UNITED STATES PATENT OFFICE.

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APPARATUS FOR SINKING SHAFTS.


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To all whom it may concern:

Be it known that I, PETER G. MORAN, a citizen of the United States, residing at Springfield, in the county of Sangamon and State of Illinois, have invented a new and useful Apparatus for Sinking Shafts, of which the following is such a full, clear, and exact description as will enable others skilled in the art to which it appertains to make and use my said invention.

My invention relates, primarily, to apparatus which are employed in sinking coal-shafts or the like in soil having underlying quicksand through which it is necessary for the shaft to pass.

The general purpose of my invention is to provide an apparatus of the class described having a shield adapted to be forced downward through quicksand and adapted to prevent the flow of sand into the excavation.

With this general purpose in view the more specific purposes of my invention are to provide a shield consisting of separable parts of novel and improved construction, to provide simple and effective means for connecting the separable parts of said shield, to provide means to facilitate the assembling of the parts of the shield, to provide means to prevent the displacement of the timber-work of the shaft during the descent of the shield, and to provide means for connecting the shield with the timber-work of the shaft in such manner as to prevent too rapid descent of the shield when operating in quicksand.

With these purposes in view my invention consists in the novel features of construction and combinations of parts shown in the annexed drawings, to which reference is hereby made and in which similar reference-letters designate like parts in all of the views.

Figure 1 is an end view of the tower and appurtenances and the upper part of the shield and the upper part of the timber-work of the shaft and shows the preferable form of the means employed to prevent displacement of the timber-work of the shaft.

Figure 2 is a top plan of the shield and timber-work. Figure 3 is a vertical longitudinal section on the line 3-3 of Figure 2. Figure 4 is an enlarged partial vertical section on the line 6-6 of Figure 3. Figure 5 is an enlarged perspective view of one of the upper clamping-plates. Figure 6 is an enlarged partial vertical section on the line 6-6 of Figure 3. Figure 7 is an enlarged perspective view of one of the upper clamping-plates.

The outer shell of the shield consists of separable shield-pieces of boiler-iron. In its preferable form the shell is rectangular and consists of corner-pieces A and intermediate pieces A', connected together, as hereinafter described; but a shield of different form may be used without departing from my invention.

Timbers B are framed to fit within the shell and are secured together by bolts B', passing through the timbers. Along the dividing-lines between the timbers transverse holes b are bored, one half of each hole being in one timber and the other half being in the adjacent timber. Bolts B' pass through the holes b and through the holes a in the plates 70 of the shield and serve to connect the plates with the timbers.

The lower parts of the shield-plates A and A' are connected together and strengthened by rods F, to which the shield-plates are clamped by clamping-plates E and G. Each of the plates E has at its lower end a notch e, in which the beveled lower edges of the plates A' fit. The plates E are secured to the plates A and A' by bolts e passing through the holes e' in the plates E and through corresponding holes in the plates A and A'. The notches e serve to prevent the plates E from turning on the bolts e'. The rods F are supported on the curved parts e of the plates E.

The plates G are pierced by holes g'. Bolts g' pass through the holes g and through corresponding holes in the plates A and A' and secure the plates G to the plates A and A'.

The upper surface g of the plates G is flat and when the plates are in place abuts against the under side of the bottom timbers B and serves as a guide in placing the plates A and A' on the timbers B, so that the bolt-holes a through the plates will be in registry with the holes b through the timbers B. The curved parts g of the plates G fit around the rods F, and the plates E and G serve to connect the rods F with the plates A and A'.

Timbers H' are framed together at the corners, form a lining for the shaft. The lower part of said timber-work fits within the shield, and the shield is saidable thereon to a limited extent. At suitable intervals timbers H' are
interposed between the timbers H. The timbers H project beyond the timbers H into recesses excavated to receive them and form drift sets, which serve to prevent upward or downward movement of the timber-work in the shaft. When operating in quicksand, outwardly projecting closers II are interposed at suitable intervals between the timbers H and serve to interrupt and retard downward flow of the sand. The tower J is supported on sills H on or near the surface of the ground, and the timbers H lie under the sills. Stanchions II are secured to the sills H and abut against the corner-posts of the tower. Cables K pass over the tower J and across the outer ends of the stanchions II and have their ends secured to anchor-plates K. The timber-work H being under the sills H, the anchored tower supported on the sills serves to prevent upward displacement of the timber-work. Jack-screws M rest on the timbers B and act against the under-side of the timbers H. The timbers H being immovable, the turning of the screws causes the screws to force the timbers B downward, carrying with them the shield which is secured to the timbers. When the shield has been forced down as far as can be done at one setting of the jack-screws, additional timbers H are built in under the original timbers. The jack-screws are reset under the added timbers and are operated to force the shield another step downward, and additional timbers H are built in as before, and this operation is repeated until the desired depth has been attained.

In practice it is not necessary to use the shield constantly. It is used only when sand is encountered during the sinking of the shaft. After passing through the sand the shield may be dismounted and removed and may be used again, as occasion may require. As timbers H are successively added they are connected with the overlying timbers by means of wall-plates II, which are secured to the timbers by lag-screws b or other suitable securing devices. As the work progresses cross-pieces II are inserted at suitable intervals to strengthen the timber-work of the shaft. Eyebolts N are secured into the timbers H. Hook-bolts N screw into the timbers B. Screw-threaded rods N are supported on the eyebolts N and have at their lower ends links which fit on the hooks of the bolts N. Nuts n on the rods N serve to adjust the rods up or down, as may be desired. When operating in quicksand where there is danger of too sudden descent of the shield, the links may be placed on the hooks, so that the shield will hang suspended by the rods N, and the nuts n may be turned so as to permit gradual descent of the shield.

As additional timbers H are added the bolts N may be withdrawn and reset in position for use in effecting further descent of the shield. In preparing the shield for use the parts are assembled substantially in the manner which I will now describe.

First a hole is dug suitable to receive the shield. The clamping-plates E and G are then placed in position on the pieces A and A'. The pieces A and A are then placed in the hole in a vertical position and in the proper relation to each other. The rods F are then placed in position on the plates E and under the plates G, and the nuts on the bolts connecting the plates with the pieces A and A' are tightened, so as to cause the clamping-plates to firmly connect the pieces A and A with the rods F and clamp the rods against the shield-pieces, so as to prevent accidental displacement of the shield-pieces. When the parts are in this position, the upper parts g of the plates G project at right angles to the pieces A and A' and form ledges adapted to support the first tier of timbers B and serve as a convenient means for effecting and maintaining the alignment of the lower edges of the pieces A and A'. The first tier of timbers is then laid on the ledges g, and the other tiers of timbers are then successively placed above the first tier. The bolts B are then placed in the registering holes o and b, and the nuts on the bolts are tightened to connect the parts firmly together.

To remove the shield from the shaft, the procedure just described will be reversed. I preferably employ plates G, having projecting flat upper parts which serve as ledges on which the first course of timbers B may be laid; but it is obvious that other suitable ledges adapted to effect the alignment of the lower edges of the shield-plates may be used without departing from my invention. Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A shield for apparatus for sinking shafts, consisting of shield-pieces pierced by holes, timbers having holes halved in said timbers and registering with the holes in said shield-pieces, and bolts fitting in the holes in said timbers and shield-pieces and connecting them with each other; in combination with timber-work on which said shield is slideable, and means for forcing said shield downward, as set forth.

2. A shield for apparatus for sinking shafts, consisting of shield-pieces, clamping-plates secured on said shield-pieces and rods supported and clamped against said shield-pieces by said clamping-plates; in combination with timber-work on which said shield is slideable and means for forcing said shield downward, as set forth.

3. A shield for apparatus for sinking shafts consisting of shield-pieces having holes, timbers having holes registering with the holes in said shield-pieces, bolts fitting in the holes in said timbers and shield-pieces, clamping-plates connected with said shield-pieces, and rods clamped against said shield-pieces by said clamping-plates; in combination with
In an apparatus for sinking shafts, the combination of shield-pieces, clamping-plates having notches in which said shield-pieces fit, and rods clamped against said shield-pieces by said clamping-plates, as set forth.

In a shield for apparatus for sinking shafts, the combination of shield-pieces, ledges on said shield-pieces adapted to support timbers, timbers resting on said ledges and securing devices connecting said timbers with said shield-pieces, as set forth.

In a shield for apparatus for sinking shafts, the combination of shield-pieces, ledges on said shield-pieces, clamping-plates on said shield-pieces, rods clamped against said shield-pieces by said clamping-plates and timbers connected with said shield-pieces and resting on said ledges, as set forth.

In an apparatus for sinking shafts, the combination of a shield, timber-work secured in said shield, immovable timber-work on which said shield is slidable, eyebolts secured to said immovable timber-work, hook-bolts secured to the timber-work within said shield, and screw-rods mounted on said eyebolts and connectible with said hook-bolts, as set forth.

In an apparatus for the class described, the combination of a shell, timber-work secured in said shell, timber-work on which said shell is slidable, means adjustably connecting said timber-works and means adapted to force downward said first-named timber-work and connected shell, as set forth.

In an apparatus of the class described, the combination of shield-pieces, timber-work inclosed by and detachably connected with said shield-pieces, timber-work on which said shield-pieces are slidable and jack-screws adapted to force downward said first-named timber-work and connected shield-pieces, as set forth.

In an apparatus of the class described, the combination of a shell, timber-work on which said shell is slidable, closers connected with said timber-work, timber-work secured in said shell, and means for forcing downward said last-named timber-work and connected shell, as set forth.

In an apparatus of the class described, the combination of a shell, timber-work on which said shell is slidable, drift-sets built in said timber-work, timber-work secured in said shell, and means for forcing downward said last-named timber-work and connected shell, as set forth.

In an apparatus of the class described, the combination of sills, a tower supported on said sills, stanchions secured to said sills and abutting against said tower, cables carried on said tower and stanchions, anchors to which said cables are secured, timber-work underlyng said sills, a shell slidable on said timber-work, timber-work secured in said shell and means for forcing downward said last-named timber-work and connected shell, as set forth.

In witness whereof I have hereunto subscribed my name, at Springfield, Illinois, this 24th day of October, 1901.

PETER G. MORAN.

Witnesses:

MAY F. Ryan,
FORDYCE W. BROWN.