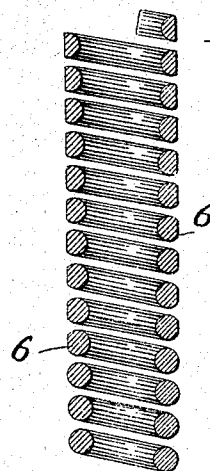
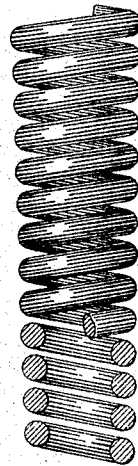
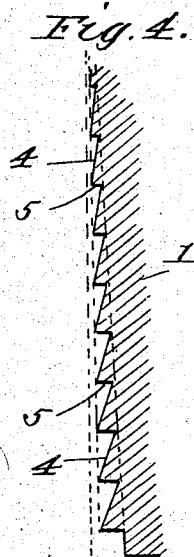
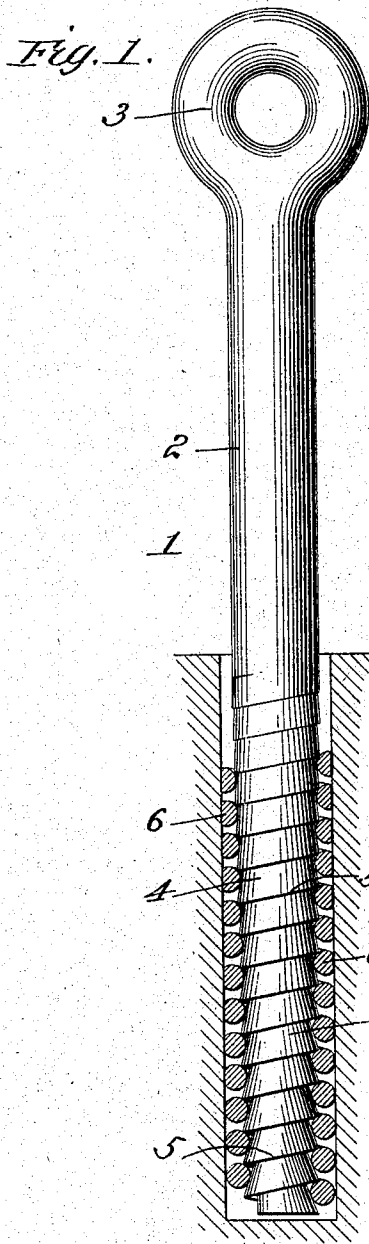


No. 806,408.

PATENTED DEC. 5, 1905.

H. FARRINGTON.
GRAPPLE.

APPLICATION FILED MAY 27, 1905.



Witnesses:

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UNITED STATES PATENT OFFICE.

HARVEY FARRINGTON, OF YONKERS, NEW YORK.

GRAPPLE.

No. 806,408.

Specification of Letters Patent.

Patented Dec. 5, 1905.

Application filed May 27, 1905. Serial No. 262,695.

To all whom it may concern:

Be it known that I, HARVEY FARRINGTON, a citizen of the United States, residing at Yonkers, in the county of Westchester, State of New York, have invented certain new and useful Improvements in Grapples, of which the following is a specification, reference being had therein to the accompanying drawings, in which—

Figure 1 is a side elevation of the device applied, showing the expansible gripping device in section; Fig. 2, a side elevation of the gripping device as it is first formed and showing it tapered internally and externally; Fig. 3, a sectional view of the said device after it is cut to make its outer diameter uniform, and Fig. 4 a detail sectional view of a portion of the expander.

One of the many objects of this invention is to provide a grapple of very simple construction which may be used instead of the ordinary lewis and which may be placed in an aperture having parallel walls—such, for instance, as is formed by the ordinary rock-drill.

A further object of the invention is to provide such a device of simple construction which may be temporarily secured in operative position by simply rotating the expander in the expansible keeper or gripping device, said gripping device being preferably first applied to the expander and the two parts thus engaged inserted in the aperture prepared to receive them.

It is intended that the device may be used as an expanding-bolt, if desired, and as a wedge or expanding device by means of which blocks of stone or other material may be split. It is obvious that there are other uses to which this device may be put and which will readily suggest themselves to those using this class of invention.

Referring to the various parts by numerals, 1 designates the expander, which, as shown in the drawings, consists of a main shank or portion 2, on one end of which is formed an eye 3. The other end of this expander is tapered slightly, and on this tapered part is formed a single-faced broad thread or spiral expander-cam 4. The angle of the face of this thread varies from end to end. Its surface at the end of the expander is at an acute angle with respect to the central line of the expander, while at its other end it is parallel with said central line. It will thus be seen that this spiral wedge face or expander-cam

at its entering end is at an acute angle with respect to the central line of the expander, this angle being gradually reduced until at the other end of said cam it is merged into the parallel sides of the expander. The result of this construction is to gradually lessen the height of the shoulder 5 formed by the thread, said shoulder being greatest at the entering end of the expander and gradually growing less toward the other end thereof. This shoulder is perpendicular to the axis of the expander and forms a positive stop for the keeper to prevent it moving outward on the expander when the device is being forced into an aperture prepared to receive it.

The purpose of changing the angle of the expander-cam is to reduce the shoulder 5, while at the same time maintain the broad face of the cam. The object of varying the height of the shoulder 5 is to provide an expander which will act quickly on the upper coil of the keeper when a strain is placed upon the expander tending to draw it from the keeper. It will be readily seen that the coils of the keeper will move over the expander-cam face at the upper end of the tapered part of the expander much more readily than over the face of the cam at the end of the expander. The result of this is that when the strain is first placed upon the expander the coils at the top of the keeper will be first expanded, while the coils at the bottom thereof will move slightly upward. As the strain increases on the expander the coils of the keeper will gradually expand from the upper end of the keeper downward until the friction of the keeper against the wall of the aperture in which it is placed is sufficient to hold the keeper therein and permit the expander to lift the block of stone or other article in which said keeper is placed. From this it is clear that the keeper is caused to progressively engage the wall of the aperture in which it is placed, said engagement beginning at the upper end of the keeper and gradually extending to the lower end thereof as the strain thereon increases and as the coils thereof are gradually expanded. It will further be understood that by forming the upper part of the expander-cam of slight angularity it will be much easier to secure the keeper in an aperture prepared for it, as it will be only necessary to rotate the expander to slightly bind the keeper therein, after which the strain placed upon the expander will enlarge the keeper and cause the coils thereof to firmly grip the wall of the

aperture. If the angle of the face of the expander-cam were uniform throughout, this gradually-increasing gripping effect could not be secured, and the keeper would have to be very tightly wedged in the aperture prepared for it before a strain could with safety be placed upon the expander tending to draw the expander from the keeper.

It will be noted that the upper coils of the keeper are of thinner material than the lower coils thereof and are consequently more easily expanded. It will also be seen that the flat surfaces of these upper coils engage the wall of the aperture in which the keeper is to be used. It is clear that the upper portion of the expander-cam will slide through the coil because of the slight angularity of said cam, thereby causing said coils to frictionally engage the wall of the aperture. It is also clear that because of the angle of the lower coils of the expander-cam the lower coils of the keeper will first slide upward in the aperture until the expansion of the keeper has progressed from its upper to its lower end. The lower coils of the keeper being comparatively stiff will be more apt to slide up in the aperture than the upper coils thereof, which will more readily yield to the force exerted by the expander-cam.

As the expander is tapered, it is evident that an expansible keeper or gripping device must be provided having its interior tapered to correspond substantially to the taper of the threaded end of the expander. It is also clear that this gripping device or keeper must have parallel outer sides—that is, it must be equal in outside diameter throughout its length in order that it may be used in apertures having parallel walls. The gripping device 6 (shown in Fig. 3) is tapered internally to correspond substantially to the taper of the expander; but it is of equal outside diameter throughout its length. This keeper is formed of wire or a strip of other suitable material, preferably of soft steel wire of the proper gage and temper wound upon a tapered mandrel, said mandrel corresponding in taper to the taper of the expander, or it may be wound upon the expander so that the interior of the spiral keeper will be tapered to correspond to the taper of the expander. When the keeper is withdrawn from the mandrel, its outside diameter varies from end to end, as shown in Fig. 2. As thus formed it is placed in a lathe or other device and turned or ground down until its outside diameter is equal throughout its entire length, as shown clearly in Fig. 3. It will therefore be seen that the material of the keeper at one of its ends will be much thinner and more resilient than at the other end and that said thinner end will expand more readily than the other parts of the keeper. It will also be noted that the material of the keeper at the lower end thereof—that is, at its smallest internal

diameter—is circular in cross-section and that at the opposite end thereof it is segmental in cross-section, with its flat side forming a portion of the outer side of the coil and adapted to contact with the wall of the aperture prepared to receive it. By reference to Fig. 1 it will be seen that the material of the coil of the smallest section in cross-section is arranged on the expander in such a position that it will be engaged by that portion of the face of the expander-cam having the least angle. It will be also noted that the spiral shoulder formed by the spiral thread will be correspondingly reduced by the change in the angle of the face of the thread, so that the outer surface of the keeper will at all points project beyond the shoulder.

When the parts are arranged as shown in Fig. 1, the keeper will be forced by the inward inclination of the cam face or thread upward against the shoulder, and any strain tending to withdraw the expander from the keeper will tend to cause the keeper to ride outward on said inclined face of the expander-cam and against the walls of the aperture in which the device is temporarily secured. As the keeper or gripping device is in the form of a coil, it is obvious that the extent of the gripping or frictional surface is equal to the length of the material forming the coil. It is also clear that when a strain is applied to the expander tending to draw it out of the keeper the upper end of the keeper will be first expanded, as it will yield more readily than the lower part thereof. This outward expansion will contract the keeper longitudinally and will be gradually distributed throughout the length of the keeper as the outward pull on the expander is increased.

It is obvious that the coil and the expander may be made of any desired length and of any diameter to suit it for the work for which it is designed. I have found that an expander one inch in diameter with its corresponding keeper is ample for lifting loads as high as six or eight tons and that with an expander and keeper of one and one-half inches in diameter as much as thirty tons may be lifted with perfect safety.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A grapple comprising an expander tapered toward one end and formed at said tapered portion with a spiral thread or expander-cam having a face whose angle varies from end to end, whereby a spiral shoulder is formed varying in height from end to end, and a coiled keeper or gripping device adapted to be engaged by said spiral expander-cam, said keeper varying in internal diameter to correspond substantially with the tapered part of the expander, the exterior diameter of said keeper being uniform throughout.

2. A grapple comprising an expander ta-

pered at one end and formed at said tapered part with a single broad-faced spiral thread or expander-cam whose angle varies from end to end, the face of said cam at the end of the expander being at an acute angle with respect to the longitudinal center line of the expander, its opposite end merging into the side of the expander at the end of the tapered part thereof, and a coiled keeper or gripping device varying in internal diameter to correspond to the taper of the expander, the external diameter of said gripping device being uniform throughout its length, whereby the said keeper may be inserted in an aperture having parallel walls.

3. A grapple comprising an expander formed at one end with a broad-faced spiral thread or expander-cam, the face of said cam at the entering end of the expander being at an acute angle with respect to the longitudinal line of the expander and gradually lessening its angle to its other end, and an internally-tapered expansible gripping device adapted to be engaged by the expander-cam, the external diameter of said gripping device being uniform throughout its length.

4. A grapple comprising an expander formed at one end with a single broad-faced spiral thread or expander-cam of uniform pitch from end to end, the face of said cam at the end of the expander being at an acute angle with respect to the longitudinal line of the expander and gradually lessening its angle to the opposite end of said cam, and a coiled gripping device varying in internal diameter and adapted to be engaged by the spiral expander-cam, the external diameter of said gripping device being uniform throughout its length.

5. A gripping device for a grapple consisting of a coiled strip of suitable material whose internal diameter varies from end to end and

whose external diameter is uniform throughout, in combination with an expander formed with a single-faced spiral expander-cam or thread adapted to engage said coil throughout its length.

6. A keeper or gripping device for a grapple and similar devices formed of a coil of suitable material circular in cross-section at one of its ends, and gradually flattened toward its other end, said other end of said material being segmental in cross-section, said material being so coiled that the flattened portion thereof will form a portion of the exterior of said coil, the internal diameter of said coil varying from end to end and the external diameter thereof being uniform throughout its length.

7. A grapple comprising an expander tapered at one end and formed at said tapered part with a one-faced broad spiral thread or expander-cam, a shoulder being formed by said thread perpendicular to the axis of the expander, and a coiled keeper varying in internal diameter to correspond to the taper of the expander and adapted to be engaged throughout its length by the expander-cam and to normally lie against the said shoulder.

8. A grapple comprising a coiled expansible keeper and a tapered expander formed with an expander-cam adapted to engage said coil-keeper, the angularity of said cam varying from end to end thereof, whereby a strain tending to draw the expander from the keeper will gradually and progressively expand the coils of the keeper from end to end.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 26th day of May, 1905.

HARVEY FARRINGTON.

Witnesses:

WM. R. DAVIS,

W. H. RUBY.