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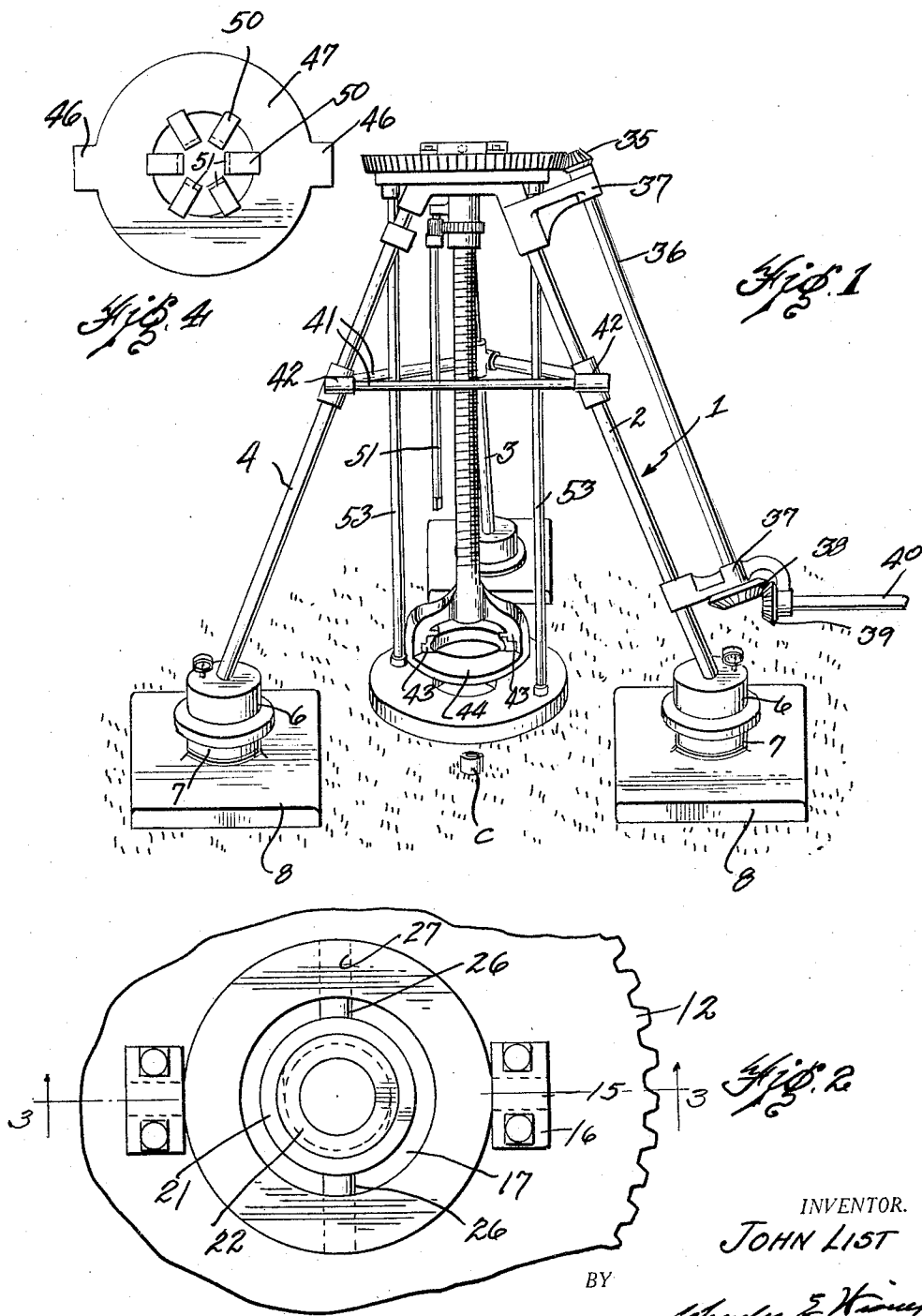
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1,909,696

PULLER FOR WELL CASINGS

Filed July 7, 1930

4 Sheets-Sheet 1



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PULLER FOR WELL CASINGS

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4 Sheets-Sheet 2

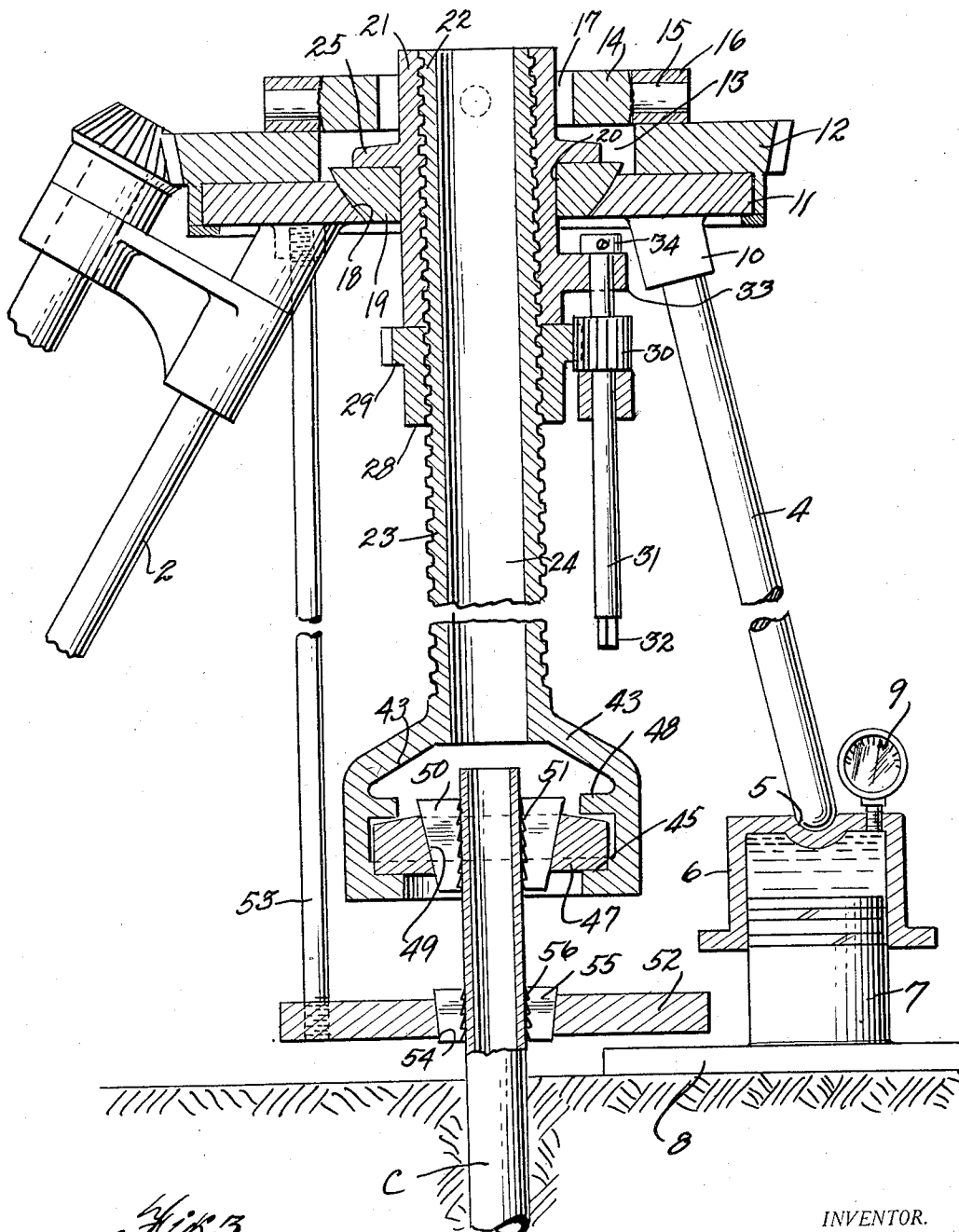


Fig. 3

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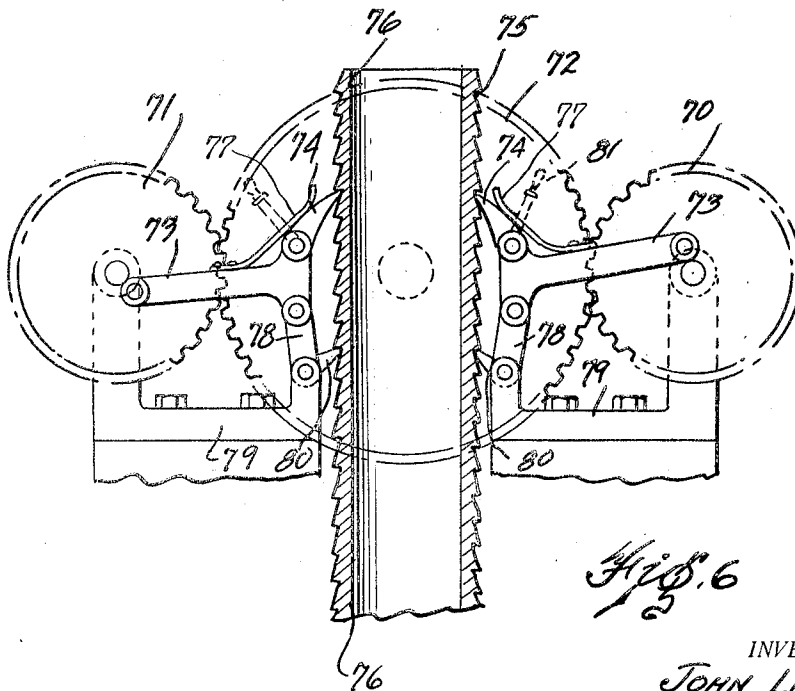
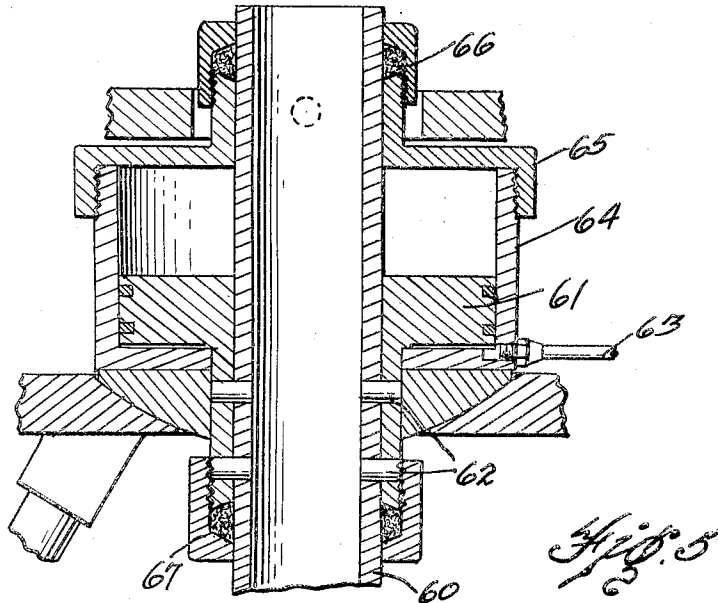
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PULLER FOR WELL CASINGS

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4 Sheets-Sheet 3



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PULLER FOR WELL CASINGS

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4 Sheets-Sheet 4

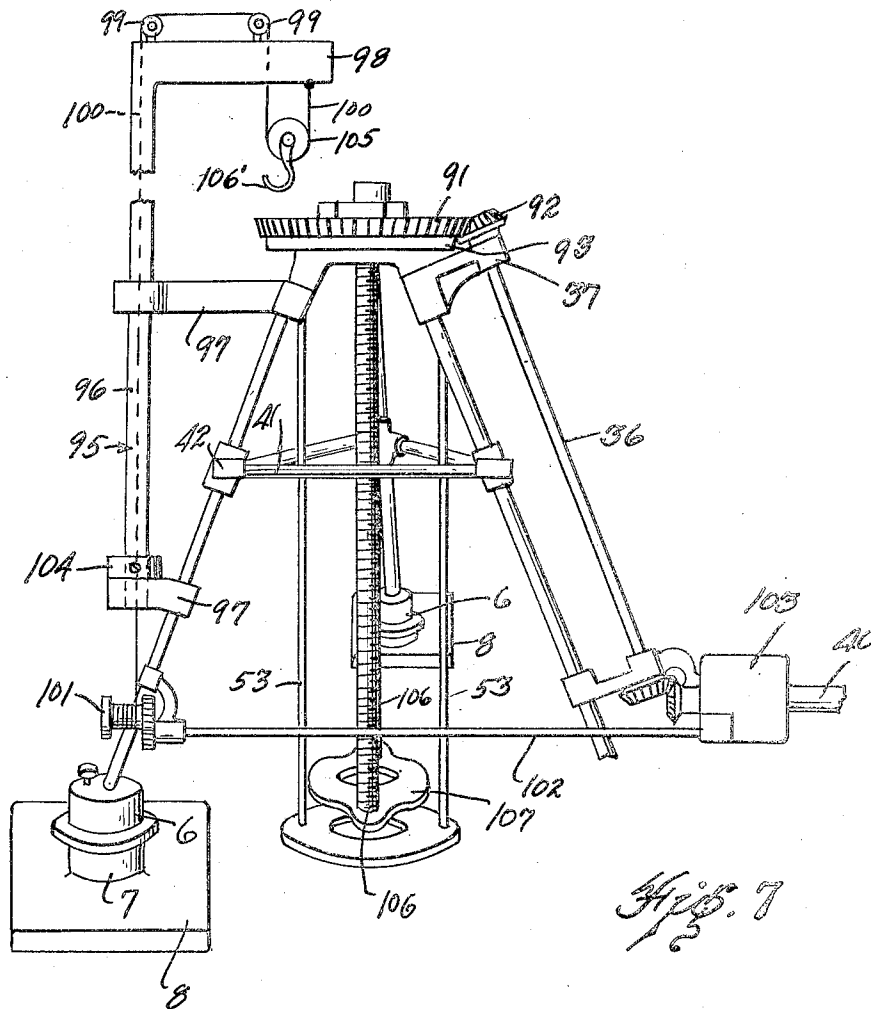


Fig. 7

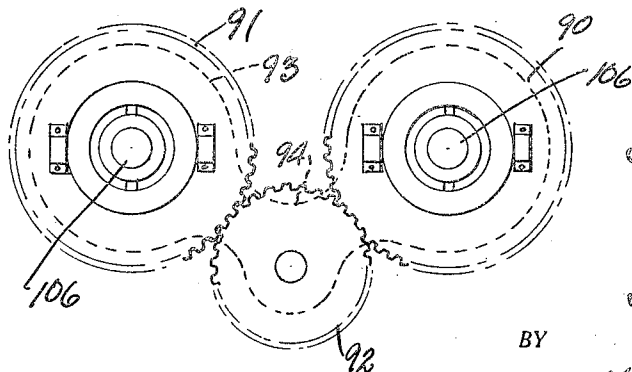


Fig. 8

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PULLER FOR WELL CASINGS

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This invention relates to pullers for well casings. After a well has been drilled particularly in oil wells where comparatively large diameter casing is used and after the well has been worked out and abandoned it is customary to leave the casing in the ground as no practical method has heretofore been in use which will quickly and easily remove the casing from the ground.

10 An object of this invention is to provide a device of this character which will quickly and easily pull the casing from the ground and allow the different sections to be uncoupled from each other.

15 Another object of this invention is to provide a device of this character consisting of a tripod having a large gear mounted on the top end of the tripod and an externally threaded hollow shaft connected to the gear and a well casing engaging member positioned at the lower end of the threaded shaft engaging the casing extending above the ground so that rotation of the gear will cause the threaded shaft to be lifted and thus pull the casing from the ground.

25 Another object of this invention is to provide a device of this character consisting of a tripod and a gear mounted upon the top of the tripod engaging an externally threaded hollow shaft and a well casing engaging member mounted upon the lower end thereof and a crane mounted upon one of the legs of the tripod for moving the several lengths of the casing that have been removed from the ground out of the way.

30 These objects and the several novel features of the invention are hereinafter more fully described and claimed and the preferred form of construction by which these objects are attained is shown in the accompanying drawings in which—

Fig. 1 is a perspective view of my device in position to receive a well casing.

45 Fig. 2 is a partial top plan view of the same.

Fig. 3 is a vertical sectional view through the device.

50 Fig. 4 is a detail top plan view of a casing engaging plate.

Fig. 5 is a detail sectional view showing a different means for raising the casing.

Fig. 6 is a similar view showing another modified form of construction.

Fig. 7 is a perspective view of another modified form of the device showing a crane attached thereto.

Fig. 8 is a top plan view of Fig. 7.

Referring now to the drawings wherein like reference characters indicate like parts throughout the several views. The tripod indicated generally at 1 consists of the legs 2, 3 and 4 mounted in recesses 5 provided in the top of the cup shaped members 6 slidably engaging the upstanding portions 7 mounted upon the bases 8.

The space between the top of the upstanding portion 7 and the lower face of the cup shaped member 6 is filled with liquid and a dial 9 registers the pressure exerted upon the top of the cup shaped member 6. The upper ends of the legs 2, 3 and 4 engage in the bosses 10 mounted upon the lower face of the plate 11. A gear 12 is rotatably mounted on the plate 11 and has a central aperture 13 therein. A plate 14 having the oppositely extending pins 15 mounted in bearings 16 secured to the gear 12, is provided with a central aperture 17. The plate 11 is provided with a recess 18 for receiving the plate 19 having the central aperture 20 therein and plate 19 is so constructed as to permit the same to oscillate in the recess 18. A cylindrical member 21 is internally threaded as indicated at 22 for engagement with the externally threaded shaft 23 provided with a hollow bore 24. A flange 25 provided on the member 21 engages the top face of the plate 19 as best seen in Fig. 3. Pins 26 extend from the cylindrical member 21 and engage in suitable sockets 27 in the plate 14. A locking member 28 threadedly engages the threaded shaft 23 and has the flange 29 on its upper end. The flange 29 is provided with gear teeth for engagement with the pinion 30. The pinion 30 is mounted upon a vertically extending shaft 31 having a squared end 32 on the lower end thereof to permit the shaft to be gripped by a wrench or a handle. The upper end of

the shaft 31 is rotatably mounted in the bearing 33 extending from the periphery of the cylindrical member 21.

A collar 34 is mounted upon the upper end of the shaft 31 and holds the same in place. A pinion 35 is mounted upon the shaft 36 mounted in suitable bearings 37 extending from the legs 2. The lower end of the shaft 36 has a beveled gear 38 mounted thereon for engagement with the beveled gear 39 driven from any suitable source of power through the shaft 40. As best seen in Fig. 1 suitable tie rods 41 engage the members 42 mounted upon the legs 2, 3 and 4 to hold the same in position.

As best illustrated in Figs. 1 and 3 the lower end of the shaft 23 is provided with the flared outwardly extending portions 43 and a circular plate 44. The plate 44 is recessed as indicated at 45 for receiving the lugs 46 extending from the casing engaging plate 47. The flared portions 43 are provided with inwardly extending lugs 48 extending over the lugs 46 when the plate 47 is engaged in the recess 45. The plate 47 is provided with a tapered recess 49 for receiving the tapered wedges 50. The tapered wedges 50 are provided on their inner face with the teeth 51. As further illustrated in Figs. 1 and 3 a plate 52 is connected to the plate 11 by means of the vertically extending rods 53. The plate 52 is provided centrally thereof with a tapered aperture 54 for receiving the tapered wedges 55 the same being provided on their inner face with the teeth 56. As will be noted from Fig. 3 the teeth 56 in the wedges 55 extend in the same direction as the teeth 51 in the wedges 50 for a purpose to be hereinafter described.

Under ordinary conditions the casing C will extend above the ground a sufficient amount to be engaged by the wedges 50. The operation of this part of the device is as follows: The tripod 1 is first so positioned as to have the vertical center line of the casing C in line with the vertical center line of the bore 24. Power is then applied to the train of gears 39, 38 and 35 to the gear 12 causing the same to rotate. Rotation of the gear 12 will cause rotation of the sleeve 21 through the medium of a universal joint and since the plate 14 cannot move vertically in relation to the plate 11 the threaded shaft 23 must necessarily be lowered. When the teeth of the wedges 50 are in contact with the casing C and the direction of movement of the gear 12 is reversed due to reversing of the power applied thereto, the shaft 23 will move upwardly carrying the plate 47 with it and since the beveled aperture 49 is in contact with the beveled face of the wedge 50 it will cause the teeth on the said wedges to bite into the periphery of the casing C and further vertical movement of the shaft 23 will

carry the casing C with it until the shaft 23 has reached the limit of its movement upwardly. Upon reversal of the power applied to the gear 12 the shaft 23 will move downwardly thus releasing the teeth 51 on the wedges 50 from the periphery of the casing C and inasmuch as the wedges 55 in the plate 52, have the teeth 56 extending in same direction to the teeth 51 in the wedges 50, will cause the said wedges 55 to bite into the casing C due to the tendency of the casing C to move downwardly when the wedges 50 have been released.

The shaft 23 will again be lowered and another portion of the casing C pulled upwardly until one of the couplings between the several sections of the casing C has been brought above ground whereupon the upper section of the said casing may be uncoupled from the next lower section and the same removed from the hollow bore 24 in the shaft 23.

Any deviation from the center line of the hollow bore 24 and the casing C will be compensated for due to the universal hook-up between the cylindrical member 21 and the gear 12.

Rotation of the shaft 31 will cause the locking member 28 to jamb against the lower end of the cylindrical member 21.

Referring now to Figs. 5 and 6 it will be seen that the hollow shaft 60 is connected to the piston 61 by means of the rivets 62. A pressure inlet pipe 63 is threaded in an opening in the lower end of the cylinder 64 encircling the piston 61. A cap 65 closes the upper end of the cylinder 64 and is provided with a packing nut 66 at the upper end and a similar packing 67 at the lower end. It will be clearly seen that pressure applied to the lower face of the piston 61 will cause vertical movement to be imparted to the hollow shaft 60. The lower end of the hollow shaft 60 is similar in design to the structure heretofore described.

As seen in Fig. 6 the gears 70 and 71 are connected through the medium of the driving gear 72. Suitable pitmans 73 are eccentrically mounted upon one face of the gears 70 and 71 respectively and are provided on their upper edges with pawls 74 for engaging the ratchet face 75 of the hollow shaft 76.

Suitable springs 77 tend to keep the pawls 74 in engagement with the ratchet face 75. The lower end of the pitmans 73 are pivotally connected to a link 78. The lower end of the link 78 is pivotally connected to a casting 79 and the outer end of the casting 79 provides supports for the gears 70 and 71. Pivotally connected to the inner side of the bearing 79 are the locking pawls 80 which prevent the shaft 76 from dropping when the upward pressure exerted

by the pawls 74 has been released. The releasing handles 81 are provided for releasing the pawls 74 and 80. It will be clearly seen that upon rotation of the gears 70 and 71 the pawls 74 will lift the shaft 76 a certain amount and inasmuch as the lower end of the shaft 76 is similar in design as the lower end of the shaft 23 and engages the casing C the same will be lifted from the ground.

Referring now to Figs. 7 and 8, a pair of gears 90 and 91 positioned at the top of the tripod, as heretofore described, are in spaced relation to each other both being engaged by the driving pinion 92. The plate 93 which supports the gears 90 and 91 has the indenture 94 in one edge thereof for permitting the casing C to be raised vertically between the gears 90 and 91 and then swung out of position by means of the crane 95. The crane 95 comprises the vertically extending pipe 96 carried in bearings 97, the said bearings being secured to one leg of the tripod. A horizontally disposed arm 98 extends from the upper end of the standard 96 and is provided on its upper face with the pulleys 99 over which a cable 100 passes. One end of the cable 100 passes through the standard 96 and is secured to a drum 101 driven through suitable gears located at one end of the drum 101. A power take off shaft 102 for operating the drum 101 is in turn driven from the transmission 103. A collar 104 is secured to the hollow standard 96, near the lower end thereof, and supports the crane 95 on the lower bearing 97. The opposite end of the cable 100 to the end secured to the drum 101 is secured to the lower face of the horizontally extending member 98 and passes under a pulley 105 carrying the hook 106' thereon. When a device of this character is used having the spaced double gears 90 and 91 located at the top of the tripod the central shafts extending downwardly from the said gears need not be hollow nor of such large diameter as is needed where a single gear is used at the top of the tripod.

The upper part of the tripod is practically the same as heretofore described with the exception that there are two gears and universal joints instead of one. Threaded shafts 106 extend downwardly from the center of the gears 90 and 91 and are rotatably mounted, at their lower end in a casing engaging plate 107, which is similar in design to the plate 47. The threaded shafts 106 must have the same slope thread, in other words, both must be right hand threads or both left hand threads so that rotation of the gears 90 and 91 will cause the threaded shafts to move together in a vertical direction and thus lift the casing C from the ground. When one section of the casing C has been lifted from the ground

the lower end of that section will be unthreaded from the coupling securing it to the next lower section. The hook 106' will be fastened to the upper end of the section C that has been removed from the ground and the hollow standard 96 will be swung laterally manually causing the removed section of the well casing to be swung out of the way and thus permitting another section to be pulled up from the ground.

From the foregoing description it becomes evident that I have provided a device of this character which is capable of removing well casings from the ground and thus permitting the same to be used a number of times, materially reducing the cost of well drilling.

Having thus fully described my invention, its utility and mode of operation, what I claim and desire to secure by Letters Patent of the United States is—

1. A device of the character described comprising a supporting member, driving means mounted at the top of the support, a hollow shaft open throughout its length to permit the passage of a well casing there-through, mounted in the said driving means in such a manner that rotation of the driving means will impart vertical movement to the hollow shaft and a well casing engaging member mounted at the lower end of the hollow shaft.

2. A device of the character described comprising a supporting member, a gear rotatably mounted upon the top of the supporting member, means for driving said gear, a sleeve universally mounted in the said gear, the said sleeve being provided internally thereof with threads, a hollow shaft threaded externally thereof for engagement with the said sleeve, and a well casing engaging member mounted at the lower end of the hollow shaft.

3. A device of the character described comprising a supporting member, a gear rotatably mounted upon the top of the support, means for rotating the said gear, a hollow shaft, open throughout its length to permit the passage of a well casing there-through, mounted in the said gear in such a manner that rotation of the gear will impart vertical movement to the hollow shaft and a well casing engaging member mounted at the lower end of the hollow shaft.

4. A device of the character described comprising a supporting member, a hollow shaft, open throughout its length to permit the passage of a well casing therethrough, mounted within the top of the supporting member, driving means on the support for imparting vertical movement to the hollow shaft, and a well casing engaging member mounted at the lower end of the hollow shaft.

5. A device of the character described,

comprising a tripod supporting member, a plate mounted upon the top of the tripod provided centrally thereof with a recess, a gear rotatably mounted upon the top of the said plate, means for driving the said gear, a sleeve universally mounted in the said gear and recess of the said plate and threaded internally thereof, a hollow shaft threaded externally thereof for engagement with the hollow sleeve so that rotation of the sleeve will impart vertical movement to the hollow shaft, means on the lower end of the hollow shaft for engaging a well casing so that vertical movement of the hollow shaft will pull the casing from the ground, and means located below the means on the hollow shaft for preventing downward movement of the said well casing when the means on the lower end of the hollow shaft has released the same.

6. A device of the character described, comprising a supporting member, a gear rotatably mounted at the top of the supporting member, means for driving the said gear, a sleeve universally mounted in the said gear and the top of the supporting member, the said sleeve being provided internally thereof with threads, a hollow shaft threaded externally thereof for engagement with the said sleeve so that rotation of the said sleeve will impart vertical movement to the hollow shaft, a casing engaging member located at the lower end of the hollow shaft comprising a ring like member provided centrally thereof with a tapered aperture, tapered wedges slidable in the tapered aperture and provided on one edge thereof with serrations for engaging the well casing upon upward movement of the hollow shaft.

7. A device of the character described comprising a supporting member, a gear rotatably mounted at the top of the supporting member, means for driving the said gear, a sleeve universally mounted in the said gear, the said sleeve provided internally thereof with threads, a hollow shaft threaded externally thereof for engaging with the said sleeve so that rotation of the said sleeve will impart vertical movement to the said hollow shaft, a well casing engaging member mounted at the lower end of the hollow shaft, and a second casing engaging member mounted below the first mentioned casing engaging member for preventing the well casing from moving downwardly when disengaged by the first mentioned engaging member.

8. A device of the character described comprising a supporting member, a pair of gears in spaced relation to each other mounted upon the top of the supporting member, means for driving the said gears, a pair of shafts mounted within the respective gears, means operable by the said gears for imparting vertical movement to the said

shafts, and a well casing engaging member mounted at the lower end of the said shafts.

9. A device of the character described comprising a supporting member, a pair of gears in spaced relation to each other rotatably mounted upon the top of the supporting member, means for driving the said gears, a pair of sleeves universally mounted in the respective gears, the said sleeves being provided internally thereof with threads, a pair of shafts threaded externally thereof for engagement with the said sleeves and a well casing engaging member mounted at the lower end of the said shafts.

10. A device of the character described comprising a supporting member, driving means mounted at the top of the supporting member, a pair of shafts mounted in the said driving means, in such a manner that rotation of the driving means will impart vertical movement to the said shafts, and a well casing engaging member mounted at the lower end of the said shafts.

11. A device of the character described comprising a supporting member, a pair of gears rotatably mounted at the top of the supporting member, means for driving the said gears, a pair of sleeves universally mounted in the said gears, the said sleeves provided on their inner face with threads, a pair of shafts threaded externally thereof for engagement with the said sleeves so that rotation of the said sleeves will impart vertical movement to the said shafts, and a casing engaging member located at the lower end of the said shafts comprising a ring like member provided centrally thereof with a tapered aperture, and tapered wedges slidable in the tapered aperture and provided on one edge thereof with serrations for engaging the well casing upon upward movement of the said shafts.

12. A device of the character described comprising a supporting member, driving means mounted at the top of the supporting member, a shaft mounted in the said driving means in such a manner that rotation of the driving means will impart vertical movement to the shaft, a well casing engaging member mounted at the lower end of the said shaft, and means extending from the supporting member for preventing downward movement of the well casing.

In testimony whereof I sign this specification.

JOHN LIST.