Feb. 18, 1936. H. E. WOODRUFF 2,031,353

UNDERREAMER

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Fig. 1.

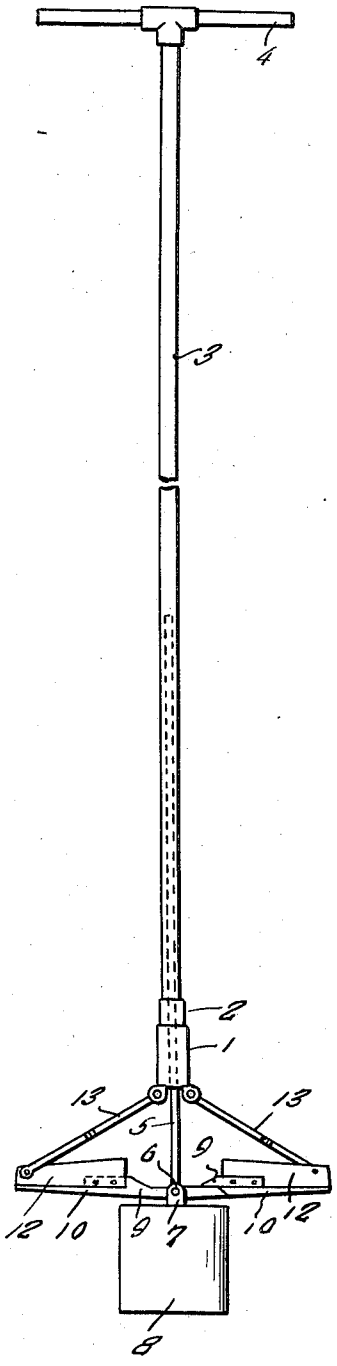
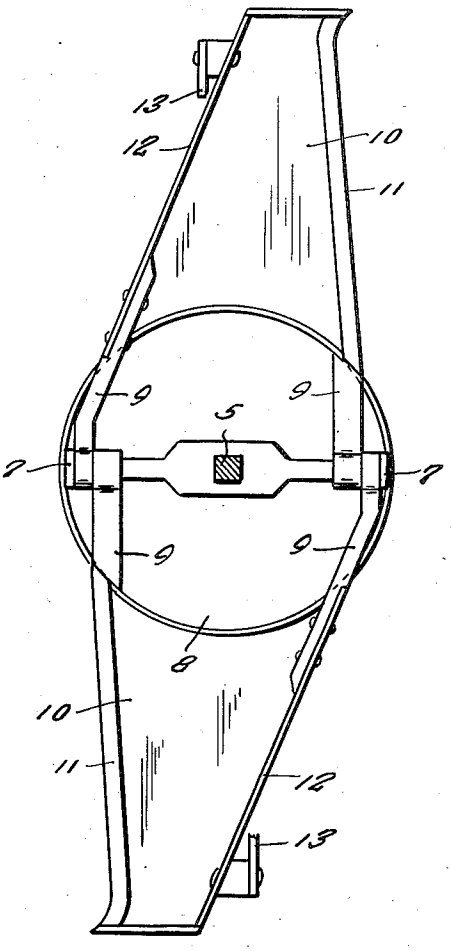


Fig. 3.



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Fig. 2.

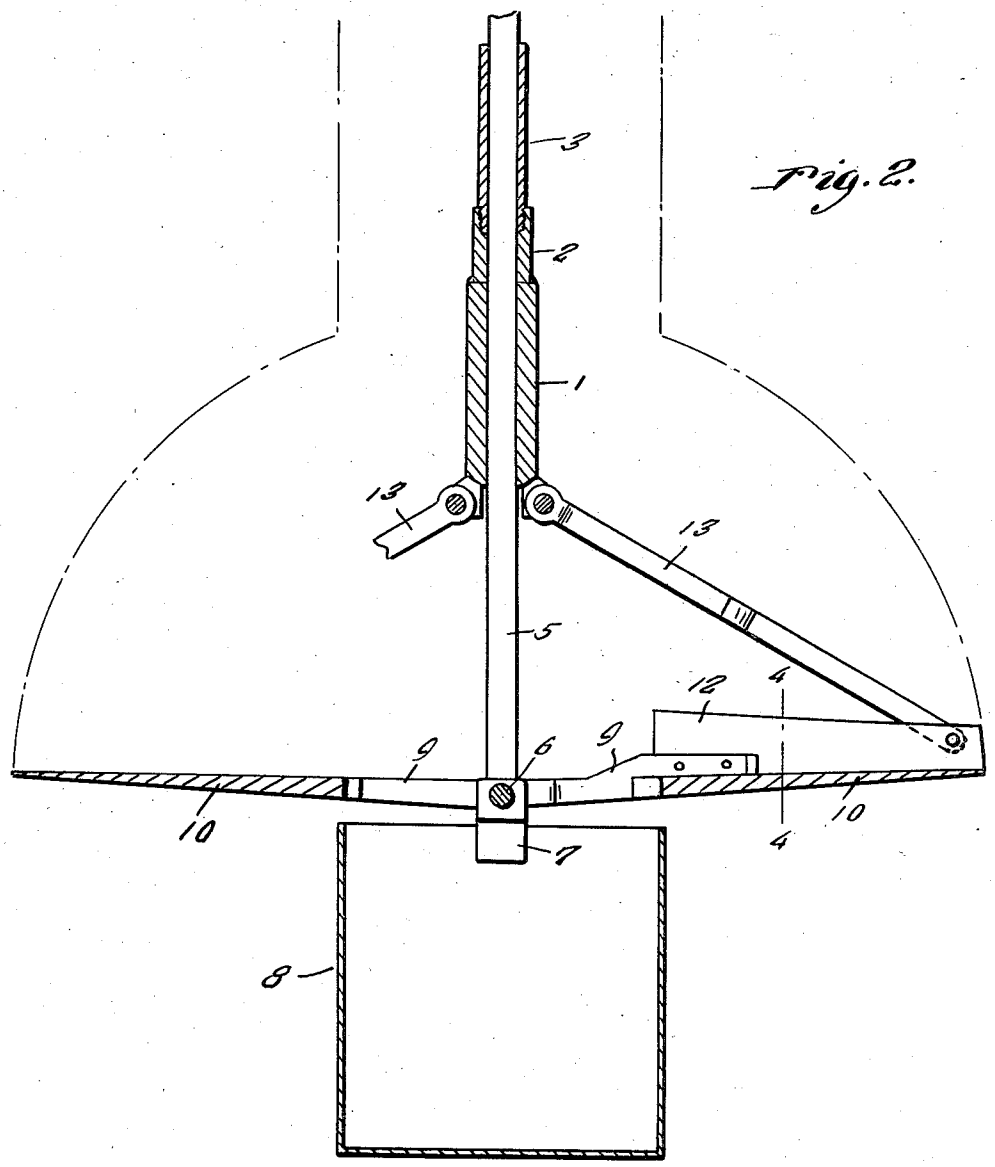
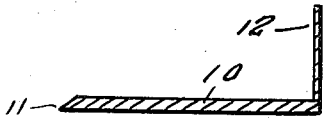


Fig. 4.



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Patented Feb. 18, 1936 2,031,353

UNITED STATES PATENT OFFICE

2,031,353

UNDERREAMER

Harvey Ellis Woodruff, Corpus Christi, Tex.

Application August 16, 1935, Serial No. 36,569

1 Claim. (Cl. 255—76)

The present invention relates to new and useful improvements in underreamers and has for its primary object to provide, in a manner as hereinafter set forth, a manually or power operated device of this character embodying a novel construction, combination and arrangement of parts through the medium of which the lower portion of a hole which has been previously made in the ground may be expeditiously enlarged for providing an increased area for the reception of a footing, while at the same time rendering unnecessary an increase in the size or bore of said hole.

Another very important object of the invention is to provide an underreamer of the aforementioned character which includes novel means for removing the dirt which has been excavated when forming the enlargement.

Other objects of the invention are to provide an underreamer of the character described which will be comparatively simple in construction, strong, durable, highly efficient and reliable in use, compact, light in weight and which may be manufactured at low cost.

All of the foregoing and still further objects and advantages of the invention will become apparent from a study of the following specification, taken in connection with the accompanying drawings, wherein like characters of reference designate corresponding parts throughout the several views, and wherein:—

Figure 1 is a view in side elevation of an underreamer constructed in accordance with the present invention, showing the blades in extended or operative position.

Figure 2 is a view in vertical section through the lower portion of the device.

Figure 3 is a view in horizontal section through a lower portion of the device.

Figure 4 is a detail view in vertical transverse section through one of the blades, taken substantially on the line 4—4 of Figure 2.

Referring now to the drawings in detail, it will be seen that the embodiment of the invention which has been illustrated comprises a metallic sleeve 1 having a polygonal bore, the purpose of which will be presently set forth. Fixed on the upper end of the sleeve 1 is a nipple 2 in which a tubular rod 3 is threadedly engaged. A handle 4 is mounted on the upper end of the tubular rod 3.

Extending slidably through the sleeve 1 into the tubular rod 3 is a polygonal shaft 5 having fixed on its lower end a cross-head 6. Journaled on the end portions of the cross-head 6 are the ears 7 of a bucket 8. It will thus be seen that the bucket 8 is mounted for swinging movement on the lower end of the polygonal shaft 5.

Also journaled on the cross-head 6 are oppositely extending pairs of arms 9 on which blades 10 are rigidly mounted. The leading edges of the blades 10 are sharpened, as at 11. Rising from the trailing edges of the blades 10 are flanges 12.

As best seen in Figure 3 of the drawings, the inner ends of the blades 10 are arcuate to conform substantially to the curvature of the bucket 8. Links 13 are pivotally connected, at one end, to the lower end of the sleeve 1, and at their other ends to the flanges 12 for swinging the blades 10 in a vertical plane.

Briefly, the device is used in the following manner:—

With the polygonal shaft 5 in lowered position in the sleeve 1, the links 13 maintain the blades 10 in raised position adjacent said polygonal shaft 5. With the blades 10 in raised position the implement may be freely inserted in the previously formed hole. When the bucket 8 comes to rest on the bottom of the hole continued downward movement of the tubular rod 3 urges the blades 10 outwardly through the medium of the links 13. The tool is then rotated to cause the blades 10 to underream the hole, the dirt which is excavated during this underreaming operation rolling by gravity down the blades 10 into the bucket 8. As will be understood, the polygonal bore of the sleeve 1 causes the correspondingly shaped shaft 5 to rotate with the tubular rod 3. As the cutting progresses the blades 10 are swung downwardly until they reach a substantially horizontal position, as seen to advantage in Figure 2 of the drawings. When the work has been completed the tubular rod 3 is lifted in a manner to raise the blades 10 to inoperative position, after which the implement, with the excavated dirt contained in the bucket 8, may be withdrawn from the hole.

It is believed that the many advantages of an underreamer constructed in accordance with the present invention will be readily understood, and although a preferred embodiment of the device is as illustrated and described, it is to be understood that changes in the details of construction and in the combination and arrangement of parts may be resorted to which will fall within the scope of the invention as claimed.

What is claimed is:—

An underreamer comprising a tubular rod, means for actuating said rod, a shaft extending slidably into said tubular rod but non-rotatable relative thereto, a cross-head fixed on the lower end of said shaft, blades mounted for swinging movement in a vertical plane on said cross-head, means operatively connecting the blades to the tubular rod for raising and lowering thereby, and a bucket mounted for swinging movement on the cross-head and adapted to receive excavated material from the blades.

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