No. 701,490. Patented June 3, 1902.

G. J. MAAS.

METHOD OF SINKING SHAFTS.

(Application filed Dec. 3, 1900.)

(No Model.)

Fig. 2.

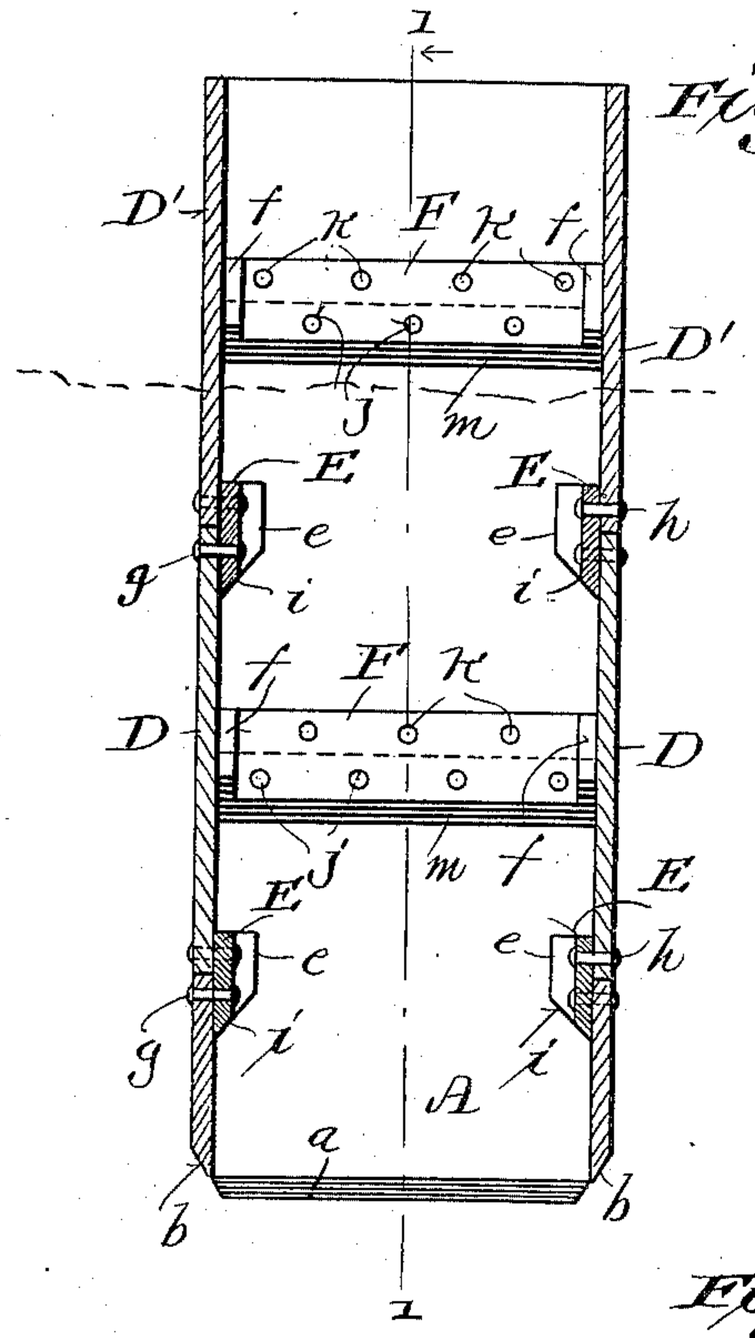


Fig. 1.

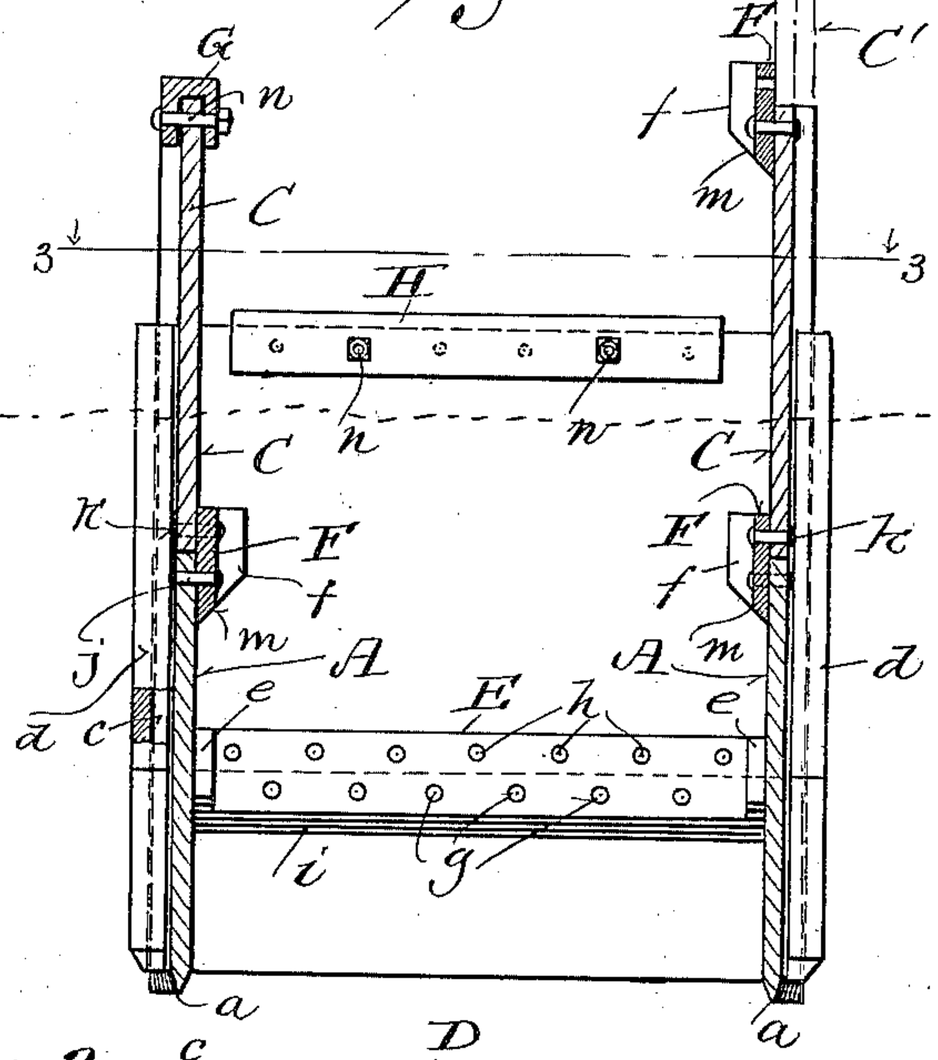


Fig. 3.

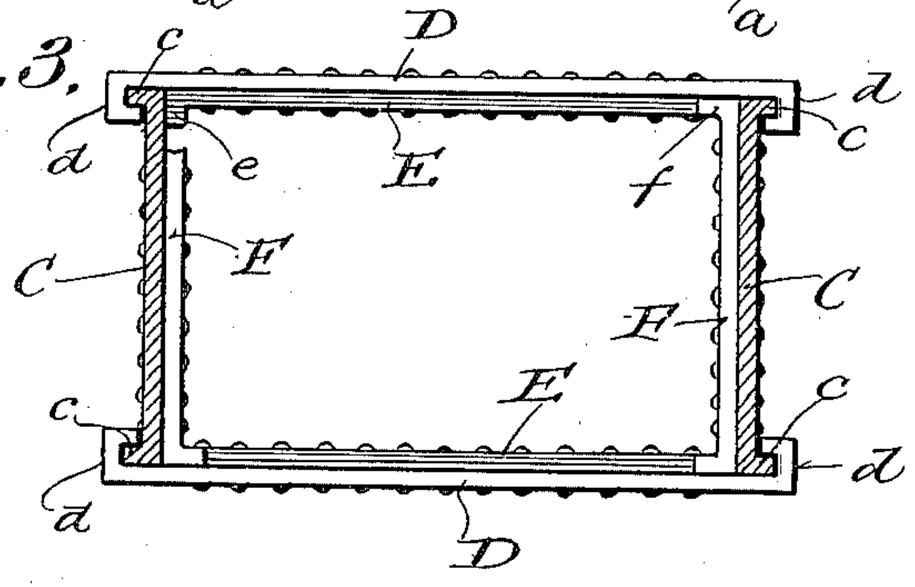


Fig. 5.

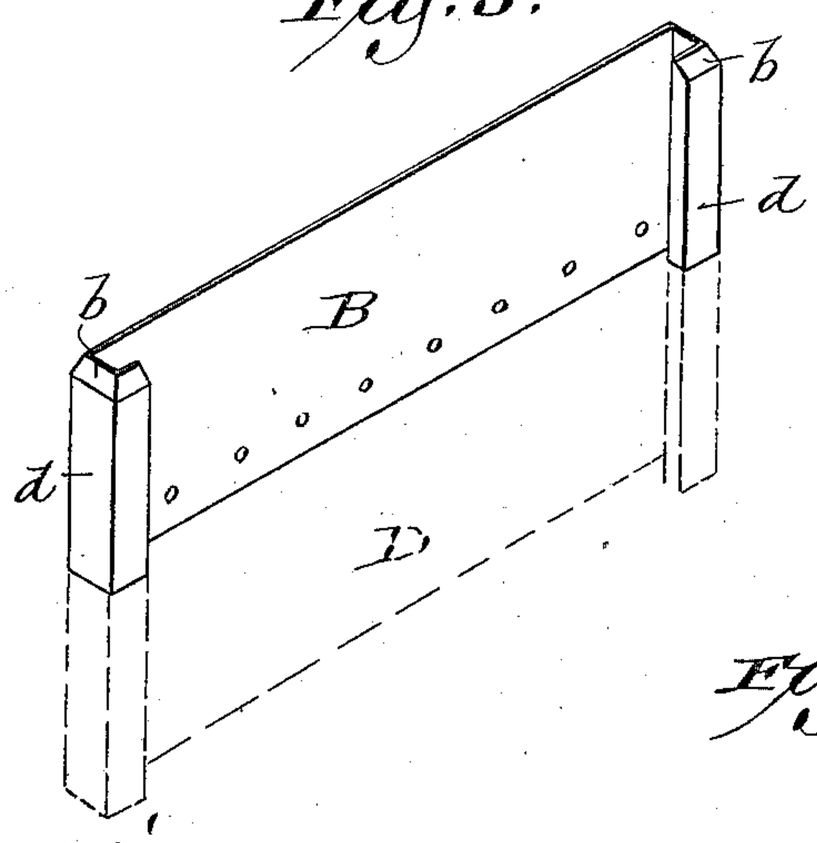
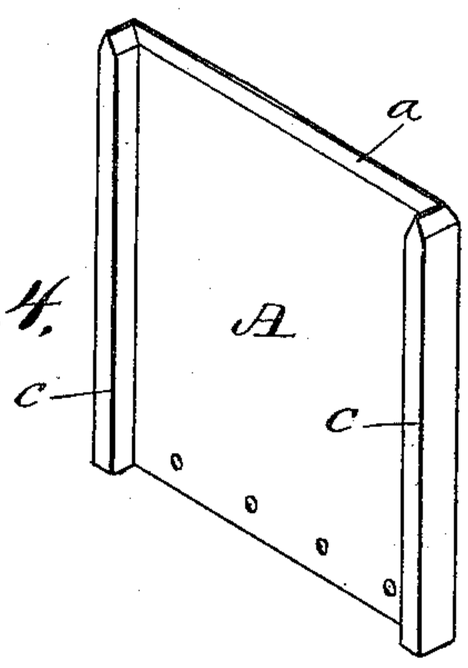


Fig. 4.



Witnesses:
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UNITED STATES PATENT OFFICE.

GEORGE J. MAAS, OF NEGAUNEE, MICHIGAN.

METHOD OF SINKING SHAFTS.

SPECIFICATION forming part of Letters Patent No. 701,490, dated June 3, 1902.

Original application filed July 3, 1899, Serial No. 722,614. Divided and this application filed December 3, 1900. Serial No. 38,428. (No model.)

To all whom it may concern:

Be it known that I, GEORGE J. MAAS, a citizen of the United States, and a resident of Negaunee, in the county of Marquette and State of Michigan, have invented certain new and useful Improvements in Methods of Sinking Shafts; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to the construction of a shaft for use in mining, particularly in places where a quicksand is found to exist; and it consists in the method of forming the shaft and forcing it to place, all as will be fully set forth hereinafter and subsequently claimed.

In the drawings, Figure 1 is a vertical sectional view, taken on the line 1 1 of Fig. 2, of the preferred form of my said shaft. Fig. 2 is a similar sectional view taken at right angles to the view shown in Fig. 1. Fig. 3 is a horizontal sectional view taken on the line 3 3 of Fig. 1 and looking downward, the cap on the side piece shown in Fig. 1 being removed in Fig. 3 and the end of one of the end braces being shown as broken away. Figs. 4 and 5 are detail perspective views of one of the bottom plates and one of the bottom side plates inverted.

Referring to the drawings, A A represent the bottom end plates, and B B the bottom side plates, forming what I term the "shoe" of the shaft when put together, while C C represent the other end plates, and D D the other side plates, of the shaft. The bottom or shoe plates are beveled on their lower edges for the more ready penetration of the earth. All of my plates are made, preferably, of steel, although iron plates may answer in some cases. All of the end plates in their preferred form are made with outwardly-turned side or edge flanges *c c*, integral with the body of the plate, and all of the side plates are shown with angle-flanges *d d* to inclose the flanges *c c* of the end plates. It will be understood that I may somewhat vary the shape of those respective flanges, if desired; but I have shown a simple and satisfactory form thereof in the present drawings. The end shoe-plates A have preferably a double bevel to their lower edges, as shown at *a*, and the side shoe-plates B only a single bevel on the outer side, as shown at *b*, and the side shoe-plates are further of only half the height, preferably, of the end shoe-plates, while the other plates C D are usually all of the same height except at the top of the completed shaft, where the relative height of the end and side plates is reversed in forming the collar of the shaft, the top end plates being of half-height, as shown at C′, and the top side plates being of full height, as shown at D′. In the drawings I have only shown one full set of the intermediate plates C D; but it will be understood that as many sets are employed as is required by the depth of the shaft in any given instance.

In starting the sinking of a shaft I may put together as many sets of plates as is practical, and I unite them by means of the inner braces E F. The braces E, which unite two adjacent side plates, have inturned ends *e e*, which bear against the inner surfaces of the end plates, and said braces E are secured to the side plates by rows of rivets *g h*, and the lower edges of said braces E are beveled, as shown at *i*. Similarly the braces F, which unite the adjacent end plates, have like inturned ends *f f*, bearing against the side plates, and said braces F are united to the end plates by rows of rivets *j k*, and said braces F have beveled lower edges, as shown at *m*. It will be seen that although the end plates, at each end, are vertically united together, and the side plates, at each side, are vertically united together, by series of the just-described braces, there is no rigid union of any of the end and side plates, nor of any of the opposing plates of any pairs of either end or side plates, but all have free vertical motion, limited only by the contact of one of the braces E against one of the braces F, and that each vertical row of plates has, therefore, play independent of the opposite vertical row. When a sufficient number of sets of plates have been added to the bottom or shoe plates, the structure is elevated by a derrick over the point at which the shaft is to be sunk and lowered until the shoe of the shaft rests on the surface, or, if preferred, the plates may

be originally put together, starting with the shoe-plates at the desired point. It then becomes necessary to drive the plates forming the lower part of the shaft into the ground, and to avoid injuring the upper edges of the plates I employ the caps G H, which are shown in Fig. 1, said caps having one horizontal surface with two parallel vertical flanges, so as to slip upon the plates C D, to which they are secured by bolts *n n*, said bolts passing through holes in the vertical flanges of the caps and through the holes in the plates C D, which are afterward to receive the rivets *g j* in the subsequent building up of the vertical series of said plates. These caps G H receive the impact of any suitable weight or hammer, such as the hammer of a pile-driver, and preferably each vertical series of plates is driven separately—first the end plates and then the side plates—the end plates and the side plates extending originally to different heights by reason of the original differences in height of the end and side shoe-plates. When the side plates in the illustration given in Fig. 1 have been driven into the earth to a point adjacent to its surface, the caps are removed and the next set of plates (both side and end) are united by proper braces, as before described, and the caps placed upon these new plates and the driving resumed; but it will be understood that none of the plates are to be driven by the pile-driver after the braces on that vertical set of plates come in contact with the ends of the braces on the other plates, as when that happens, say, in driving the end plates then the side plates must next be driven as far as they will go until their braces in turn rest on the braces of the end plates below, and so on. When the shaft has been thus built and driven to the required depth—as, for example, through and past a quicksand down to the hard-pan, clay, or solid ledge, thereby cutting off the inflow of the quicksand—then the sand and earth and other "dirt" within the shaft can be hoisted out and the shaft is in place for all necessary subsequent mining operations.

While I prefer to drive each vertical row of end plates and of side plates separately, as described, I believe I am the first to ever put together the shoe of a shaft and drive the same down into the earth and through and past a quicksand, and thereby cutting off the inflow of same, and hence I do not limit myself to the hereinbefore-described method of separately driving said plates.

I do not herein claim the mechanical construction of the shaft illustrated and described either broadly or specifically, as that forms the subject-matter of my application for patent filed July 3, 1899, under Serial No. 722,614, of which application the present one is a division.

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

The method of building and sinking metal shafts consisting in maintaining a series of shaft-plates in proper relative position to form a transverse section or zone of shafting incapable of lateral separation and capable of independent vertical movement; forcing said plates independently downward; building up the shaft by adding thereto other shaft sections or zones, the plates thereof alining with those of the sections or zones below, and applying force independently to each of the plates of said added sections to drive said added plates, and the plates below the same downward; and finally removing the material within the shaft.

In testimony that I claim the foregoing I have hereunto set my hand, at Negaunee, in the county of Marquette and State of Michigan, in the presence of two witnesses.

GEORGE J. MAAS.

Witnesses:
E. W. BELL,
LESLIE FRENCH.