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M. S. CULLUM
PORTABLE WELL DRIVER

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2 Sheets-Sheet 1

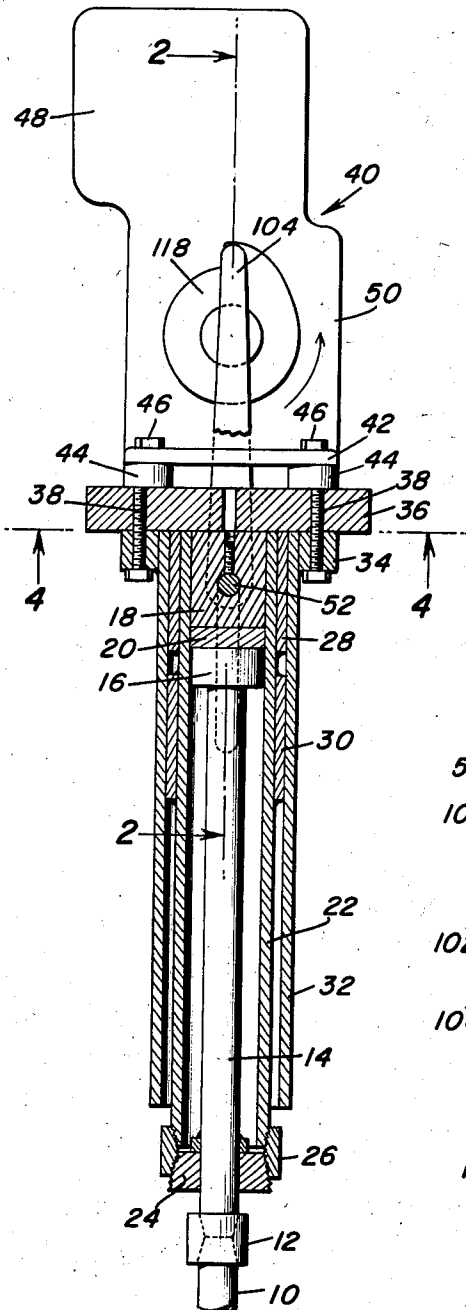


Fig. 1

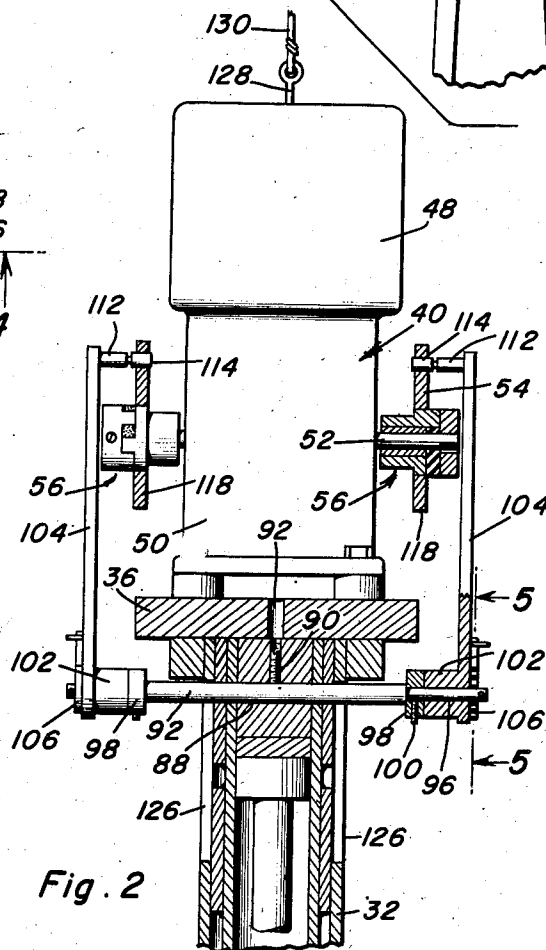
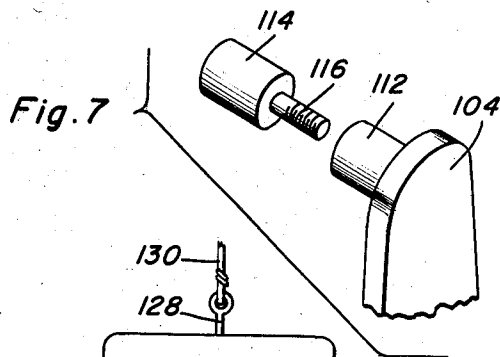


Fig. 2

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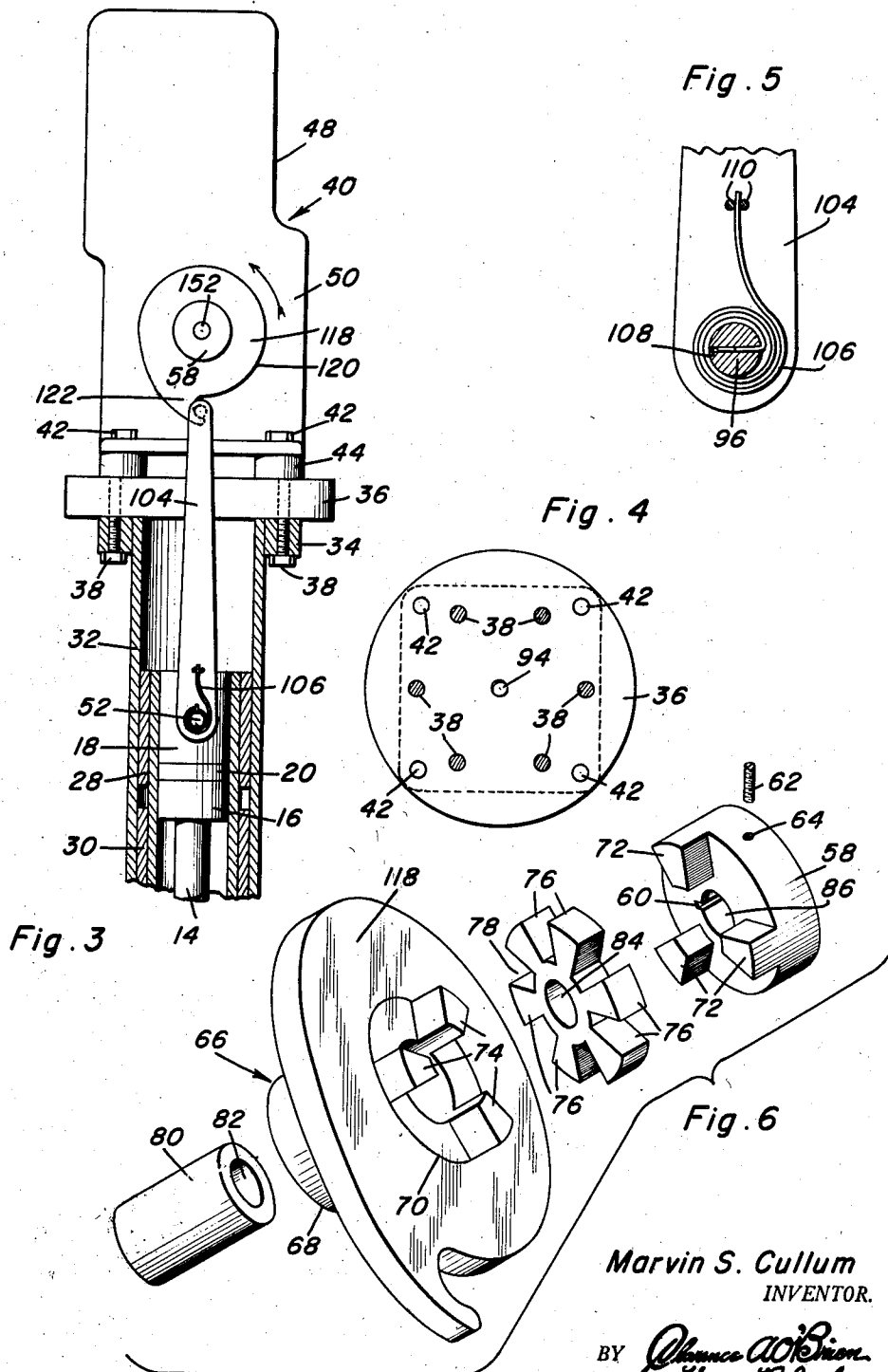
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PORTABLE WELL DRIVER

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7 Claims. (Cl. 61—73)

This invention relates in general to new and useful improvements in well drilling equipment, and more specifically to a novel portable well driver.

Under certain type of well forming there is provided on the lower end of a pipe a driving point. The pipe is then driven into the ground, adding sections as is necessary, until such time as the driving point enters into water bearing sands or the like. In order that the pipe may be driven, there is normally placed on the upper end of the pipe a driving section, which driving section may be either manually driven or by means of a portable well driver. However, such portable well drivers are generally in the form of special rigs which must be mounted on trucks and which in themselves are expensive.

It is therefore the primary object of this invention to provide a portable well driver which is in the form of a relatively small unit which may be carried by one man and which may be readily positioned on well pipe for driving the same.

Another object of this invention is to provide a portable well driver which is relatively small and which may be powered with an electric motor and connected to a conventional house electrical circuit so as to facilitate the driving of wells by homeowners.

A further object of this invention is to provide a portable well driver which includes a driving shaft having coupling means at the lower end thereof for attachment to well pipe, there being slidably mounted on the driving shaft a sleeve, the sleeve having connected thereto a driving plate which supports a power unit, there being mounted on the shaft a driving head and there being disposed between the driving head and the driving plate a driving block, the driving block having lift arms cooperating with the power unit for effecting the raising of the power unit and the driving plate and the dropping of the same onto the driving block whereby a driving force is imparted to the driving shaft through the driving head thereof.

Still another object of this invention is to provide an improved means for raising and dropping a driving unit of a well driver, the means being in the form of a fixed driving block having at least one arm pivotally connected thereto with the arm being provided at the upper end thereof with an extending finger, and a power unit mounted for guided vertical movement with respect to the driving block, the power unit having lift means including a wheel like member with a hook portion engageable with the finger whereby the power unit lifts itself through engagement of the wheel like member with the finger of the lift arm and then releases itself so as to drop upon the driving block.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

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Figure 1 is an end view of the portable well driver with the guide means and driving means thereof being broken away and shown in section;

Figure 2 is a fragmentary end view of the portable well driver with parts thereof broken away and shown in section for purposes of clarity;

Figure 3 is a fragmentary end view similar to Figure 2 and shows the well driver with the power unit and driving plate thereof in an elevated position prior to being dropped upon the driving block;

Figure 4 is a sectional view taken substantially upon the plane indicated by the section line 4—4 of Figure 1 and shows the manner in which a guide sleeve is secured to the driving plate and the means mounting a power unit on the driving plate;

Figure 5 is an enlarged fragmentary sectional view taken substantially upon the plane indicated by the section line 5—5 of Figure 2 and shows the details of a return spring for the lift arm;

Figure 6 is an enlarged exploded perspective view of the shock absorbing coupling between the power unit and a wheel like member carried thereby; and

Figure 7 is an enlarged fragmentary exploded perspective view showing the mounting of a roller finger on the upper end of one of the lift arms.

Referring now to the drawings in detail, it will be seen that there is illustrated in Figure 1 an upper end of a well pipe 10. Removably secured to the well pipe 10 by means of a coupling 12 is the lower end of a driving shaft 14. The upper end of the driving shaft 14 is provided with a driving head 16.

Overlying the driving head 16 is a driving block 18 having a shock absorbing cushion 20 in engagement with the driving head 16, the cushion 20 being preferably in the form of lead or other malleable metal.

Secured to the driving block 18 and extending downwardly therefrom is an inner sleeve 22 which is provided at the lower end thereof with a removable guide block 24, the guide block 24 being secured to the inner sleeve 22 by a coupling member 26. Secured to the upper and outer part of the inner sleeve 22 are bearing sleeves 28 and 30.

Slidably disposed around the bearing sleeves 28 and 30 is an elongated guide sleeve 32. The guide sleeve 32 has its upper end secured to a mounting ring 34 which is in turn secured to the underside of a driving plate 36 by means of a plurality of fasteners 38.

Seated on the driving plate 36 in overlying relation is a power unit which is referred to in general by the reference numeral 40. The power unit 40 includes a mounting plate 42 which seats upon cushions 44. The cushions 44 are retained in place by fasteners 46 which also serve to secure the power unit 40 to the driving plate 36.

The power unit 40 includes an electric motor 48 or any other type of power source. Connected to the electric motor 48 is a reduction gear box 50 having a power shaft 52 extending from opposite sides thereof.

Mounted on each end of the power shaft 52 is a wheel like member 54, the wheel like member 54 being secured in place by a shock absorbing coupling which is referred to in general by the reference numeral 56.

Referring now to Figure 6 in particular, it will be seen that the shock absorbing coupling includes a drive member 58 which is provided with a keyway 60 for keying on the shaft 52. The drive member 58 is retained in place on the shaft 52 by means of a set screw 62 disposed in an internally threaded bore 64. Rotatably mounted on the shaft 52 adjacent the housing of the reduction gear unit 50 is a driven member 66. The driven member 66 includes a journal portion 68 and a mounting flange

70. Extending to the left, as viewed in Figure 6, from the drive member 58 is a plurality of circumferentially spaced lugs 72. Similar lugs 74 project from the driven member 66 to the right. The lugs 72 and 74 are disposed in a common plane, but are spaced apart. Disposed between the lugs 72 and 74 are lugs 76 of a cushioning member 78. The lugs 76 are so spaced apart whereby alternatively seated between the lugs 76 are the lugs 72 and 74. The cushioning member 78 is preferably formed of rubber or the like.

In order that the driven member 66 may freely rotate on the shaft 52, it is provided with a suitable bushing 80. The bushing 80 is provided with a bore 82 of a size for receiving the shaft 52. The cushioning member 78 is provided with a similar bore 84 whereas the drive member is provided with a bore 86.

Extending through a transverse bore 88 in the driving block 18 and secured thereto against rotation by means of a set screw 90 is a shaft 92. Incidentally, the driving plate 36 is provided with a bore 94 aligned with the set screw 90 to facilitate the turning of the set screw 90.

The outer ends of the shaft 92 include reduced portions 96 which carry stop collars 98 which are retained in place by set screws 100. Rotatably journaled on each reduced portion 96 is a boss 102 disposed at the lower end of a lift arm 104. The lift arm 104 is rotatable with respect to the shaft 92, but is resiliently urged towards a vertical position by means of a leaf spring 106 which has one end disposed in a slot 108 in the extreme end of the reduced portion 96 and the opposite end anchored between pins 110 projecting from the lift arm 104.

The upper end of each lift arm 104 is provided with a spacer 112. Disposed adjacent the spacer 112 and extending therefrom as a continuation thereof is a roller finger 114, the roller finger 114 being mounted on a fastener 116 for rotation relative thereto. The fastener 116 secures the roller finger 114 to the upper end of the lift arm 104.

Mounted on the mounting flange 70 of each of the driven members 66 is a wheel like member 118. The wheel like member 118 is provided with a cylindrical surface 120 for a major portion of its periphery. Each wheel like member is provided with a projecting portion 122 which terminates in an open hook portion 124, the hook portion 124 opening in the direction of rotation of the wheel like member 118.

Referring once again to Figure 2 in particular, it will be seen that the guide sleeve 32 is provided adjacent its upper end with a pair of vertically disposed slots 126. The slots 126 have received therethrough the shaft 92 which facilitates the vertical movement of the guide sleeve 32 with respect to the shaft 92.

In order that the well driver may be easily handled, the power unit 40 has extending upwardly therefrom a lift eye 128 to which there may be connected a suitable lifting line 130. The lifting line 130 may be carried by a suitable tripod, a frame or the like which is of sufficient strength to lift the well driver. It is pointed out that each time the well driver drives the well pipe 10 down to the point where it is necessary to place an additional section of well pipe intermediate the well driver and the preceding well pipe 10, it is necessary to elevate the well driver and place the well pipe section between the well driver and the last driven well pipe section.

Once the well driver has been properly coupled to the well pipe 10, the electric motor 48 is energized which results in the rotation of the power shaft 52. As the power shaft 52 rotates, the wheel like members 118 on opposite sides thereof also rotate. In Figure 1 the wheel like member is shown in engagement with the roller finger of one of the lift arms 104. As the wheel like member 118 continues to rotate, the lift arm 104 will be urged downwardly with respect to the wheel like member 118. Since the lift arm 104 cannot move downwardly, it is necessary that the wheel like member 118 move up-

wardly. As a result, the driving plate 36 and all components carried thereby including the power unit 40 and the guide sleeve 32 are moved vertically from the position illustrated in Figure 1 to the position illustrated in Figure 3. Once the roller finger 114 has moved slightly past the dead center position at the bottom of the driving wheel 118, such as that shown in Figure 3, the weight of the power unit 40 and the driving plate 36 will result in the sliding of the roller finger 114 out of the hook portion 124 and about the peripheral surface of the wheel like member 118. This is permitted by the spring 106.

As the power unit 40 and the driving plate 36 drop, the wheel like member 118 continues to rotate. The power unit 40 and the driving plate 36 will be of sufficient weight so that when they strike the driving block, sufficient force will be imparted to the driving shaft 14 through the driving head 16 to drive the well pipe 10 down into the ground. Once the driving plate 36 has become seated on the driving block 18, the roller finger 114 will be urged back into engagement with the periphery of the wheel like member 118 by the spring 106 so that it now overlies the upper part of the wheel like member 118. As the wheel like member 118 continues to rotate, the roller finger 114 will again be engaged by the hook portion 124 so as to repeat the above described operation.

Although one lift arm 104 and one of the wheel like members 118 has been described in the operation of the well driver, it is to be understood that the other lift arm 104 and the other wheel like member 118 will be cooperating in the same manner at the same time.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A portable well driver comprising a driving shaft, said driving shaft having a lower end and an upper end, pipe coupling means on said lower end, a driving head on said upper end, a guide sleeve mounted on said driving shaft for vertical sliding movement, a driving plate secured to said guide sleeve, a power unit mounted on said driving plate, a driving block seated on said driving head, a lift arm carried by said driving block, lift means connected to said power unit and engaged with said lift arm for alternately raising and dropping said driving plate and said power unit, said driving plate seating on said driving block in a lower driving position.

2. A portable well driver comprising a driving shaft, said driving shaft having a lower end and an upper end, pipe coupling means on said lower end, a driving head on said upper end, a guide sleeve mounted on said driving shaft for vertical sliding movement, a driving plate secured to said guide sleeve, a power unit mounted on said driving plate, a driving block seated on said driving head, a lift arm carried by said driving block, lift means connected to said power unit and engaged with said lift arm for alternately raising and dropping said driving plate and said power unit, said driving plate seating on said driving block in a lower driving position, said lift means being in the form of a rotating wheel like member having a hook portion open in the direction of rotation, said lift arm having a projecting finger aligned with and engageable by said hook portion.

3. A portable well driver comprising a driving shaft said driving shaft having a lower end and an upper end, pipe coupling means on said lower end, a driving head on said upper end, a guide sleeve mounted on said driving shaft for vertical sliding movement, a driving plate secured to said guide sleeve, a power unit mounted on said driving plate, a driving block seated on said driving

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head, a lift arm carried by said driving block, lift means connected to said power unit and engaged with said lift arm for alternately raising and dropping said driving plate and said power unit, said driving plate seating on said driving block in a lower driving position, said lift means being in the form of a rotating wheel like member having a hook portion open in the direction of rotation, said lift arm having a projecting finger aligned with and engageable by said hook portion, said finger being in the form of a roller for riding over an edge of said wheel like member when said lift arm reaches an over center position.

4. A portable well driver comprising a driving shaft, said driving shaft having a lower end and an upper end, pipe coupling means on said lower end, a driving head on said upper end, a guide sleeve mounted on said driving shaft for vertical sliding movement, a driving plate secured to said guide sleeve, a power unit mounted on said driving plate, a driving block seated on said driving head, a lift arm carried by said driving block, lift means connected to said power unit and engaged with said lift arm for alternately raising and dropping said driving plate and said power unit, said driving plate seating on said driving block in a lower driving position, said lift means being in the form of a rotating wheel like member having a hook portion open in the direction of rotation, said lift arm having a projecting finger aligned with and engageable by said hook portion, said lift arm having a pivotal connection with said driving block, spring means urging said rotation of said lift arm to a vertical position to insure engagement of said hook portion and said finger.

5. A portable well driver comprising a driving shaft, said driving shaft having a lower end and an upper end, pipe coupling means on said lower end, a driving head on said upper end, a guide sleeve mounted on said driving shaft for vertical sliding movement, a driving plate secured to said guide sleeve, a power unit mounted on said driving plate, a driving block seated on said driving head, a lift arm carried by said driving block, lift means connected to said power unit and engaged with said lift arm for alternately raising and dropping said driving plate and said power unit, said driving plate seating on said driving block in a lower driving position, said lift means being in the form of a rotating wheel like member having a hook portion open in the direction of rotation, said lift arm having a projecting finger aligned with and engageable by said hook portion, said lift arm having a pivotal connection with said driving block, spring means urging said rotation of said lift arm to a vertical position to insure engagement of said hook portion and said finger, said finger being in the form of a

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roller for riding over an edge of said wheel like member when said lift arm reaches an over center position.

6. A portable well driver comprising a driving shaft, said driving shaft having a lower end and an upper end, pipe coupling means on said lower end, a driving head on said upper end, a guide sleeve mounted on said driving shaft for vertical sliding movement, a driving plate secured to said guide sleeve, a power unit mounted on said driving plate, a driving block seated on said driving head, a lift arm carried by said driving block, lift means connected to said power unit and engaged with said lift arm for alternately raising and dropping said driving plate and said power unit, said driving plate seating on said driving block in a lower driving position, said lift means being in the form of a rotating wheel like member having a hook portion open in the direction of rotation, said lift arm having a projecting finger aligned with and engageable by said hook portion, a shock absorbing coupling between said power unit and said wheel like member to absorb the shock of the engagement of said hook portion and said finger.

7. A portable well driver comprising a driving shaft, said driving shaft having a lower end and an upper end, pipe coupling means on said lower end, a driving head on said upper end, a guide sleeve mounted on said driving shaft for vertical sliding movement, a driving plate secured to said guide sleeve, a power unit mounted on said driving plate, a driving block seated on said driving head, a lift arm carried by said driving block, lift means connected to said power unit and engaged with said lift arm for alternately raising and dropping said driving plate and said power unit, said driving plate seating on said driving block in a lower driving position, said lift means being in the form of a rotating wheel like member having a hook portion open in the direction of rotation, said lift arm having a projecting finger aligned with and engageable by said hook portion, said lift arm having a pivotal connection with said driving block, spring means urging said rotation of said lift arm to a vertical position to insure engagement of said hook portion and said finger, a shock absorbing coupling between said power unit and said wheel like member to absorb the shock of the engagement of said hook portion and said finger.

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