March 25, 1952 T. A. ROURKE 2,590,274

BLASTING SWITCH

Filed Jan. 16, 1950 3 Sheets-Sheet 1

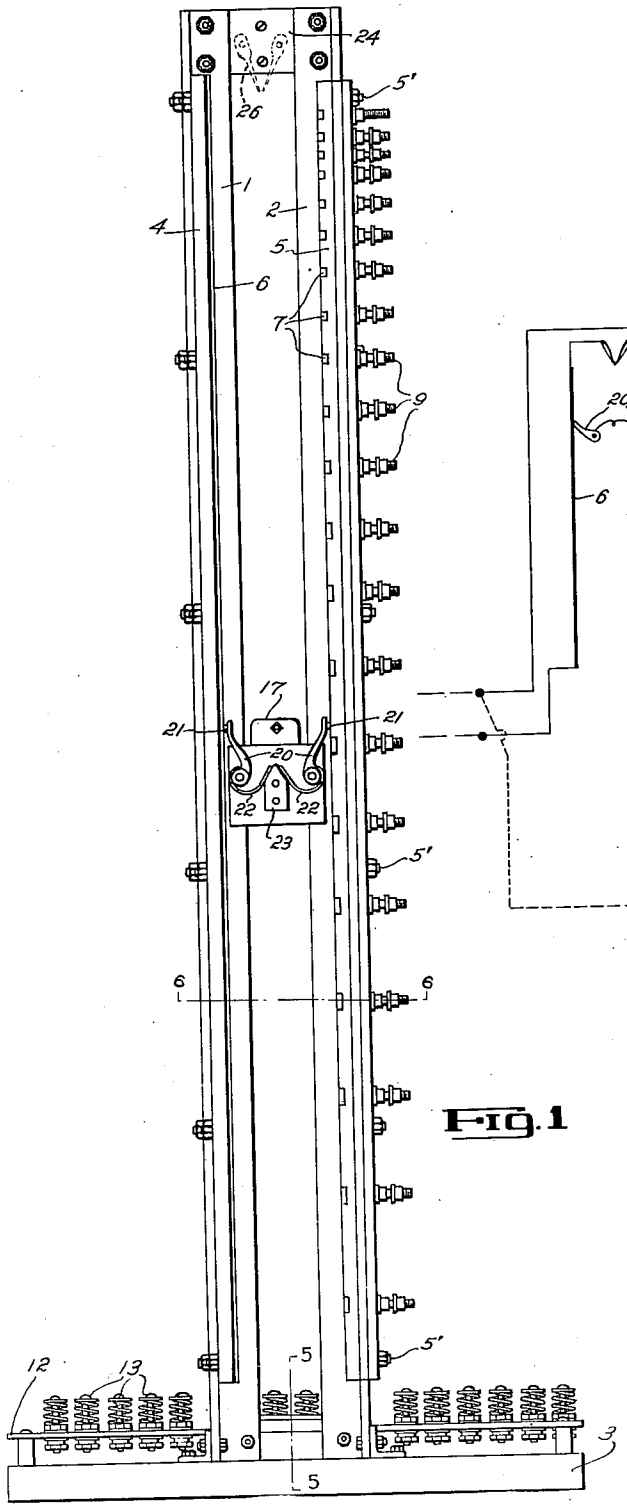

FIG. 1

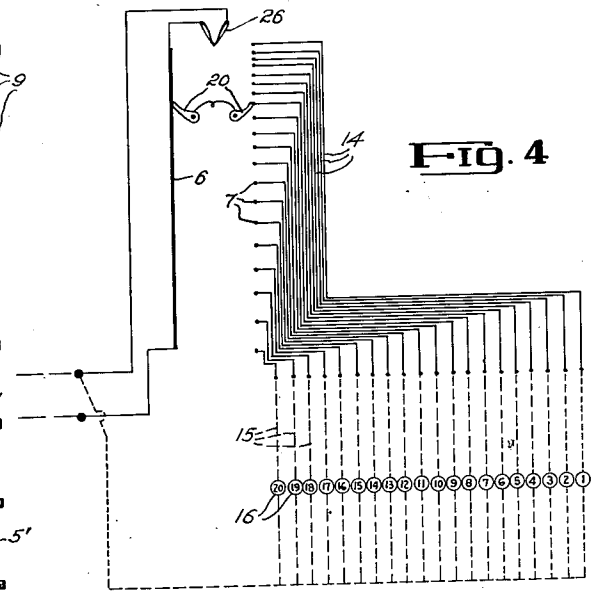

FIG. 4

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March 25, 1952 T. A. ROURKE 2,590,274

BLASTING SWITCH

Filed Jan. 16, 1950 3 Sheets-Sheet 2

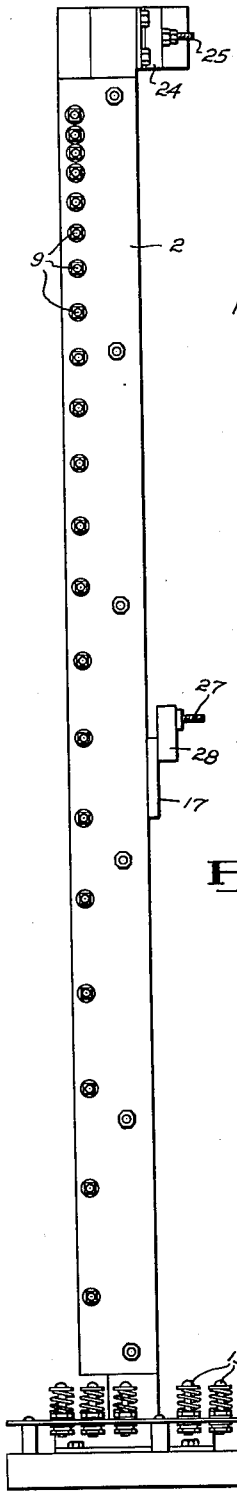

Fig. 2

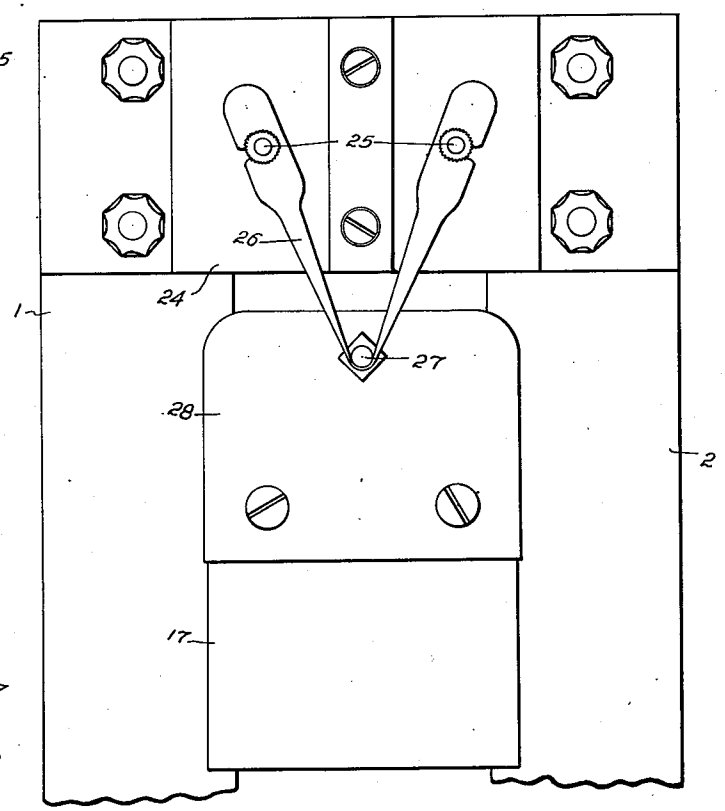

Fig. 7

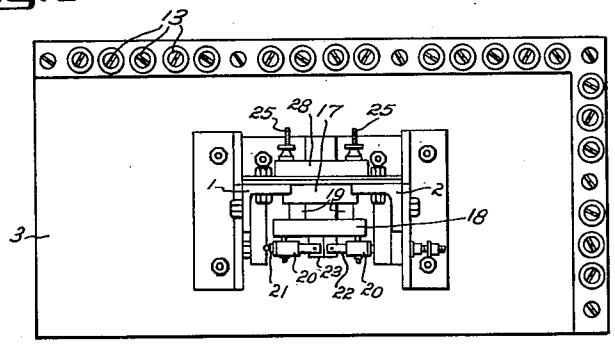

Fig. 3

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March 25, 1952 T. A. ROURKE 2,590,274

BLASTING SWITCH

Filed Jan. 16, 1950 3 Sheets-Sheet 3

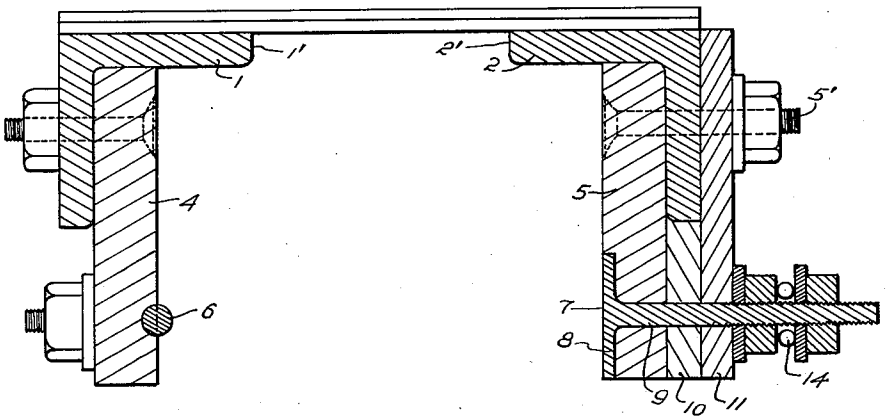

Fig. 6

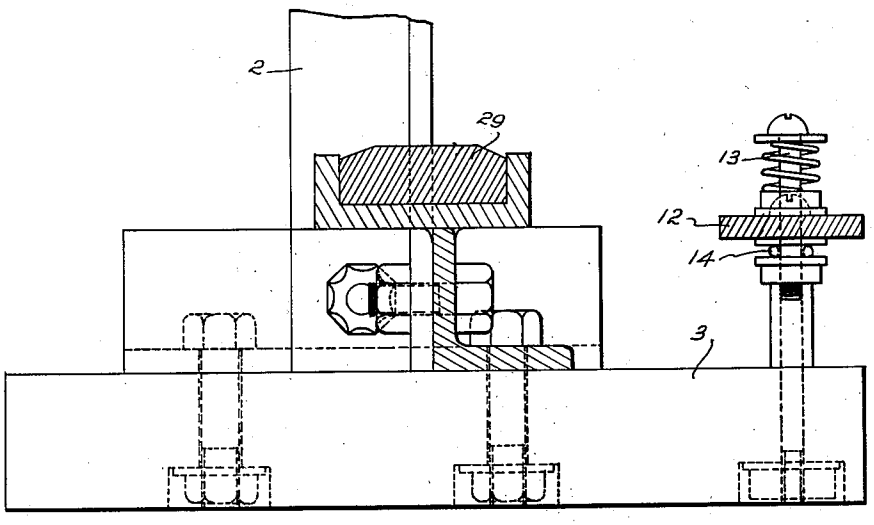

Fig. 5

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UNITED STATES PATENT OFFICE

2,590,274

BLASTING SWITCH

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Application January 16, 1950, Serial No. 138,726

2 Claims. (Cl. 200—16)

1

This invention relates to blasting switches of the multiple firing type.

As is well known, better results are obtained in blasting the face of a rock quarry if the several charges employed for the purpose are exploded in rotation along the face, rather than in unison. Mechanically operated switches for successive firing of a plurality of charges have heretofore been proposed, but such switches are relatively expensive and not entirely reliable in operation.

An object of the present invention is to provide a low cost switch for successive firing of multiple charges, such switch having a contact making member which it at least in part gravity operable for effective and positive operation and being of a structure which provides greater safety measures for the operator and equipment.

The invention will be described with reference to the accompanying drawings in which:

Figure 1 is a front elevation of a switch in accordance with the invention,

Figure 2 is a side elevation of such switch,

Figure 3 is a plan view of the switch,

Figure 4 is a schematic wiring diagram of the switch current,

Figure 5 is an enlarged sectional elevation on line 5—5 of Figure 1,

Figure 6 is an enlarged section view on line 6—6 of Figure 1, and

Figure 7 is an enlarged rear elevation of the upper portion of the switch.

In the drawing, 1 and 2 are spaced parallel frame members mounted in preferably vertically disposed relation on a base 3. A contact mounting 4 comprises a strip of non-conducting material, such as that known under the trade name "Bakelite," is mounted in parallel relation on frame member 1. A contact holder 5 comprises a vertically disposed strip of non-conducting material, similar to strip 4, is mounted on frame member 2, the strips 4 and 5 being in spaced parallel and transversely aligned relation, as shown. A common contact 6 comprises a conductor rod, of copper or the like, seated on the inner face of mounting 4 and extending continuously from the top to bottom thereof. As shown, the contact surface of rod 6 is inwardly offset from the plane of the inner surface of contact mounting 4. Mounted in contact holder 5 in vertically aligned relation are a series of spaced contacts 7 each having an inner head portion 8, the inner surface of which is flush with the inner surface of holder 5, and an outwardly extending wire-connection shank portion 9. The shanks 9 extend through a spacer strip 10 and a holder

2

strip 11 mounted on frame member 2, such strips being of non-conducting material.

Mounted on base 3 by means of a support 12 are a series of blasting cap terminals 13, each of which is connected to a complementary contact 7 by means of a wire 14. The usual wire connections 15 to the series of blasting caps 16 are shown schematically in Figure 4.

A weighted slide 17 is mounted for freely sliding vertical movement between the frame members 1 and 2. The slide is arranged to drop by gravity from the top to bottom of frame members 1 and 2, which provide guide surfaces 1' and 2' for the slide. A plate 18 is mounted on slide 17 forwardly thereof as by means of spacers 19. Pivotally mounted on the forward face of plate 18 are a pair of laterally opposed and electrically connected contact arms 20. Contact points 21 are provided on the ends of arms 20 for engagement with respective fixed contacts 6 and 7. Means for resiliently urging the contact arms 20 outwardly to ensure proper contacting engagement between the sliding and fixed contacts comprises a spring 22 mounted on a block 23 and secured to each arm. The block 23 may be adjustable to vary the tension applied by the springs.

Suitable means for releasably holding the slide 17 at the top of the frame is provided and, as shown, comprises a rearwardly extending bracket 24 mounted on the upper ends of members 1 and 2, a pair of fuse studs 25 on the bracket, and a fuse link 26 having notched ends for engagement with the studs and a depending intermediate portion 26' for engagement with a stud 27 mounted on a plate 28, of non-conducting material such as "Bakelite" or the like, secured to slide 17. As illustrated, the fuse link 26 is readily replaceable.

A shock absorbing pad 29 is preferably mounted at the base of the device to receive the impact of the slide 17.

It will be observed that the contacts 7 are successively spaced at a gradually increased distance apart from top to bottom of the device to compensate for the gradually increasing momentum of the slide as it drops by gravity, thus providing substantially equal time intervals between the engagement of the sliding contact 21 with the successive contacts 7.

The wiring circuit for the contact 6, fuse studs 25, and other elements of the device is schematically illustrated in Fig. 4.

The operation of the device will be clear from the foregoing description. The switch is "set" by applying a fuse link to hold the slide 17 in its uppermost position. It will be appreciated

that, when the replaceable fuse link is in place, the sliding weight in lower position, and all connections made including those to caps as well as to main power leads, the presence of the unfused link indicates positively that there is no current passing the main firing switch and therefore the sliding weight can be safely raised and placed in final firing position at the top. On energization of the circuit, the link fuses and permits the slide to drop by gravity. The slide, by continuous contact of one contact arm with the contact 6 and successive contact of the other contact arm with contacts 7, successively energizes the individual blasting circuits to explode the charges in rotation.

As shown, the contact holder 5 with its spacer strip 10 and holder strip 11 are removably mounted on the frame member 2 as by bolts 5'. Thus, the contact holder 5 may be readily interchanged with other contact holders in which the spacing of the contacts 7 is varied to provide a greater or less space between the various contacts with resultant greater or less time interval between the successive firing charges. The desirable time interval between charges differs with varying types of material being blasted. Thus, it is frequently advisable to vary such time interval, and this is conveniently possible with the device of the present invention.

The device is also subject to other means for varying the timing between charges. For instance, the connecting leads from the blasting caps could be connected only to each alternate terminal of the spaced contacts 7.

What is claimed is:

1. A multiple firing blasting switch comprising a base, an upright frame mounted on the base and having a pair of vertically disposed guide surfaces

thereon, a weighted slide between and engaging said guide surfaces, said surfaces exerting substantially no pressure on said slide and said slide being freely slidable thereon under the influence of gravity, a pair of electrically connected contact arms mounted on the slide, a strip of non-conducting material fixed to the frame adjacent each of said guide surfaces, a vertically disposed contact rod mounted in one of said strips and in continuous engagement with one of said contact arms, a plurality of vertically aligned spaced contacts mounted in the other of said strips and successively engageable by the other contact arm during sliding movement of the slide, and a fusible link for holding said slide at the upper end of said guide surfaces, said aligned contacts being spaced from each other a distance which increases gradually from the first to the last contact to compensate for the increasing momentum of said slide in its sliding movement.

2. A blasting switch as defined in claim 1, including a unitary contact holder strip in which said spaced contacts are mounted, and fasteners securing said strip to the frame, said fasteners being freely actuable to permit mounting of said holder strip in, and removal of said holder strip from, said frame.

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The following references are of record in the file of this patent:

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