May 22, 1923. 1,455,878

H. D. GRINNELL

FUSE PLUG PULLER

Filed March 3, 1922

Fig. 1.

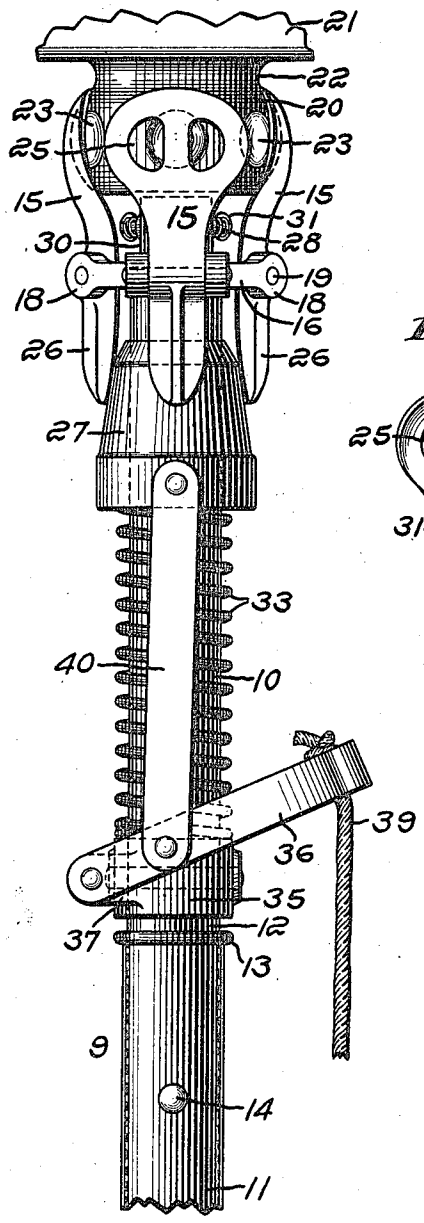


Fig. 3.

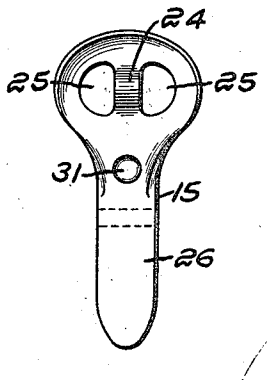


Fig. 4.

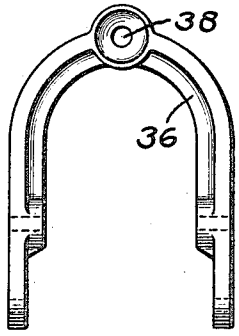
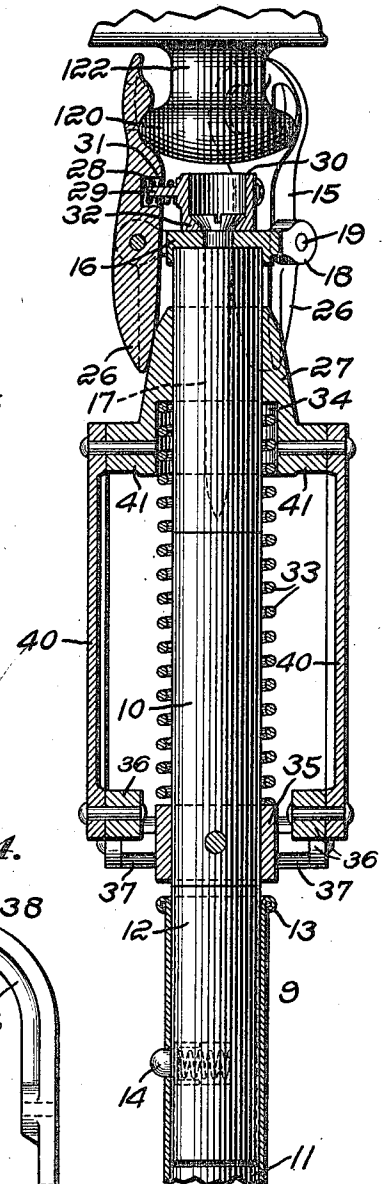


Fig. 2.



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UNITED STATES PATENT OFFICE.

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FUSE-PLUG PULLER.

Application filed March 3, 1922. Serial No. 540,770.

To all whom it may concern:

Be it known that I, HAROLD D. GRINNELL, a citizen of the United States, and a resident of Pittsfield, in the county of Berkshire and State of Massachusetts, have invented an Improvement in Fuse-Plug Pullers, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to apparatus for removing and replacing electric fuse plugs and other objects, and aims to provide novel and improved means for manually performing these operations quickly and safely, and particularly in respect to fuse plugs arranged in elevated positions.

My invention will best be understood from a description of a specific useful embodiment thereof, illustrated in the accompanying drawings, wherein,

Fig. 1 is a side elevation of the device in operative relation to an approved type of fuse plug, the lower portion of the rod or handle of the device being cut away;

Fig. 2, a longitudinal vertical section of the same on an axial plane, the device being rotated 90° to the left and operatively engaging a modified type of fuse plug;

Fig. 3, a detail inner face view of one of the clamping members; and

Fig. 4, a face view of the lever controlling the clutch actuating means.

Referring to the accompanying drawings, the device is shown as comprising a clutch portion and a supporting portion. The supporting portion, upon which the clutch portion is movably mounted for adjustment with respect to the object to be moved, is shown in the form of a rod or handle 9 of indefinite and variable length for enabling the operator to conveniently manipulate the object when placed beyond his grasp. This handle may be formed in any manner suitable to the purpose, and if preferably composed of a series of sections detachably connected so that by adding or removing a suitable number the aggregate length of the handle may be readily accommodated to the required reach for operation. As herein shown, the handle comprises a permanent terminal section 10, upon one end of which is mounted the clutch portion, while the opposite end is connected to one or more similar detachable sections, illustrated at 11, fitted end to end in any convenient manner, such as by complementary metal extension bushings 12, 13. Suitable means, such as the spring-actuated disappearing push-button 14 is, preferably employed to prevent accidental displacement, said push-button being seated transversely in the body of the handle and normally extending through suitable registering openings in the walls of the overlapping portions of the bushings 12, 13.

The clutch portion of my device including suitable control means therefor, is mounted on the upper extremity of the rod 9.

As herein shown, this portion comprises a series of adjustable fingers or clamps 15 of any convenient size or number pivotally secured near their lower ends to a support, such as the plate 16 carried on the extremity of the rod 9, and extending upward beyond the rod to provide gripping members adapted to be moved into and out of a gripping position. The supporting plate 16, which is preferably secured in a horizontal position and in rigid relation to the rod 9 by a screw 17 extending through a suitable central opening in the plate and extending well down into the rod, is provided on its outer margin with a series of radial ears 18, 18 arranged in pairs, each pair supporting a pin 19 upon which one of the clamps 15 is pivoted to swing toward and away from the axis of the rod. The upper ends of the clamps are designed as far as practicable to conform to the general outline of the knob or handle 20 provided on an approved type of fuse plug 21. While the latter may vary in structural detail, as shown in the modification 120 illustrated in Fig. 2, according to the fuse plug setting and source of manufacture, the accepted types of fuse plugs in common use carry a knob or handle connected to the body of the plug by a more or less reduced neck portion 22. This knob 20 may be provided with marginal devices such as serrations or recesses 23, 23 to cooperate with the means employed for its removal.

In normal position the clamps 15 are inclined lengthwise converging toward their outer ends, which are reduced in thickness and expanded laterally, assuming a concavo-convex or spoon-like formation. The inner or concave face of each of said outer

ends is provided centrally with a boss 24 and an aperture 25, arranged on each side thereof, the object of the boss being to take into any hollow or groove on the engaged portion of the knob 20, such groove or hollow being illustrated by the recesses 23 in the type shown in Fig. 1, and by the annular channel surrounding the neck 122, illustrated in Fig. 2, while the apertures 25 are designed to receive teeth or other projections (not shown) provided on the engaged portion of modified types of fuse handles.

Each of the clamps 15 is extended downward beyond the point of pivotal support to form a foot 26 which normally engages the outer surface of a cone-shaped thrust member 27 operating to control the movements of the clamps. Said feet 26 are held in yielding contact with the thrust member 27 preferably by means of coil springs 28 carried on radially arranged studs 29 provided on a ring 30 secured centrally to the plate 16, each of said springs being seated in a suitable recess 31 provided on the inner face of the body portion of each of the clamps 15 at a point opposite the corresponding stud 29. Said springs 28 thus operate to spread the clamps 15 when the superior force normally operating to converge the clamps is relaxed. The ring 30 is interiorly provided at its lower end with an annular inclined shoulder 32 forming a seat for the screw 17, which serves to secure the ring in fixed position on the plate 16.

The thrust member 27, which operates to throw the clamps 15 into the clamping position, is shown in the form of a metal sleeve mounted upon the rod 9 below the terminal plate 16 and arranged to move into and out of engagement with the feet 26. This thrust member is forced upward and held normally in elevated position on the rod 9 by means of a coil expansion mainspring 33 surrounding the handle immediately below the thrust member, thus spreading the feet 26. The upper end of said mainspring 33 extends into a bore 34 provided in the lower end of the thrust member, and having a larger diameter than the axial opening therethrough, while the opposite end of said spring abuts upon a fixed collar 35 carried on the rod 9.

Downward movements of the thrust member 27 are controlled by a lever 36 disposed in angular relation to the rod 9 and pivotally attached thereto at one end. As shown, the lever 36 has a yoke-like or U-shaped formation adapted to freely straddle the rod 9, the inner ends of the lever being suitably pivoted to apertured lugs 37, 37 laterally provided on the collar 35, while the outer or curved end of the lever is projected in the opposite direction to a point well beyond the rod, being provided with an aperture 38 to receive a flexible pull-cord 39 of indefinite length suspended therefrom, said pull-cord being extended downward to a convenient point within the grasp of the operator. Movable connection between the thrust member 27 and lever 36 is established by means of the bar links 40 arranged in parallel on opposite sides of the rod 9, said links being pivotally attached at their upper ends to studs 41 provided on the lower rim of the thrust member 27 and also pivotally connected at their lower ends to the lever 36 at points preferably adjacent its pivoted ends.

The lever 36 normally assumes an upward inclination, being held in this position while at rest under the force of the mainspring 33 acting through the medium of the thrust member 27 and bar links 40. To spread the clamps for the purpose of releasing or attaching my device with respect to a fuse-plug, the position of the thrust member 27 is reversed or retracted by means of the pull-cord 39, thereby permitting the reflex coil springs 28 controlling the action of the individual clamps to operate in the manner before described.

The fuse plug shown in Fig. 1 belongs to that type of plugs wherein it is necessary to supplement a straight pulling or pushing action by a rotary motion, while the type indicated in Fig. 2 requires no rotary motion to install it. Hence it will be apparent that my device is designed to be applied in practice to objects varying in structural detail and method of attachment, including both the "screw" and "pull" types of setting.

My invention is obviously not restricted to the particular embodiment herein shown and described.

I claim as my invention:

1. In a device of the class described, a support, and a series of clamping arms pivoted to the support and having jaw portions adapted to be moved into and out of cooperative relationship, each of said jaw portions having a concave gripping face and a rigidly acting extension member on said face adapted to cooperate with the object engaged to prevent rotation on such object.

2. In a device of the class described, a support, and a series of clamping arms pivotally secured to the support and having jaw portions adapted to be moved into and out of cooperative relationship, each of said jaw portions having a concave gripping face and a transverse opening therethrough for receiving an extension member on the object engaged to prevent rotation on such object.

3. A device of the class described adapted for application lengthwise in the direction of the axial line of the object to be moved and comprising, in combination, a longitudinal support, clamping arms pivotally secured to the support and having their gripping ends adapted to be moved into and out of co-

operative relationship, a member mounted to slide on the support and spring means cooperating therewith for throwing the arms into the gripping position, retraction means therefor, and means for spreading the clamping arms at their gripping ends, each of the clamping arms having a concave gripping face with rigidly acting means thereon adapted to cooperate with the object to be moved to prevent relative movement in turning, drawing or pushing the object.

4. In a device of the class described, in combination, a support, a series of clamping arms pivotally secured to the support, each of said clamping arms being extended on opposite sides of said point of support, a sliding member carried on the support and adapted to be moved into and out of position for spreading the lower ends of said clamping arms, by a rapid thrust movement, means for actuating said sliding member, and means independent of sliding member and its actuating means provided above said support for moving the clamping arms out of the clamping position.

5. In a device of the class described, in combination, a rod, clamping arms pivoted to one end of the rod and extending lengthwise of the rod in opposite directions beyond the point of support, means for throwing the arms into the gripping position, and separate means for spreading said arms and including an extension member carried on said end of the rod and spring means carried by said extension member and operating to impel said arms away from said extension member.

6. In a device of the class described, in combination, a support, a series of clamping arms pivotally secured to the support and having jaw portions adapted to be moved into and out of cooperative relationship, said jaw portions having uneven gripping faces providing parallel spaced channels surrounding the axis of said support, means for throwing the arms into the gripping position, and separate means for spreading said jaw portions.

7. In a device of the class described, in combination, a support 9, clamping arms 15 mounted on the support and having concave jaws, an extension member 24 on the inner face of each of the jaws, a spring 33 for actuating the arms into the gripping position, and separate springs 28 for spreading the arms.

In testimony whereof, I have signed my name to this specification.

HAROLD D. GRINNELL.