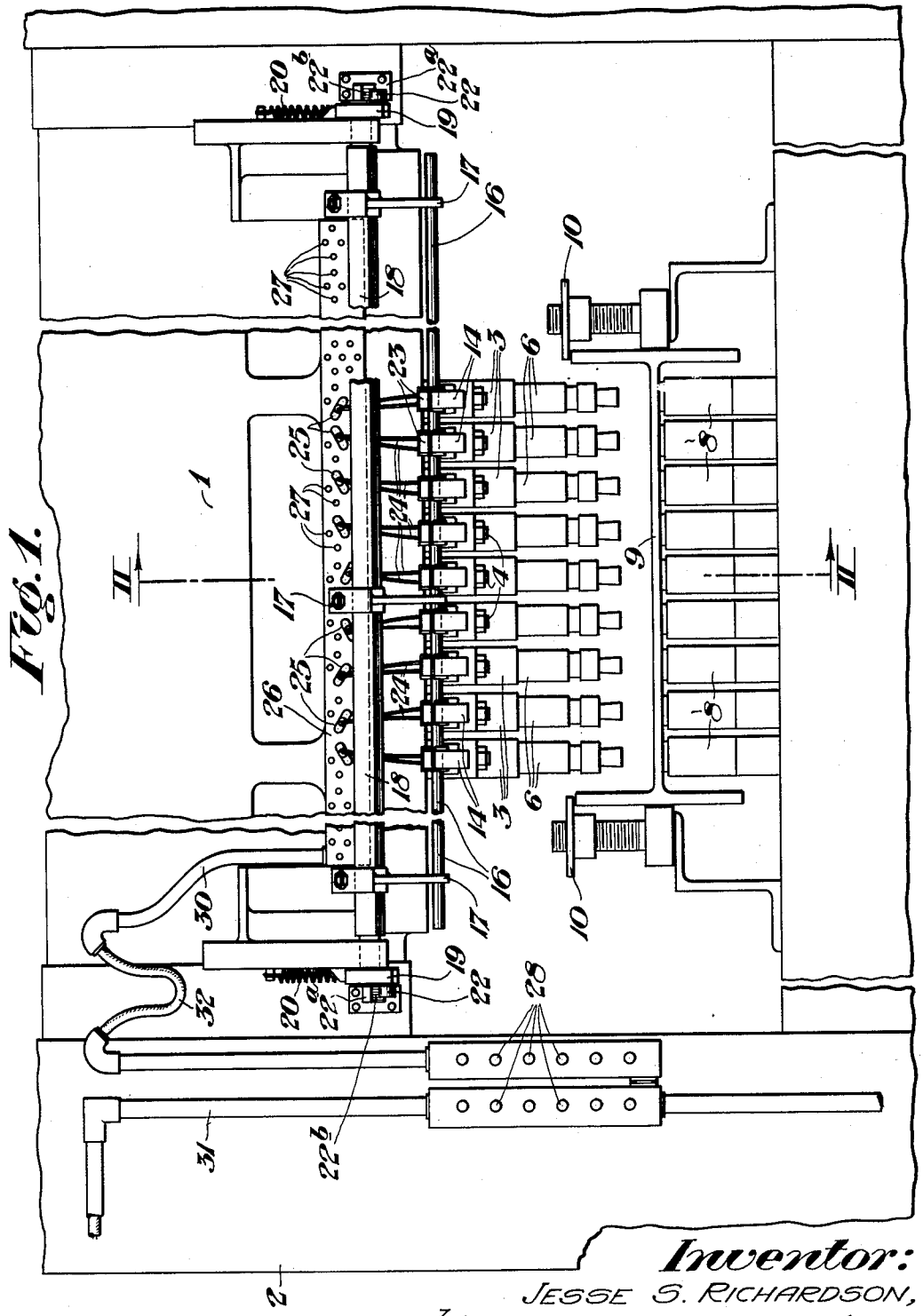
June 19, 1934. J. S. RICHARDSON 1,963,313

GAG OPERATING DEVICE

Filed June 25, 1932 5 Sheets-Sheet 1



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GAG OPERATING DEVICE

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Fig. 2.

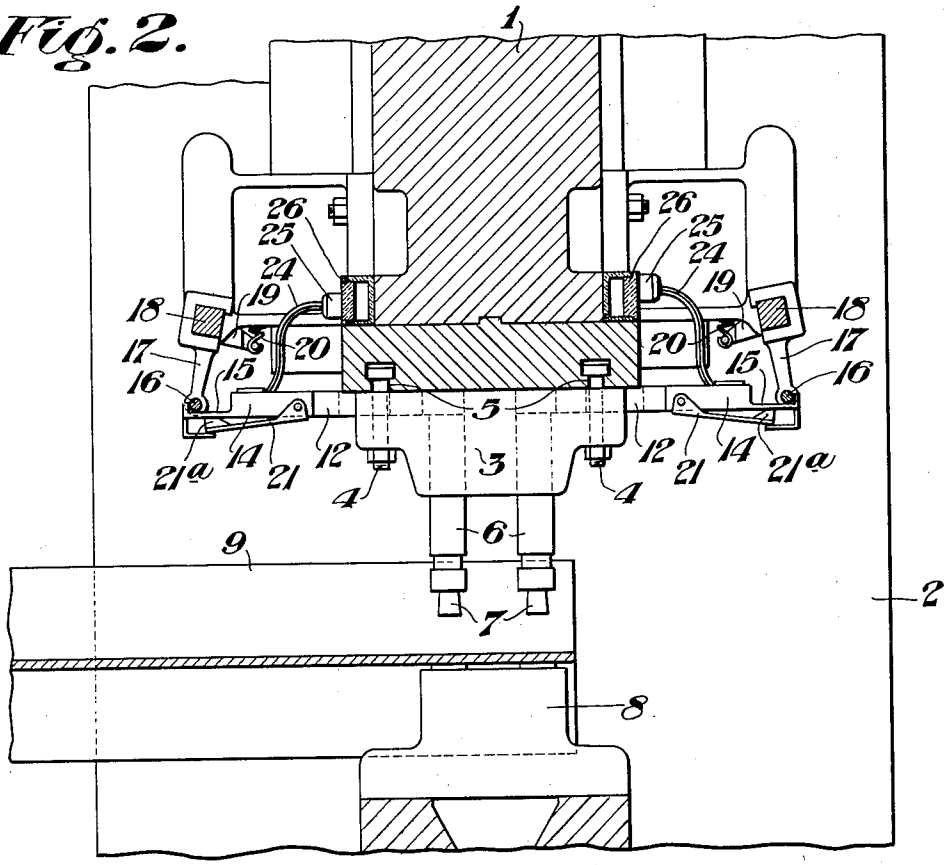
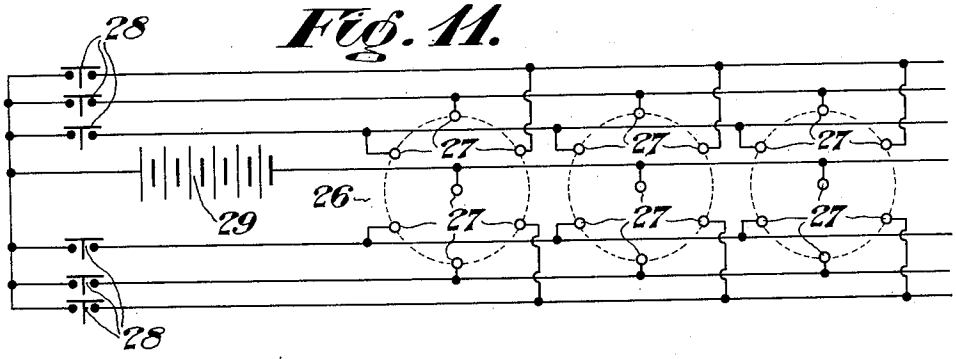


Fig. 11.



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GAG OPERATING DEVICE

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Fig. 3.

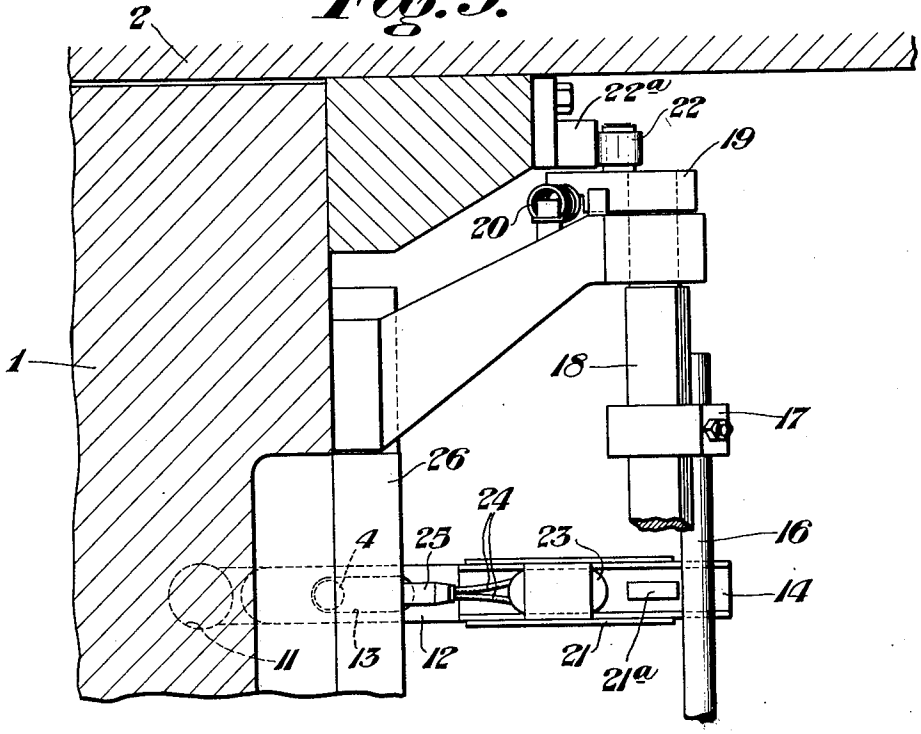
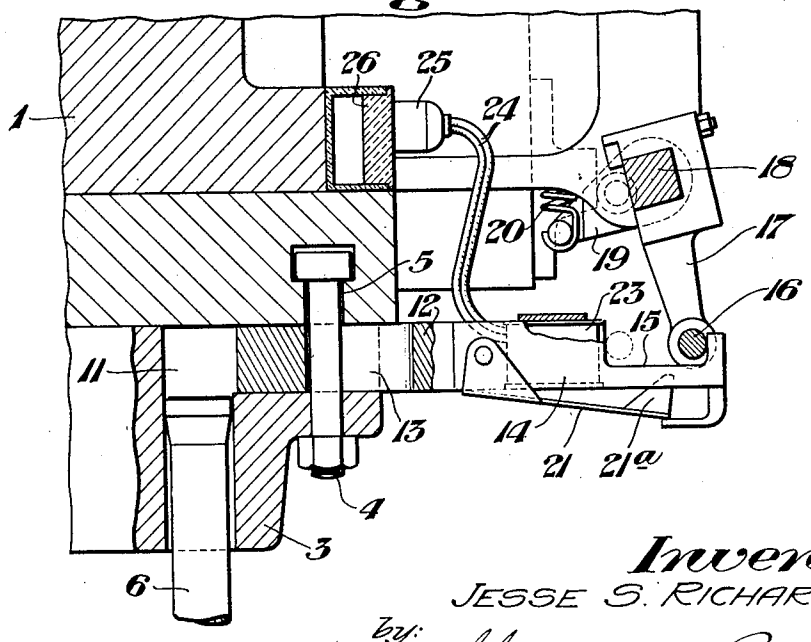


Fig. 4.



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Fig. 5.

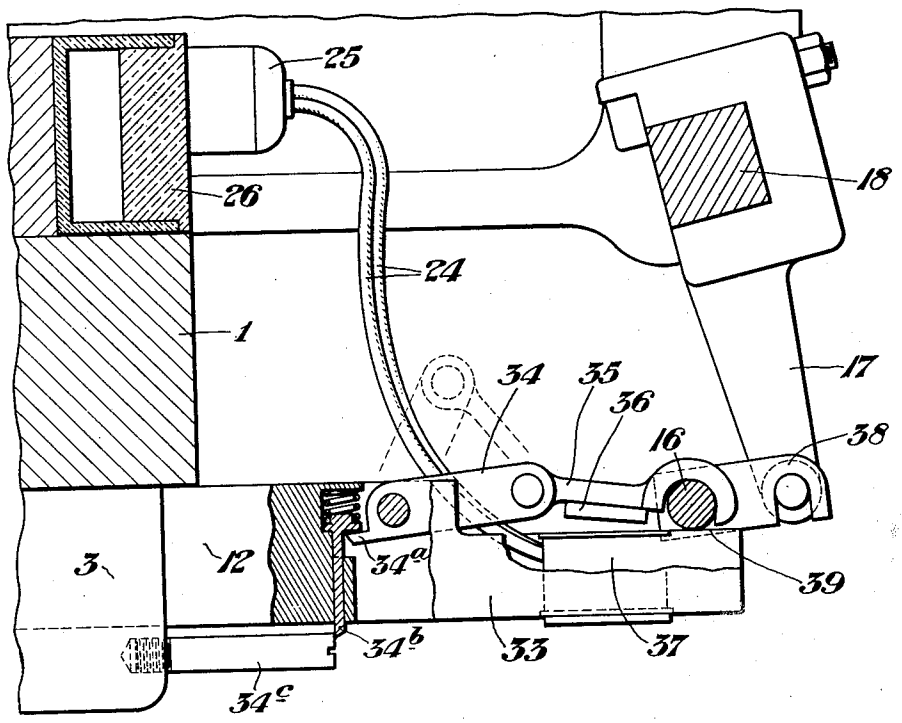
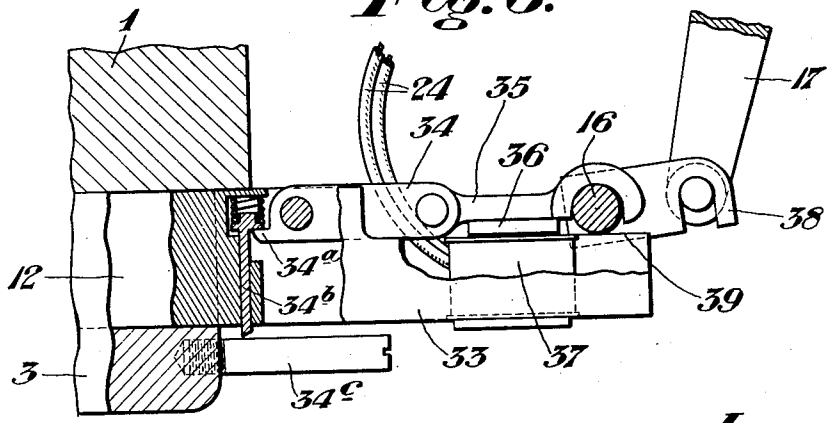


Fig. 6.



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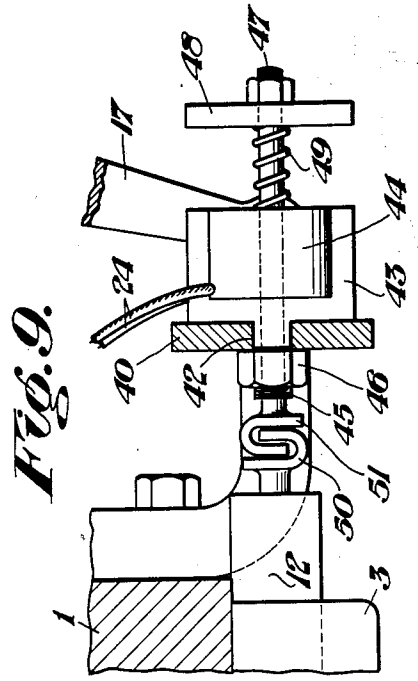


Fig. 9.

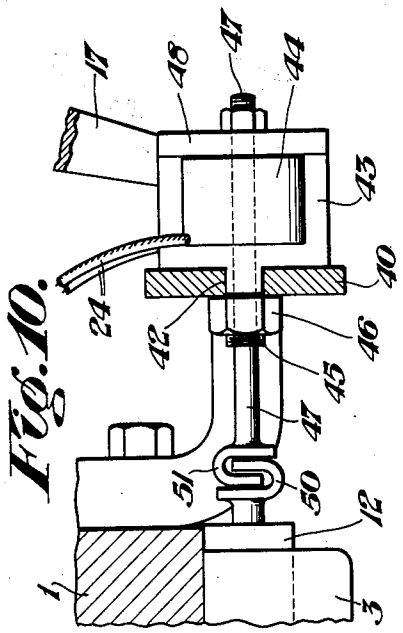


Fig. 10.

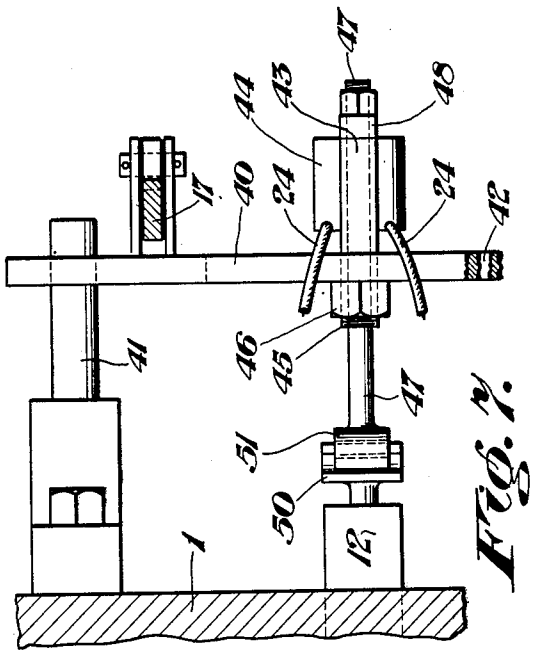


Fig. 7.

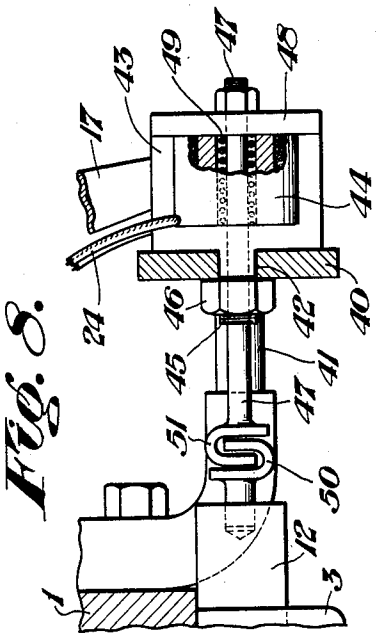


Fig. 8.

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Patented June 19, 1934

1,963,313

UNITED STATES PATENT OFFICE

1,963,313

GAG OPERATING DEVICE

Jesse S. Richardson, Wilkinsburg, Pa.

Application June 25, 1932, Serial No. 619,315

10 Claims. (Cl. 164—111)

This invention relates to multiple punching machines, multiple drills, or, in general, any machine having a plurality of operating or working elements telescopically carried by a common moving part and rendered operative by blocks or gags which may be selectively moved into the path of these elements to stop their telescopic action, whereby they are forced into the work by the aforesaid moving part.

Such machines are constructed so their operating or working elements may be adjusted to accommodate them to the hole patterns required for each particular piece of work, one of the objects of the present inventor being the provision of a block or gag operating means which may easily be moved with these elements when such adjustment is made. Another object is to construct these means for operation by push buttons, preferably arranged at a central station, so that any number may be simultaneously controlled by any one or more of these buttons. Other objects may be inferred from the following disclosure of a specific form of the invention as applied to a multiple punching machine.

In the accompanying drawings,—

Figure 1 is a front elevation of the above specific form.

Figure 2 is a cross-section from the line II—II in Figure 1.

Figures 3 and 4 are respectively top plan and vertical cross-sectional views of details from the first two figures.

Figures 5 and 6 are vertical cross-sectional views of a modification of the invention.

Figures 7 to 10, inclusive, illustrate a further modification, and

Figure 11 is a diagram of the invention's wiring.

A vertically reciprocable cross-head 1 is carried by a frame 2, and a plurality of spindle holders 3 are adjustably clamped to this cross-head by bolts 4 having T-heads engaged in slots 5 in the head. These heads each carry a pair of spindles 6 which hold punches 7. These punches are each opposed by the usual dies 8 which are adjustable to register with them. A beam 9 is shown about to be punched, hold-down rollers 10 preventing it from being lifted by the punches.

Each of the spindles 6 telescopes into bores 11 in the spindle holder 3, and when their paths are unimpeded are inoperative because they will freely rise in the bore 11 during the downward punching stroke of the head 1. This may be prevented by gags or blocks 12 which slide in guideways opening into these bores and have slots 13 so they may slide about the bolts 4, thus holding their motion within their working limits. The above construction is conventional and perfectly familiar to any one using machinery of this general character.

Ordinarily, the cross-head 1 reciprocates continuously and the gags 12 are operated by a rather complicated system of levers which the punch man operates during the punch's working stroke, in the sequence necessary to punch the desired pattern. These levers must be adjusted and operated by a man of experience and are troublesome to set up when the spindles are moved to accommodate different classes of work.

In the present instance, each of the gags carries a frame 14 having a cut-out portion 15 in its outer end, and a bar 16 extends the width of the cross-head and reciprocates back and forth in the cut-out part of each of these frames. This bar 16 is carried by fingers 17 secured to a drive-shaft 18 which may be reciprocated in any manner, the one requirement being that it move towards the spindle-head during the latter's downward stroke and will have completed its movement in this direction before the punches contact the work. This may be accomplished by a large solenoid energized at the proper moment, or mechanically, the latter being here disclosed.

Thus, the ends of the shaft 18 have short arms 19 which are urged upwardly by springs 20 and carry rollers 22 which contact cams 22^a stationarily fixed to the punch's frame. These cams are suitably shaped to impart the desired motion and are preferably constructed with a rather abrupt working face 22^b so that the shaft's reciprocation occurs in a quick and snapping manner.

From the above it will be noted that each gag carries an extending frame 14 having a cut-out portion in which the bar 16 continuously reciprocates in the proper directions and at the proper times to move the gags into and out of their blocking positions so that the punches operate. Proceeding, each frame carries a pivoted arm 21 having an upstanding end 21^a which engages the bar 16, when swung upwardly. An electric solenoid 23 is mounted directly over this arm 21 so as to draw it to this upward position when energized. Each solenoid is provided with a pair of leads 24 terminating in a double contact plug 25.

An elongated switchboard 26 extending the width of the cross-head is positioned at a convenient point above the frames 14. This board is provided with spaced groups of electric jacks 27, each group being arranged so that the central jack is surrounded by a group. The plugs 25 are

constructed so that their contacts just span the distance between each central plug and one of those surrounding it in the case of each group, and the central ones of these jacks are continuously energized while those surrounding these central ones are selectively energized by push buttons. This circuit is diagrammatically shown with a storage battery 29 as the energizing force, although in actual practice the system will probably be connected to a low power line. For convenience, the individual wires are carried through a conduit 30 fixed to the reciprocating element and a second conduit 31 fixed to the frame of the punch, a flexible conduit 32 interconnecting these two.

The construction of the various push buttons is not shown because any type may be used. Two groups of push buttons are shown in the elevation view because the modern multiple punch generally includes two lines of punches.

When it is desired to adjust the spindle holders of the punch laterally it is only necessary to pull the plugs from the jacks, adjust the holders in the usual manner, and reinsert the plugs in the closest group of jacks. The gags may be operated in any sequence desired by proper insertion of the plugs in the respective jack groups. Thus, if several holes are to be punched at once in a number of instances, the respective plugs associated therewith are inserted in the same positions in the respective groups. Then, when the button is pushed which energizes those particular jacks, the entire group of gags will be simultaneously shoved into place. Also, should it become necessary to change the operating sequence of these punches thus associated, it is a simple matter to individually shift the plugs to another set of jacks in each group, and the push buttons 28 will then cause the punches to operate in this changed sequence.

Another form of the gag operating device above specifically described may consist of a frame 33 fixed to the gag 12 and engaging the rod 16 through links 34 and 35. At each stroke of the bar 16 these links buckle upwardly and downwardly and no motion is imparted to the frame 33. The link 35 carries an armature 36 which may be attracted downwardly by a solenoid 37 fixed to the frame 33 and energized in the manner described in connection with the first construction. When this energizing occurs the links will be prevented from buckling upwardly and the gag will be moved into punch-operating position. When the solenoid is energized, a lug 34^a on the link 34 releases a latch 34^b which otherwise engages a stop 34^c.

In this form the bar 16 is preferably reciprocated in a perfectly horizontal plane instead of an arcuate direction. This motion may be obtained by inserting links 38 between the bar 16 and its driving fingers 17 and providing the frames 33 with flattened surfaces 39 on which it can slide.

Another form may consist in eliminating the round bar 16 and providing a flat bar 40 which slides on horizontal guides 41. This bar is driven by the fingers 17 through suitable links which may be the same, generally speaking, as those shown in connection with the above modification. The bar 40 is provided with a longitudinal slot 42 which mounts frames 43. Each of these frames mounts a solenoid 44 and is fixed to the bar 40 through its slot by a bored and externally threaded portion 45 on which a securing nut 46 is screwed. This bored bolt portion slidably carries a plunger 47 which passes through the solenoid 44 and terminates with an armature 48. A compression spring 49 is arranged about this plunger through the solenoid 44 so as to urge the armature 48 away therefrom. Each of the gags 12 is provided with a U-shaped coupling element 50 which cooperates with an inverted U-shaped coupling element 51 on the inner end of the plunger 47.

Preferably, the frame's threaded portion 45 is of rectangular form where it passes through the slot 42 so that it may be held against rotation from its proper position.

The action of this last form is as follows. When the fingers 17 reciprocate the bar 40 the plunger maintains a stationary position because as the bar moves forwardly the compression spring 49 will keep this plunger in its gag retracted position. However, as soon as the solenoid 44 is energized it will hold the armature 48 when brought into contact therewith by the backward movement of the bar 40 and will carry it along as the bar moves forwardly, causing the plunger 47 to move the gag into spindle-blocking position.

Although specific forms of this gag or block-operating device and system have been disclosed in accordance with the patent statutes, it is not intended to limit the scope of the invention exactly thereto, except as defined by the following claims.

I claim:

1. In combination with a machine including a spindle telescopically carried by a reciprocating element and a gag arranged for movement behind said spindle, power controlled means for moving said gag, a board arranged across said machine and constructed with interconnected groups of power outlets, means for selectively supplying said interconnected outlets in each group with power for said first means, and power conducting leads arranged in connection with said first means and constructed for selective connection to one or more of said outlets in any of said groups of same.

2. In combination with a machine including a spindle telescopically carried by a reciprocating element and a gag arranged for movement behind said spindle, power controlled means for moving said gag, a board arranged across said machine and constructed with spaced interconnected power outlets, means for supplying said outlets with controlling power for said first means, and power conducting leads arranged in connection with said first means and constructed for selective connection to said outlets.

3. In combination with a machine including a spindle telescopically carried by a reciprocable element and a gag arranged for movement behind said spindle, a reciprocable bar arranged adjacent said gag, electromagnetically operated means on said gag for engaging said bar when energized, a board arranged across said machine and constructed with interconnected electrical jacks, means for energizing said jacks, and leads connected to said electromagnetically operated means and including plugs constructed for selective insertion in said jacks.

4. In combination with a machine including a spindle telescopically carried by a reciprocating element and a gag arranged for movement behind said spindle, a reciprocable bar arranged adjacent said gag, electromagnetically operated means on said gag for engaging said bar when energized, a board arranged across said machine

and constructed with interconnected groups of separately connected electrical jacks, means for selectively energizing said separately connected jacks in each group, and leads connected to said electromagnetically operated means and including plugs constructed for selective insertion in said jacks.

5. In combination with a machine including a spindle telescopically carried by a reciprocating element and a gag arranged for movement behind said spindle, power controlled means for moving said gag, a plurality of power outlets arranged across said machine adjacent said gag moving means, and power conducting leads arranged in connection with the first named means and constructed and arranged for connection to any of said power outlets.

6. In combination with a machine including a spindle telescopically carried by a reciprocating element and a gag arranged for movement behind said spindle, a reciprocable bar arranged adjacent said gag, a frame extending from said bar and arranged tangentially to the movement thereof, a lever pivotally fixed to said frame and having an end engaging said bar when the lever is swung, an electromagnet for swinging said lever, and means for energizing said electromagnet.

7. In combination with a machine including a spindle telescopically carried by a reciprocating element and a gag arranged for movement behind said spindle, a reciprocable bar arranged adjacent said gag, a frame projecting from said gag, links interconnecting said frame and bar, an armature on one of said links, an electromagnet for attracting said armature and means for energizing said electromagnet, said links being constructed and arranged to buckle as said bar reciprocates, and said armature and electromagnet being constructed and arranged to hold said links against buckling when the electromagnet is energized.

8. In combination with a machine including a spindle telescopically carried by a reciprocating element and a gag arranged for movement behind said spindle, a reciprocable bar arranged adjacent said gag, a frame projecting from said gag, links interconnecting said frame and bar, an armature on one of said links, an electromagnet for attracting said armature and means for energizing said electromagnet, said links being constructed and arranged to buckle as said bar reciprocates and said armature and electromagnet being constructed and arranged to hold said links against buckling when the electromagnet is energized, a latch constructed and arranged to prevent movement of said gag, and a projection constructed and arranged on one of said links to withdraw said latch when they are held against buckling by said electromagnet.

9. In combination with a machine including a spindle telescopically carried by a reciprocating element and a gag arranged for movement behind said spindle, a reciprocable bar arranged adjacent said gag, an electromagnet carried by said bar, a rod connected to said gag, an armature on the free end of said rod, said rod and armature being constructed and arranged for contact by said electromagnet when said bar is reciprocated away from said gag, and means for energizing said electromagnet.

10. In combination with a machine including a spindle telescopically carried by a reciprocating element and a gag arranged for movement behind said spindle, a reciprocating horizontally slotted bar arranged adjacently in line with said gag, a solenoid adjustably secured to said bar through its slot, a rod sliding through said solenoid, horizontally flexible means releasably coupling said gag to the end of said rod theretowards, an armature on the other end of said rod, and a spring arranged to urge the armature end of said rod away from said solenoid.

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