

March 7, 1950

I. J. KARHU
WELL DIGGER

2,499,508

Filed Oct. 15, 1948

2 Sheets-Sheet 1

Fig. 1

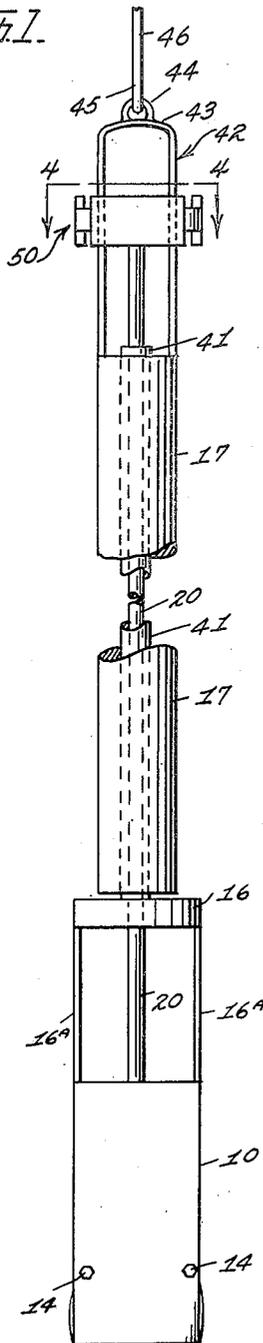
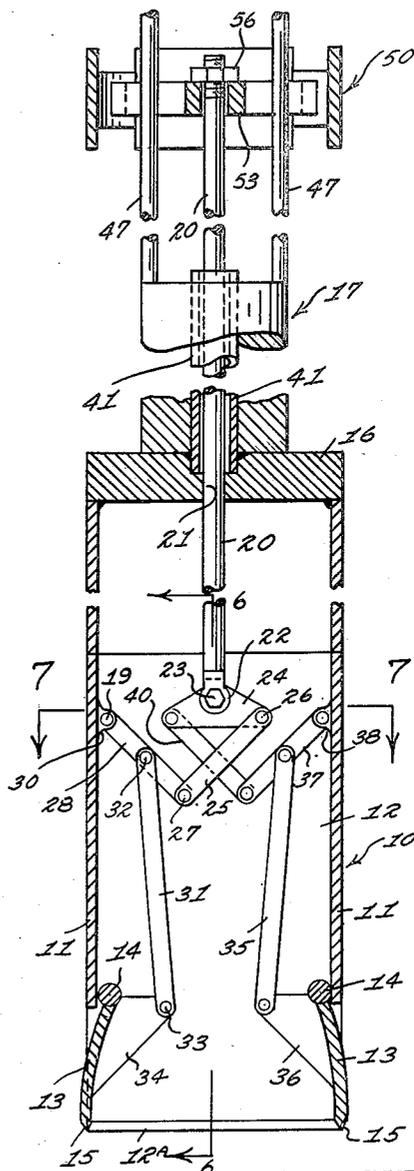


Fig. 2



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Fig. 3.

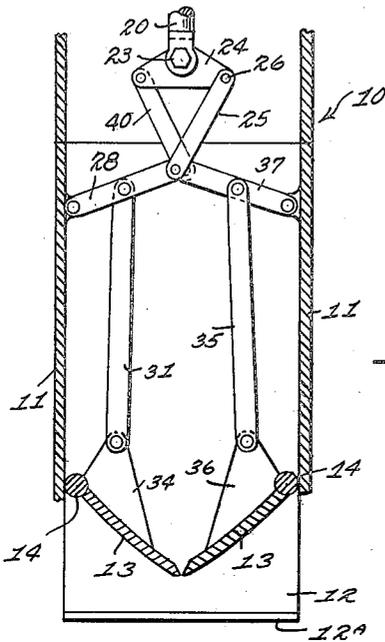


Fig. 4.

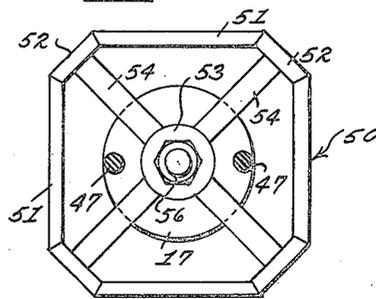


Fig. 5.

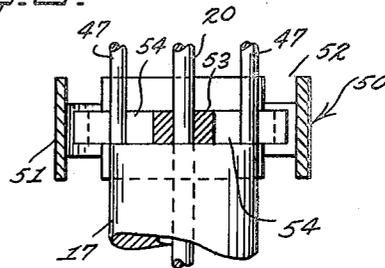


Fig. 6.

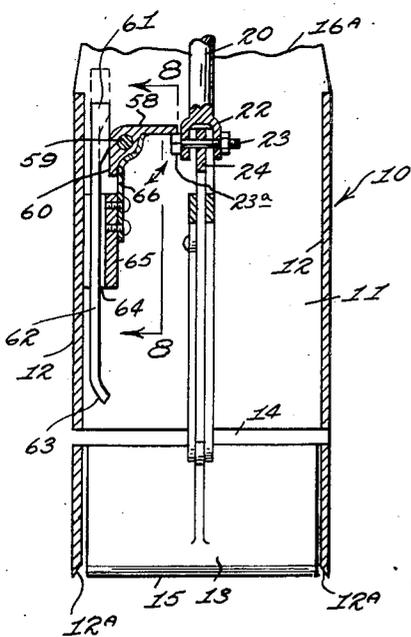


Fig. 7.

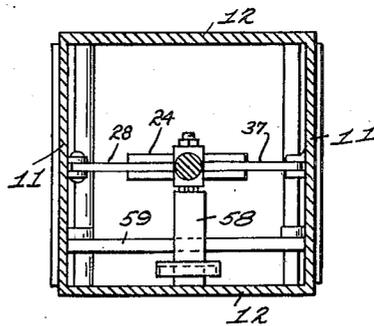
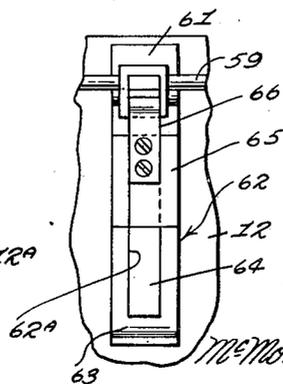


Fig. 8.



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WELL DIGGER

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2 Claims. (Cl. 255-68)

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This invention relates to an excavating apparatus and has for its object the provision of a simple and efficient digger in which a pair of jaws are movable to closed or open positions between depending extensions on a pair of side walls of a bucket substantially rectangular in cross section, said jaws being oscillated through levers and links suspended from an operating rod upon which is slidably mounted a hammer adapted to be dropped onto the top of the bucket by a supporting cable for forcing the bucket and jaws into the ground, means being employed for supporting the rod on the top of the hammer when said hammer is raised for causing oscillation of the jaws to closed position.

A further object of the invention is the provision of an excavating apparatus for wells in which a pair of jaws pivoted on and within a bucket are oscillated to closed or open position by reciprocating an operating rod having connections with the jaws, a dog being employed for restraining movement of the rod to close said jaws until said jaws and bucket are forced into the ground to a predetermined depth when the ground will force a retaining means for the dog to an inoperative position.

The invention is best understood from a consideration of the following detailed description in connection with the accompanying drawing forming part of the specification, nevertheless, it is to be understood that the invention is not confined to the disclosure but is susceptible of such changes and modifications as shall define no material departure from the salient features of the invention as expressed in the appended claims.

In the drawings:

Figure 1 is a view in elevation of my well digger,

Figure 2 is an enlarged transverse vertical section of the well digger showing a pair of grapples or jaws in open position,

Figure 3 is an enlarged fragmentary vertical section of the body of the bucket showing the jaws in closed position,

Figure 4 is an enlarged horizontal section taken along the line 4-4 of Figure 1,

Figure 5 is a fragmentary vertical section of the stop shown in Figure 4 when the hammer is in raised position,

Figure 6 is a fragmentary vertical section taken along the line 6-6 of Figure 2,

Figure 7 is a horizontal section taken along the line 7-7 of Figure 2, and

Figure 8 is a transverse vertical section taken along the line 8-8 of Figure 6.

Referring more particularly to the drawings 10

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designates the body of a bucket which is rectangular in cross section. The body includes a pair of parallel short side walls 11 and a pair of long side walls 12 extending below the bottom edges of the short side walls. A pair of oppositely swingable depending jaws 13 have their upper or inner edges welded to shafts 14 having outer ends seated in openings in the side walls 12 at the inner sides of the lower ends of the side walls 11. It will be noted from Figure 2 that the lower ends of the jaws are sheared to provide cutting edges 15 which in the depressed positions of the jaws are on a level with the sheared lower ends 12a of the side walls 12. The jaws are slightly bowed. A head 16 supported by arms 16a above the top of the body 10 receives the impacts of a hammer 17.

A reciprocating rod 20 is slidable in a bore 21 formed at the center of the head 16 and has its lower end projecting into the body 10 of the bucket and having a pair of spaced ears carrying a bolt 23 upon which is mounted a plate 24. A link 25 has one end pivoted at 26 on one end of the plate 24 while the other end of said link has pivotal connections at 27 with the lower end of a lever 28 hinged at its upper end at 19 on spaced ears 30 welded to a side wall 11 of the bucket. A link 31 has the upper end pivoted at 32 to an intermediate portion of the lever 28 with its lower end pivoted at 33 to a lug 34 projecting from the inner face of one jaw 13. In like manner, the other jaw 13 is operated by a link 35 having pivotal connections with a lug 36 on the jaw and a lever 37 hinged at one end on ears 38 welded to the other side wall 11 and to a link 40 having pivotal connections with the lower end of the lever 37 and the remaining end of the plate 24. Thus, when the rod 20 is raised, the free ends 15 of the jaws 13 will be swung into engagement to close the lower end of the bucket 10, as shown in Figure 3.

The rod 20 passes loosely through a sleeve 41 having its lower end located in a socket in the head 16 and welded thereto. The hammer 17 has an axial bore for the sleeve upon which said hammer slides vertically. A U-shaped hanger 42 has a bight portion 43 provided with an eye 44 for the reception of a hook 45 on the lower end of an operating cable 46. The lower ends of the legs 47 of the hanger are welded or secured in any approved manner to the top of the hammer 17.

A stop generally designated by the numeral 50 is substantially rectangular in plan and includes four plane vertical walls 51 connected together

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by bars 52 forming the corners of the stop. A ring 53 which receives the upper end of the rod 20 is connected to the bars 52 by arms 54 forming a web. A nut 56 is threaded onto the upper end of the rod 20 and rests upon the ring 53.

A device for retaining the jaws 13 in open position is illustrated in Figures 6 to 8 and comprises a dog 58 pivoted on a rod 59 secured at its ends to the side walls 11 of the bucket. The free end of the dog is adapted to engage over a head 23a on the pivot bolt 23 while a lug 60 depending from the pivoted portion of the dog is adapted to be engaged by an enlargement 61 on a vertically disposed latch member 62 which has a curved lower free end 63 adapted to be engaged by materials encountered in the well when the bucket is forced into said materials. The latch member has a slot 62a receiving a guide 64 which is welded to one of the side walls 12. A flange 65 on the guide retains the latch member on the guide. A spring 66 has one end secured to upper end of the guide 64 while the free end of said spring is in neat engagement with the dog 58 for retaining said dog in contact with the head of the bolt 23.

The operation of my device is as follows: The bucket 10 is lowered into the well by the hanger 42 and the cable 46 and is supported by the engagement of the upper end of the hammer 17 with the ring 53 on the stop 50. The rod 20 is then suspended by the engagement of the nut 56 with the top of the ring 53. In this disposition of the elements just described, the jaws 13 are held open (Fig. 2) by the dog 58 with the latch 62 in the lowered position wherein the enlargement 61 on the upper end of said latch is in engagement with the lug 60 on the dog 58, the dog being engaged over the head 23a of the pivot bolt 23.

When the cable 46 is lowered and the lower ends of the jaws 13 and the lower ends of the bucket wall 12 hit the ground or the bottom of a well and the downward progress of the bucket 10 is thereby arrested, the hammer 17 will continue falling and strike the head 16 of the bucket and thereby cause the cutting edges 15 of the jaws 13 and the cutting edges 12a of the walls 12 to be forced through the materials of the well bottom. The hammer may be thereafter raised and dropped several times until the bucket has been driven deep enough to cause the materials to press upwardly on the curved end 63 of the latch member 62, thereby raising said latch member and removing the enlargement 61 thereon from the lug 60 on the dog 58. A pull on the cable 46 will raise the rod 20 and the head 23a on the bolt 23 will trip the dog 58 against the tension of the spring 66 so that the rod 20 will raise the levers 28 and 37 and likewise the links 31 and 35, so as to force the jaws 13 toward the closed position shown in Figure 3. The bucket is then elevated above the well and the contents thereof are discharged.

The construction is such that the jaws 13 will not only pick up large stones but will crumble softer stones. The jaws will close firmly on wet soil and raise said soil without spilling it. This is due to the fact that the side edges of the jaws move in close contact with the side walls 12 of the bucket 10.

What I claim:

1. Digging apparatus comprising a tubular bucket open at its lower end and having an anvil on its upper end, a pair of jaws arranged on opposite sides of said bucket adjacent said open

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lower end thereof and each mounted on an axis transverse of said bucket to swing inwardly from depressed separated positions to substantially touching positions in which said jaws serve to close the lower end of said bucket, a rod vertically slidable through said anvil and extending above and below said anvil, a link arranged adjacent the end of said rod extending below said anvil and having one end pivotally connected to said rod end adjacent one side thereof, a lever having one end pivotally connected to the other end of said link and having the other end pivotally connected to the wall of said bucket adjacent thereto, a second link vertically disposed within said tubular bucket and having one end pivotally connected to said lever intermediate its ends and having the other end operatively connected to the jaw transverse axis adjacent thereto, a third link arranged adjacent the end of said rod extending below said anvil and having one end pivotally connected to said rod and adjacent the other side thereof, a second lever having one end pivotally connected to the other end of said third link and having the other end pivotally connected to the opposite wall of said bucket adjacent thereto, and a fourth link vertically disposed within said tubular bucket and having one end pivotally connected to said second lever intermediate its ends and having the other end operatively connected to the other jaw transverse axis adjacent thereto, a hammer slidably mounted on said rod above said anvil, a head on the upper end of said rod, elevating means connected to the upper end of said hammer, a stop on an upper part of said elevating means through which said rod extends slidably with its head above and arranged to engage the top of said stop when said elevating means is drawn upwardly with said hammer in a depressed position on said rod.

2. Digging apparatus comprising a tubular bucket open at its lower end and having an anvil on its upper end, a pair of jaws arranged on opposite sides of said bucket adjacent said open lower end thereof and each mounted on an axis transverse of said bucket to swing inwardly from depressed separated positions to substantially touching positions in which said jaws serve to close the lower end of said bucket, a rod vertically slidable through said anvil and extending above and below said anvil, a link arranged adjacent the end of said rod extending below said anvil and having one end pivotally connected to said rod end adjacent one side thereof, a lever having one end pivotally connected to the other end of said link and having the other end pivotally connected to the wall of said bucket adjacent thereto, a second link vertically disposed within said tubular bucket and having one end pivotally connected to said lever intermediate its ends and having the other end operatively connected to the jaw transverse axis adjacent thereto, a third link arranged adjacent the end of said rod extending below said anvil and having one end pivotally connected to said rod end adjacent the other side thereof, a second lever having one end pivotally connected to the other end of said third link and having the other end pivotally connected to the opposite wall of said bucket adjacent thereto, and a fourth link vertically disposed within said tubular bucket and having one end pivotally connected to said second lever intermediate its ends and having the other end operatively connected to the other jaw transverse axis adjacent thereto, a hammer slid-

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ably mounted on said rod above said anvil, a head on the upper end of said rod, elevating means connected to the upper end of said hammer, a stop on an upper part of said elevating means through which said rod extends slidably with its head above and arranged to engage the top of said stop when said elevating means is drawn upwardly with said hammer in a depressed position on said rod, latch means on said bucket comprising a spring pressed dog arranged to engage over a portion in the lower end of said rod while said rod is in a depressed position whereby said jaws are maintained in open positions, and a latch element operatively connected to said dog and operable by forcible entrance of material through the lower end of said bucket to release said dog and permit said rod to rise

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relative to said bucket and move said jaws toward their closed positions as said head is struck by said hammer upon release of said elevating means.

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