

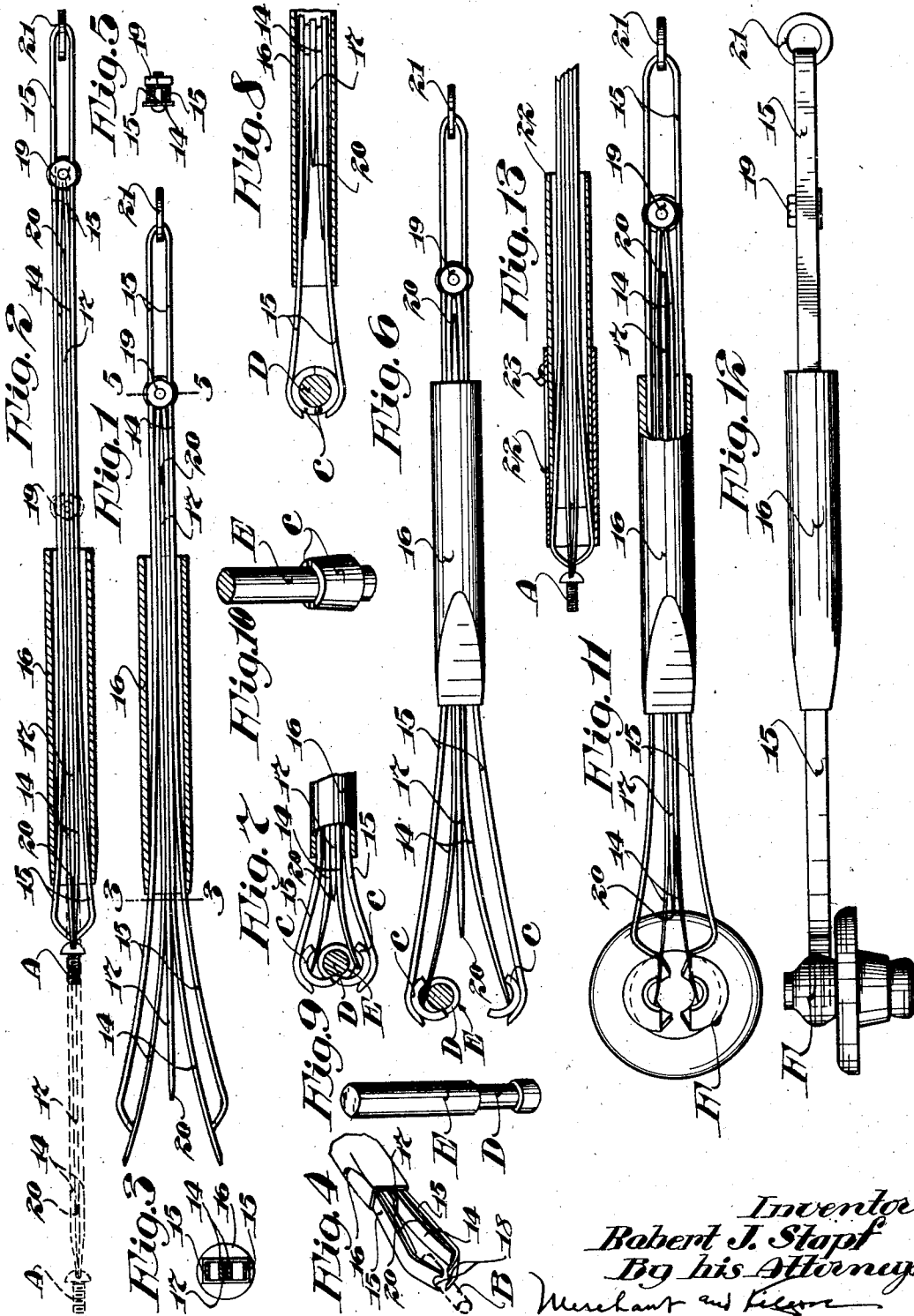
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GRAPPLE

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UNITED STATES PATENT OFFICE

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GRAPPLE

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This invention has for its object the provision of an extremely simple and highly efficient grapple intended for general use, but especially well adapted for handling small objects in inaccessible places, such as screws, nuts, pins, two-part locks for valve spring retainers and the like.

To the above end, generally stated, the invention consists of the novel devices and combinations of devices hereinafter described and defined in the claims.

In the accompanying drawings, which illustrate the invention, like characters indicate like parts throughout the several views.

Referring to the drawings:

Fig. 1 is a view of the improved grapple, partly in elevation and partly in longitudinal central section;

Fig. 2 is a view corresponding to Fig. 1, showing the grapple holding a screw, some parts shown in different positions by means of broken lines;

Fig. 3 is a view partly in end elevation and partly in transverse section taken on the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary perspective view showing the outer portion of the grapple in a different adjustment than that shown in Fig. 1;

Fig. 5 is a detail view partly in end elevation and partly in transverse section taken on the line 5—5 of Fig. 1;

Fig. 6 is an end elevation of the improved grapple holding a two-part lock for a valve spring retainer to be applied to a valve stem shown in section;

Fig. 7 is fragmentary view of the grapple showing the next step in applying the lock to the valve stem;

Fig. 8 is a view corresponding to Fig. 7 showing the lock applied to the valve stem and held in position to receive the valve spring retainer;

Fig. 9 is a perspective view of the outer end portion of the valve stem;

Fig. 10 is a view corresponding to Fig. 9, further showing the two-part lock applied to the valve stem;

Fig. 11 is a view showing the use of the

grapple in holding another type of valve spring lock and retainer;

Fig. 12 is a side elevation of the parts shown in Fig. 11; and

Fig. 13 is a fragmentary view showing the outer end portion of the grapple holding a screw and showing a modification of the slide.

The improved grapple includes inner and outer nested sear springs 14 and 15, respectively, that are relatively longitudinally movable, a slide 16 and a long relatively longitudinally movable wedge 17 within the spring 14. Each spring 14 and 15 is formed from a single piece of flat spring metal folded upon itself to form the legs thereof, and the spring 14 is somewhat shorter than the spring 15 so that it can be contained entirely within the spring 15 with the free end portions of the legs of the spring 15 extending outward thereof.

Normally the legs of the spring 14 are in outwardly diverging relation and are formed on relatively flat curves while the legs of the spring 15 are normally parallel.

The end portions of the legs of the spring 15 extend inwardly and outwardly and form a pair of jaws that contact when the spring 14 is retracted within the spring 15 and the spring 15 closed. These jaws have segmental notch-like seats 18 for holding a pin or the like. The tension of the springs 14 and 15 is reverse, that is, the legs of the spring 14 are under strain to spread or expand and the legs of the spring 15 are under strain to draw draw together or contact and the tension of the spring 14 is such as to overcome the tension of the spring 15 and hold the same spread. When the ends of the spring 14 are projected outward of the ends of the spring 15, said springs 15 intermediate of their ends bear against the jaws of the spring 15 and when the ends of the spring 15 are drawn inward of the ends of the spring 14, the ends of the spring 14 bear against the inner faces of the spring 15.

A nut-equipped bolt 19 extends transversely between the legs of the spring 14, at the transverse portion thereof, and its head and nut engage opposite longitudinal edges of the

springs 14 and 15 and hold said springs against relative transverse movement, see Fig. 5.

The slide 16 is in the form of a tubular sleeve telescoped onto the spring 15 and its outer end is diametrically contracted to engage the longitudinal edges of the springs 14 and 15 with a working fit and cooperate with the bolt 19 to hold said springs parallel and against relative transverse movement. As the slide 16 is moved outward on the spring 15 it progressively contracts the legs thereof, and hence, the legs of the spring 14 so that as the slide 16 passes over the spring 15 the legs of the springs 14 and 15 are brought into substantially parallel arrangement with the legs of the spring 15 tightly pressed onto the legs of the spring 14 and with the legs of the spring 14 pressed against the wedge 17.

The wedge 17, as shown, is of the same transverse width as the springs 14 and 15, is made from a piece of flat spring metal and the end portions thereof are beveled to form screw driver bits 20 of different widths. As the wedge 17 is loosely held between the legs of the spring 14 the same may be readily reversed end for end to bring either screw driver bit 20 into an operative position.

The primary object of the wedge 17 is to increase the tension on the outer end portions of the legs of the spring 14 when used, as shown in Figs. 2 and 13, or for any other use where outward pressure is required to hold an object. By longitudinally moving the wedge 17 between the legs of the spring 14 the tension on the end portions of said legs may be varied, at will.

A ring 21 is applied to the inner end of the spring 15 to afford convenient means by which the grapple may be hung on a hook or other support.

In the modification shown in Fig. 13, the slide 22 comprises telescopically connected sections having a screw and slot connection 23. The outer section of the slide 22 is arranged to slide forward of the inner section thereof and over the wide portion of the jaws of the spring 15, increase the pressure thereon and securely hold the same closed.

To start a screw A in an inaccessible place, the tool is adjusted, as shown in Figs. 2 and 13, wherein the outer end portions of the legs of the spring 14 are inserted into the nick in the screw and the outward tension thereon will securely hold the screw. When holding large screws where considerable outward pressure on the legs of the spring 14 is required, the wedge 17 may be moved outward between the legs of the spring 14 to increase the tension thereof. If it is necessary to start the screw in a place where it is impossible to insert the spring 15 and slide 16, or at a considerable depth, the spring 14 may

be drawn outward of the spring 15, as shown by broken lines in Fig. 2.

While the screw A is held, as shown, the same may be readily started and screwed into place by turning the grapple about its longitudinal axis. When the grapple is adjusted to hold a screw or other article the action of the slide 16 on the spring 15 is not sufficient to affect the holding action of the spring 14. In place of holding a screw, as shown, a nut may be held by inserting the end portions of the legs of the spring 14 into the bore there-through and the outward pressure thereon will be sufficient to hold the nut so that it may be applied to a bolt or stud by turning the grapple about its longitudinal axis. During the advance of the nut onto the bolt the engagement of the end of the bolt with the ends of the legs of the spring 14, will gradually move the same outward and finally release the same from the nut.

A pin B or a similar device may be held by the grapple as indicated by broken lines in Fig. 4. In this use of the grapple the slide 16 places sufficient tension on the legs of the spring 15 to hold the pin B while inserting the same into a bore or while removing the same therefrom.

It is well known that it is very difficult to apply a two-part lock C in a seat D therefor in a valve stem E while the spring retainer is being placed therearound. Fig. 6 shows how the two members of the lock C are first held, with one thereof extending into the seat D diametrically opposite from the grapple. While the grapple is thus held the slide 16 is moved outward on the spring 15 which swings the other member of the lock into a like position on the opposite side of the valve stem E, as shown in Fig. 7. To complete the application of the lock C to the valve stem E the inner spring 14 is retracted to withdraw its legs from between the valve stem E and the members of the lock C, as shown in Fig. 8. As the spring 14 is retracted the spring 15, which is under tension to contract, moves the members of the lock C in the seat D and thus hold the same, as shown in Fig. 8, to permit the spring retainer to be applied therearound and hold said members in the seat D. The slide 16 is then retracted to release the spring 15 and permit its removal from the lock C.

In removing a two-part lock F for a spring retainer of the type shown in Figs. 11 and 12 from a valve stem, said lock is held by the grapple, as shown.

The above uses are only a few of the many to which the grapple may be put.

What I claim is:

1. A device of the class described comprising two pairs of resilient jaws, the pairs of jaws being normally spread apart, the jaws of each pair being adapted to hold an object, and a slidable member engaging the outer

jaws of each pair for forcing the pairs of jaws toward each other.

2. The structure defined in claim 1 in which the outer jaws of the two pairs are longitudinally movable in respect to the inner jaws of the two pairs.

3. The structure defined in claim 1 in which the inner jaws of the two pairs are longitudinally movable in respect to the outer jaws of the two pairs.

4. The structure defined in claim 1 in which the outer jaws of the two pairs and the inner rows of said pairs are relatively longitudinally adjustable.

5. The structure defined in claim 1 in which the outer jaws of the two pairs are connected for common longitudinal movement in respect to the inner jaws of the two pairs.

6. The structure defined in claim 1 in which the inner jaws of the two pairs are connected for common longitudinal movement in respect to the outer jaws of the two pairs.

7. The structure defined in claim 1 in which the outer jaws of the two pairs are connected and the inner jaws of the two pairs are connected and in which said outer and inner jaws of the two pairs are relatively longitudinally movable.

8. The structure defined in claim 1 in which the tension of the inner jaws of the two pairs is sufficient to overcome the tension of the outer jaws of the two pairs and hold the two pairs of jaws spread apart.

9. The structure defined in claim 1 in which the slidable member comprises telescopically connected sections.

10. The structure defined in claim 1 which further includes a relatively longitudinally movable wedge between the inner jaws of the two pairs of jaws.

In testimony whereof I affix my signature.

ROBERT J. STAPP.

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