

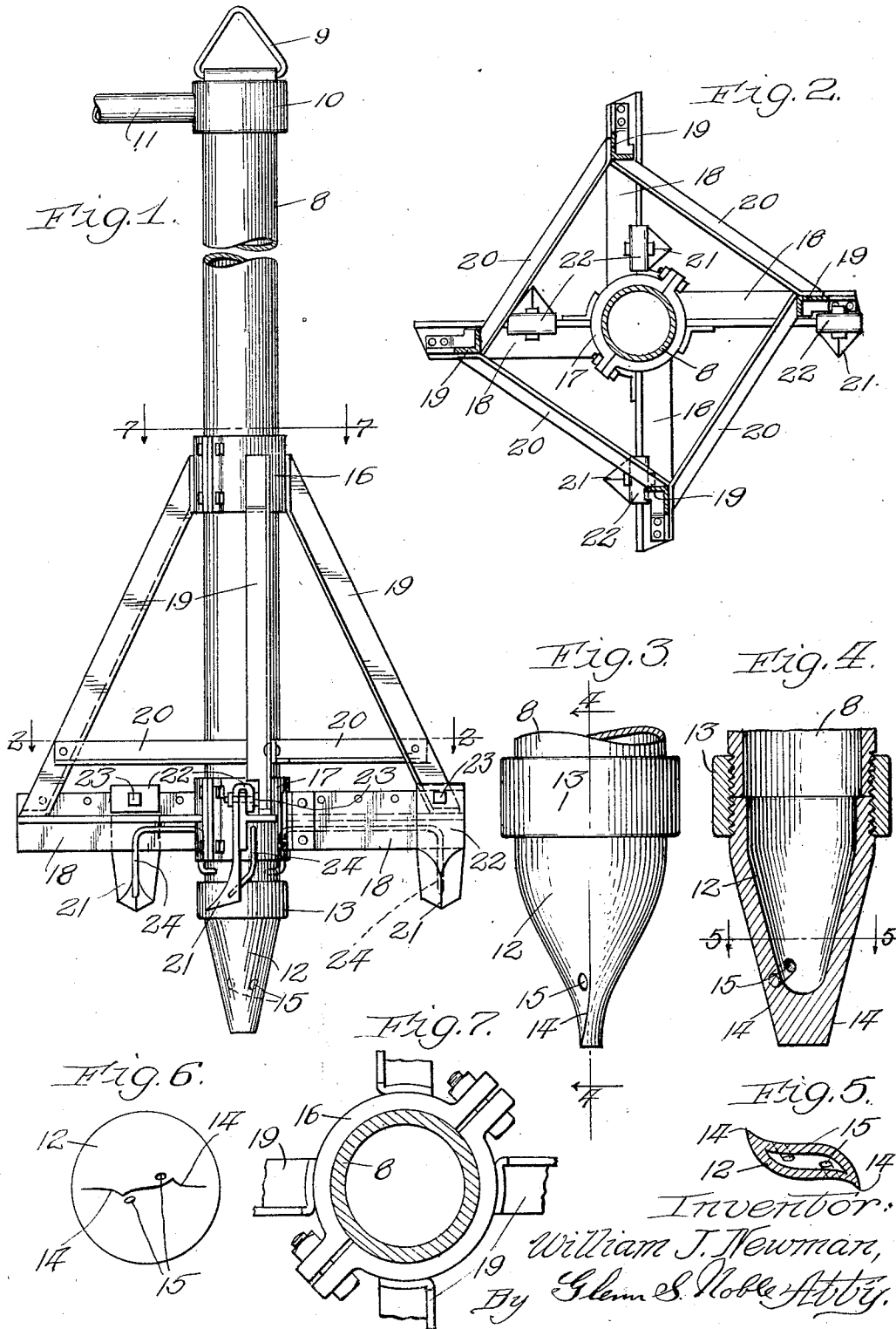
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DRILLING APPARATUS

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DRILLING APPARATUS

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This invention relates to drilling or boring apparatus which is particularly intended for boring relatively large holes, shafts, or wells in the ground, such for instance as the shafts which are sunk in the earth for filling with concrete to provide building foundations.

The objects of this invention are to provide a new and improved drilling apparatus; to provide a drilling or boring apparatus for sinking relatively large holes or shafts in the earth; to provide a combined mechanical and hydraulic drilling mechanism; and to provide such other advantages and improvements as will be described more fully hereinafter.

In the accompanying drawings illustrating a preferred form of my invention,

Figure 1 is a side view;

Figure 2 is a sectional view taken on the line 2—2 of Figure 1;

Figure 3 is an enlarged detail of the drill point;

Figure 4 is a sectional view taken on the line 4—4 of Figure 3;

Figure 5 is a sectional view taken on the line 5—5 of Figure 4;

Figure 6 is an end view of the drill; and

Figure 7 is a sectional view taken on the line 7—7 of Figure 1.

In the apparatus as shown in these drawings, 8 is a hollow shaft or pipe which may be driven or rotated by any suitable mechanism (not shown) and which is supported on a hanger 9 by means of a swivel joint or connection 10. Water is supplied to the pipe 8 through the feed pipe 11, this water being preferably forced in under sufficient pressure to materially assist in the excavating as well as in carrying off the excavated or loosened material. A bit 12 is secured to the lower end of the pipe 8 by any suitable means, such as a collar 13. This bit is preferably made tapered and substantially in the form of a bearing bit or drill having two or more cutting edges 14. This drill or point is hollow and is provided with discharge apertures 15 which are preferably arranged adjacent to the point or lower end and on the front face of the cutting lips, as shown particularly

in Figure 5, so that the water which is forced therethrough would not only tend to loosen the earth but would also serve to flush or clean the cutting surfaces.

The drill or point 12 serves as a center or lead member for the main excavating devices which are secured to the pipe 8. Such excavating device or cutter head is secured to the pipe by means of upper and lower clamps or collars 16 and 17 which are preferably provided with fastening bolts so that they may be adjustably secured to the pipe. The lower collar has a plurality of outwardly projecting arms 18 which are rigidly secured thereto, or which, if desired, may be formed integrally therewith. These arms are preferably T-shaped in section with the stem of the T projecting rearwardly. The arms 18 are connected to the collar 16 by braces 19 and these may be further supported by horizontal braces 20.

The arms 18 are provided with plows or excavating devices 21 which are preferably made so that they may be adjusted longitudinally on the arms. These plows comprise lower shares or cutting portions with upwardly projecting beams or arms 22 which engage with the front faces of the arms 18 and which are preferably provided at their upper ends with channels or grooves to take over or engage with the upper edges of the arms and have bolts 23 for holding them in position. While these plows may be arranged in any desired manner and in accordance with the nature of the material to be excavated, I have shown an arrangement in Figure 2 which is desirable, as for cutting in earth which may contain boulders or the like. In this arrangement each arm is provided with a single plow and these are positioned at different distances from the center so that each plow will cut on a different circle, the outermost plow being arranged so that it will make the hole sufficiently large to provide clearance for the cutter head.

In order to further facilitate the excavating operation, I provide pipes or tubes 24 which lead from the pipe 8 to points adjacent to the plows with their open ends directed

toward the plows or under or through the same in order to facilitate the loosening of the material and the cleaning of the plows. These pipes or tubes are arranged behind the arms in order to be protected thereby and may be secured to the arms if necessary and may be made adjustable or in sections in order to permit the adjustment of the plows on the arms.

When a hole or shaft is to be sunk the drill point 12 is started and the pipe 8 is rotated by its driving mechanism, and at the same time water is forced in through the pipe 11. The drill point guides and centers the apparatus so that when the plows engage with the earth each plow will operate through a circle and will plow up or loosen the material within its path. Simultaneously the water flowing through the pipes or tubes 24 tends to break up and loosen and agitate the material so that, as the work proceeds, the loosened earth or material will be carried in suspension in the water and will be forced up therewith over the top of the wheel where it may be discharged at any convenient point. Of course, if boulders or stones are encountered which are too large to be discharged in this manner, it may become necessary to remove them in any convenient way, as by means of grapples or the like. From this it will be seen that as the well or hole is filled with the water or water and material suspended therein, the pressure thereof will tend to support the sides thereof as the work progresses.

From this description it will be readily seen that I provide an improved drilling apparatus and method of sinking holes which will be rapid in operation and which will avoid the necessity of a large amount of manual labor ordinarily incident to the digging of wells, foundations, holes, or the like. It will of course be evident that changes may be made in the details of construction, as for instance in the form of the plows or specific supporting devices, in order to adapt the apparatus to different conditions and therefore I do not wish to be limited to the exact arrangement herein shown and described, except as specified in the following claims, in which I claim:

1. In an apparatus of the character set forth, the combination of a vertical, extensible, rotatable pipe, means for forcing water downwardly through said pipe with sufficient pressure to assist in excavating the material, a collar secured to the pipe and having outwardly projecting T-shaped arms, a second collar on said pipe, braces connecting said arms and said last named collar, plows having beams fitting over the arms, and means for securing the plows to the arms, said pipe having outlets leading to points adjacent the plows.

2. In an apparatus of the character set

forth, the combination of a vertical, extensible, rotatable pipe, means for forcing water downwardly through said pipe, a collar secured to the pipe and having outwardly projecting T-shaped arms, a second collar on the pipe, braces connecting said arms and said last named collar, plows having beams fitting over said arms, means for adjustably securing the plows to the arms, a center bit at the lower end of the pipe below the plows, said pipe having outlets leading to points adjacent to the plows and to the center bit.

3. In an apparatus of the character set forth, the combination of a pipe, means for forcing water downwardly through the pipe, a collar secured to the pipe and having outwardly projecting T-shaped arms, a second collar on the pipe, braces connecting said arms with the last named collar, excavating devices having beams fitting over said arms, means for securing said devices to the arms, a combined end cap and center bit secured to the lower end of the pipe below the excavating devices, said pipe having outlets leading to points adjacent to the excavating devices and to the center bit.

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