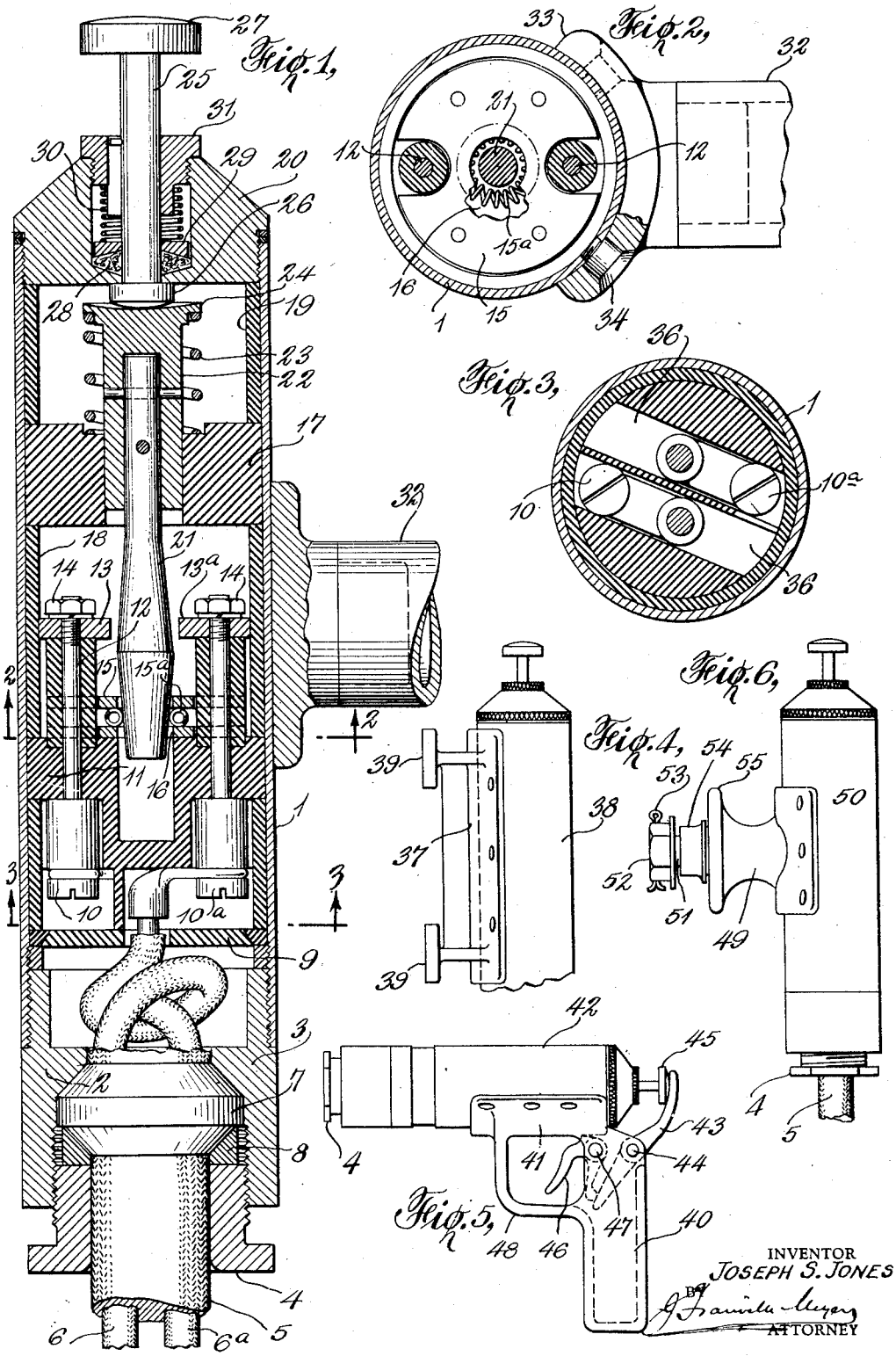
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FIRING KEY

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JOSEPH S. JONES, OF BROOKLYN, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO CHAS. CORY CORPORATION, A CORPORATION OF NEW YORK

FIRING KEY

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This invention is an improvement in firing keys, and relates more particularly to keys of the quick break type.

One of the primary objects of the invention is the provision in a construction wherein a spring is utilized to relatively move the contacts, with a plunger shaped to tension the spring and to direct the contracting energy thereof to bodily move the spring, a new and improved means for operating the plunger, and improved mechanism for supporting the parts.

A further object is the provision of a simple construction, especially adapted for use on shipboard, wherein the working parts are fully protected against the elements.

With these and other objects in view the invention consists in the construction and novel combination of parts fully described hereinafter, illustrated in the accompanying drawings, and pointed out in the claims appended hereto, it being understood that various changes in the form, proportion, size and minor details of construction within the scope of the claims, may be resorted to without departing from the spirit of the invention.

In the drawings forming a part hereof:—

Fig. 1 is a longitudinal section of an embodiment of the invention.

Figs. 2 and 3 are sections on the lines 2—2 and 3—3 respectively, of Fig. 1.

Fig. 4 is a partial side elevation of the improved key showing one type of mounting.

Figs. 5 and 6 are similar views showing other types of mounting.

In the present embodiment of the invention, the improved key comprises a cylindrical casing 1, usually of brass, internally threaded at each end and one end, the lower in use, has inserted therein a terminal tube 2 also of brass. This tube as shown has an internal annular shoulder 3, and a flanged collar 4 is threaded into the tube at the lower end thereof as shown. The end of the conduit 5 in which is arranged the leads 6 and 6*a* of the electric circuit is provided with a head 7 held between the shoulder 3 and a ring 8 at the inner end of the collar 4.

The leads pass up through an insulating ring or washer 9 to a connection with studs 10 and 10*a* respectively, which are supported in a base 11 of insulating material, such for instance as bakelite. Above the base each stud is encircled by an insulating sleeve 12, and above the sleeve each stud has connected therewith a contact element 13 and 13*a* respectively, held in place by a nut 14, a nut lock being arranged between each nut and the contact element as shown. The studs and the contact elements are of copper.

The elements 13 and 13*a* are the fixed elements, and a bridge composed of spaced plates 15 and 16 carrying between them a snap or garter spring 15*a*. The bridge is mounted to move longitudinally of the body on the sleeves 12. As shown in Fig. 1, the ends of the plates of the bridge are notched to receive these sleeves, which guide the bridge in its movement toward and from the elements 13—13*a*. A block 17 of insulating material, as for instance bakelite is arranged above the fixed contact elements, being held in spaced relation with respect to the base by means of a spacing sleeve 18. A second sleeve 19 is arranged above the block, between it and a guide cap 20 which closes the upper end of the body 1, and has threaded engagement therewith. This cap is usually of brass.

An operating rod 21 has guided movement in the block 17, the said rod having connected with the upper end thereof a socket or head 22. The upper end of the rod is received in the socket, and pinned thereto as shown. A spring 23 is arranged between the block 17 and a marginal flange 24 at the upper end of the head, and the spring acts normally to hold the rod in the position of Fig. 1. The rod is operated in its downward movement by means of a plunger 25, having guided movement in the cap 20. The inner end of the plunger has a head 26 which engages a central depression in the head 22, and the outer end has a head 27 for operating the plunger 25.

The opening in the cap through which the plunger passes is enlarged annularly from near the inner end to the outer end, and a suitable packing 28 encircles the plunger within the enlarged portion. A packing ring 29 bears against the plunger, and a spring 30 is arranged between the ring and a gland

nut 31 threaded into the outer end of the enlargement. The spring holds the packing normally compressed, forming a seal at this point between the plunger and the cap.

Referring to Fig. 1, it will be seen that the rod 21 is cam shaped, gradually tapering in both directions from a point intermediate its ends. The spring 15*a* encircles the rod under tension within the bridge, between the plates 15 and 16. This spring is held in an annular chamber in the bridge as shown, and the chamber is of a size to enable expansion of the spring as it rides over the enlarged part of the plunger. As previously stated the plunger tapers in both directions, toward its free end, and toward the head 22, and the taper in each direction is gradual and uniform.

The spring is of circular formation, and when the rod is moved downward, so that the spring passes the largest portion thereof, it will of its own resiliency move up the taper of the rod above the largest part thereof, raising the bridge, and bringing the bridge 15—16 into contact with the elements 13—13*a*. When the rod is allowed to move upward under the influence of the spring 23, as soon as the largest part of the rod is passed by the spring, it will of its own resiliency move down the lowered tapered portion, breaking the circuit.

The spring 23 and the spring 30 are also usually of phosphor-bronze, and the cap 20, the plunger 25, the head 22, and the packing ring 29 are usually of brass. The improved firing key may be arranged or supported in many different ways. In Fig. 1, it is shown adapted for connection with a periscope. A bracket indicated at 32 is connected to the body 1 at one end of the bracket, the other end being adapted for connection with the periscope. As shown in Fig. 2, the bracket has an arc shaped portion 33, fitting about the body, and secured thereto by means of screws 34.

In Fig. 4 a mounting for attaching the key to a bulkhead is shown. This mounting is in the form of a curved plate 37 secured to the body of the key indicated generally at 38 in the same manner as the bracket 32 is secured to the body of the Fig. 1 construction. The plate has feet 39 for connection with the bulkhead, thus to mount the key. In Fig. 5 a director mounting type is shown. In this arrangement the bracket 40 is in the form of a pistol grip. A curved plate 41 is carried by the grip, and this is secured to the firing key indicated generally at 42, in the same manner as is secured the bracket 32. An operating lever 43 is pivoted to the grip as indicated at 44, and one end of the lever overlies the head 45 of the firing key, the said head corresponding to the head 27 of Fig. 1. The other end of the lever is in position to be engaged by one arm of the U-shaped trigger 46 pivoted to the grip at 47. A guard 48 is provided for the trigger, and it will be apparent that the key may be held and aimed like a pistol, and fired by pressing the trigger 46.

In Fig. 6 a construction is shown of the hand wheel mounting type. In this arrangement a bracket 49 is connected to the firing key indicated generally at 50 in the same manner as the bracket 32. A threaded stud 51 extends from the bracket, and the stud is engaged by a nut 52, which is locked thereto by means of a cotter pin 53. A spacer 54 of brass or the like is arranged on the stem between the nut and a locking nut 55.

In this type, the firing key may be connected to the rim of the hand wheel of a director, directorscope, or gun train or elevating hand wheel, taking the place of the hand wheel handle. The hand wheel is usually connected to an elevation or azimuth gear. The longitudinal axis of the firing key will always be vertical, because of the running fit of the spacer 54 in its supporting hole in the handle.

It will be noticed referring to Fig. 3, that the terminals of the leads 6 and 6*a* are in separate chambers in the base 11. These chambers extend substantially diametrical to the base, and are separated by an insulating partition as shown. Below the insulating washer 9 the leads have the usual insulating coating, and only those parts of the leads above this washer are denuded. The washer 9 converts the chambers 36 into closed chambers.

What is claimed as new is:—

1. In a firing key construction, a plunger having guided longitudinal movement, fixed studs supported at opposite sides of the plunger, each carrying at its upper end a fixed contact and a sleeve of insulating material for holding the contact in fixed position, a movable contact comprising a bridge having an opening through which the plunger passes, and having its ends notched to receive the sleeves as guides in the movement of the bridge, said bridge being composed of upper and lower spaced members, a garter spring encircling the plunger between the members, said plunger having a head comprising oppositely arranged tapering portions to expand the spring when the plunger is moved in either direction with respect thereto, whereby to enable the spring to throw the bridge toward or from the fixed contacts for the purpose set forth.

2. A firing key comprising a cylindrical casing, means at one end of the casing for securing a conductor cable with leads passing up generally centrally, an insulating block in approximately central location in the casing, terminal posts on the block near sides of the casing and to which the leads are connected, the insulating block having a centrally disposed recess, conducting rods ex-

tending up from the terminal posts, insulating guide sleeves surrounding the rods and located at opposite sides of the casing, contacts secured to the tops of the rods and resting on the sleeves, a contact bridge piece having spaced walls of disk form retaining between them a garter spring and having peripheral notches by which the bridge is guided to reciprocate on the sleeves, and an operating plunger of double tapered form mounted for reciprocation at the center of the casing, to pass through a central aperture in the contact bridge and to the said recess in said insulating block, and being adapted also to cooperate with the garter spring to move the contact bridge.

3. In a circuit making and breaking device, a plurality of terminal posts, rigid conductors extending from said terminal posts, insulating guide members surrounding said rigid conductors, contacts secured to the ends of said rigid conductors and positioned to be supported by said guide members, a bridging contact movable along said guide members into and out of registry with said first named contacts, means for so moving said bridging contact comprising a rod passing freely through said bridging contact and having a tapered end projecting therebeyond, and a unitary insulating member adapted to support said terminal posts, receive said tapered end, and limit the movement of said bridging contact.

Signed at New York, in the county of New York and State of New York, this 13th day of June, A. D. 1927.

JOSEPH S. JONES.