G. W. SMITH & C. C. SANFORD.

WELL DRILLING MACHINE.

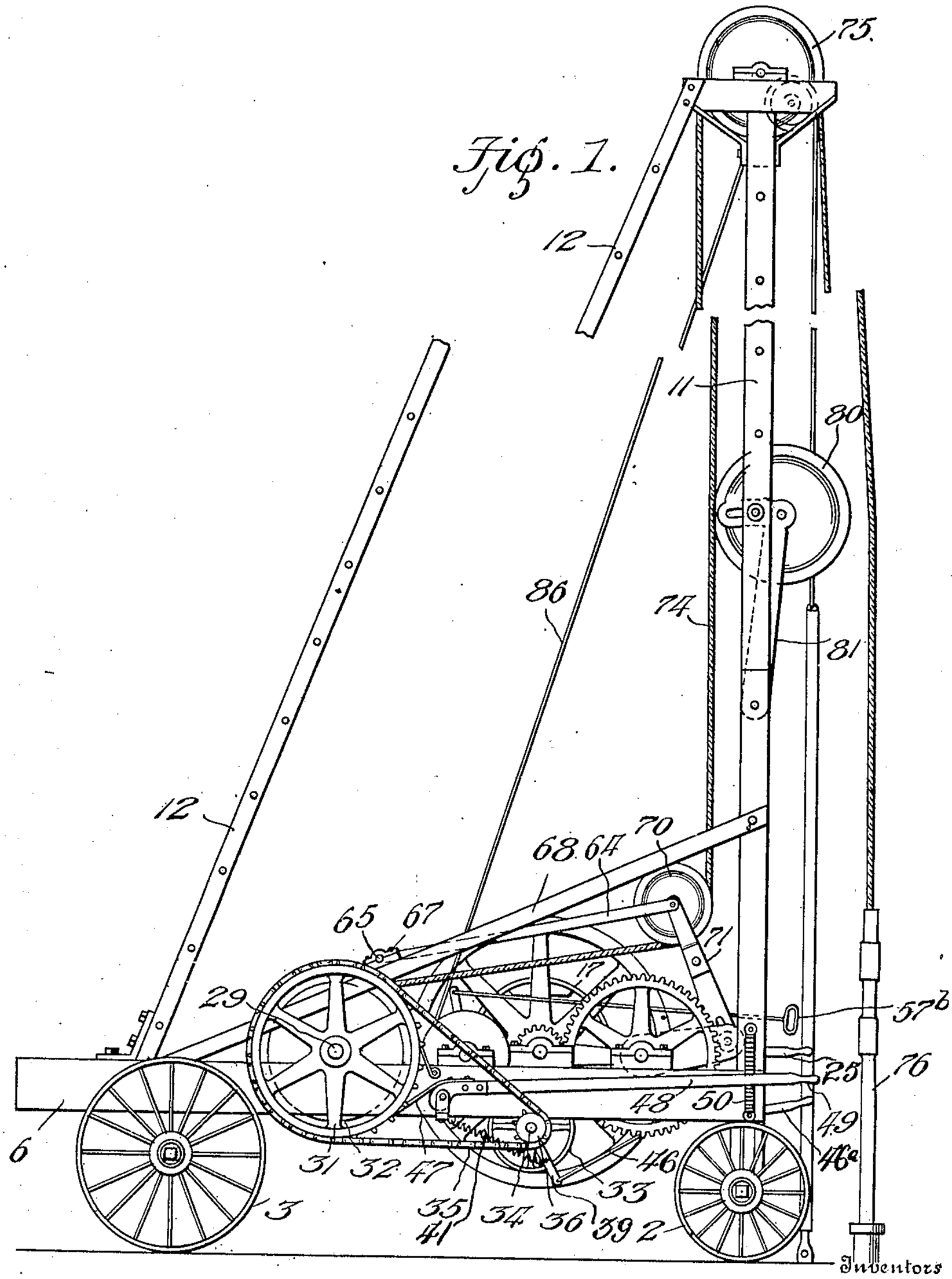
APPLICATION FILED DEC. 14, 1907.

925,960.

Patented June 22, 1909.

5 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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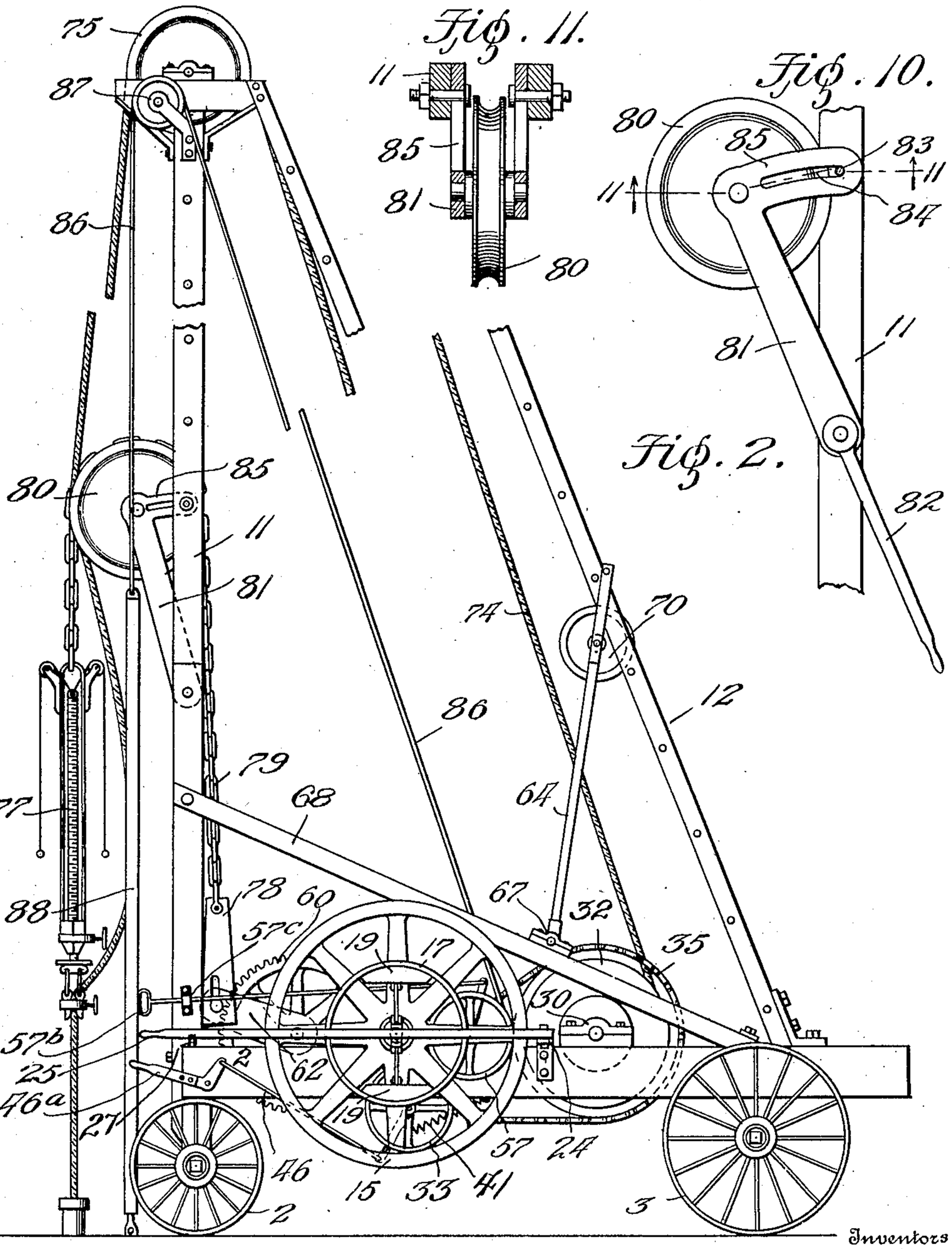

Fig. 11.

Fig. 10.

Fig. 2.

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5 SHEETS—SHEET 3.

Fig. 3.

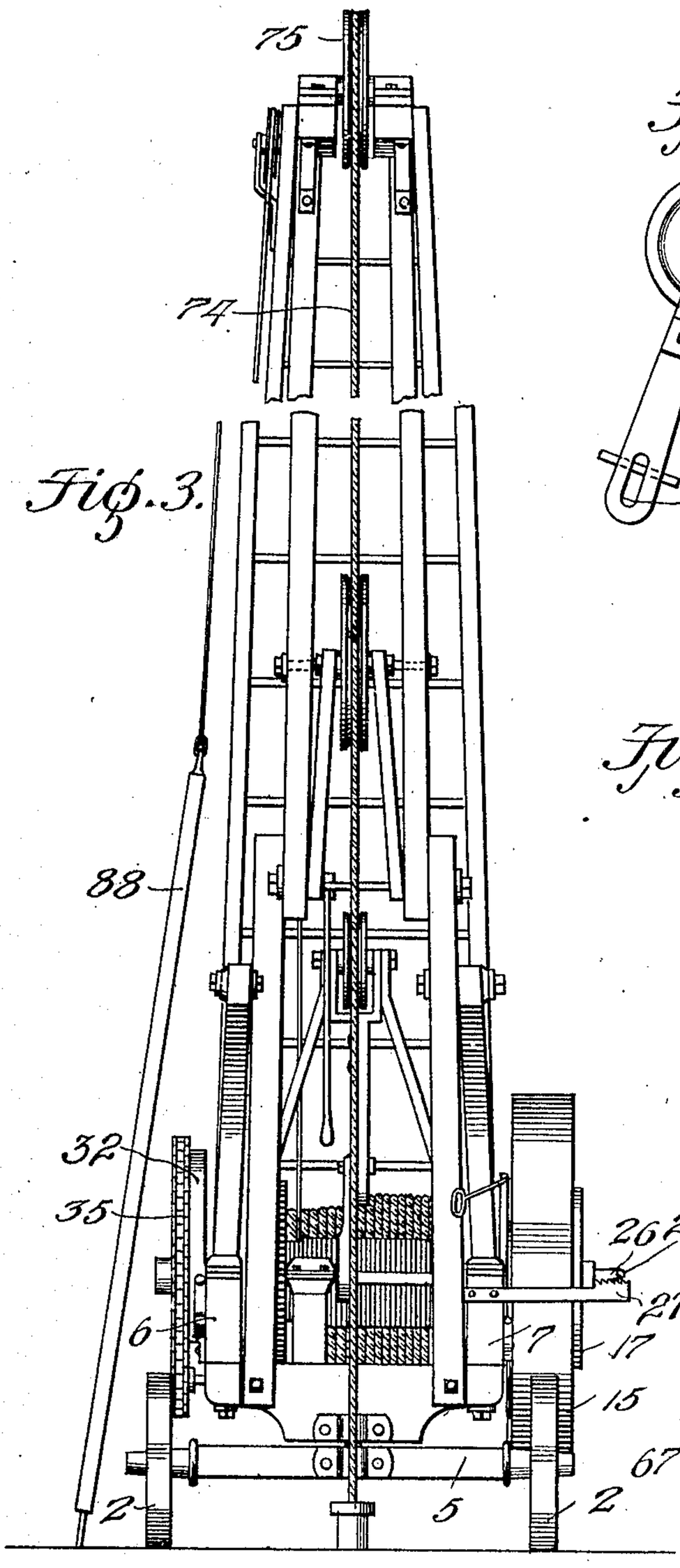


Fig. 9.

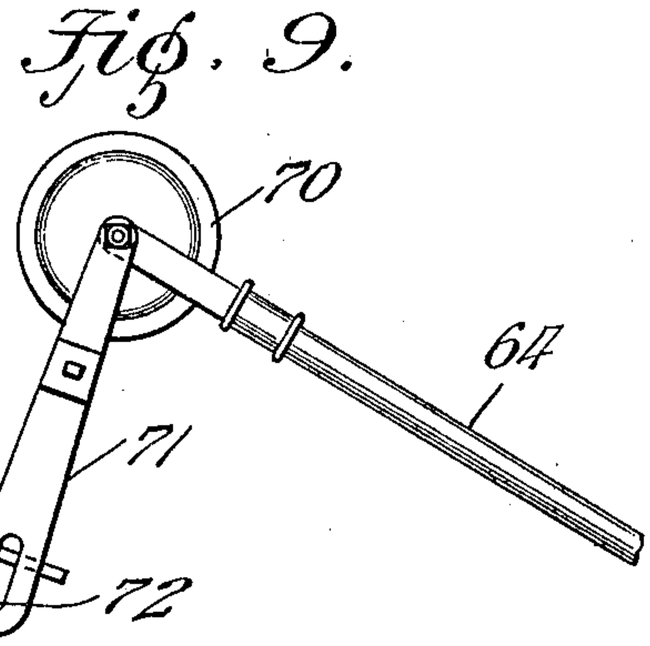
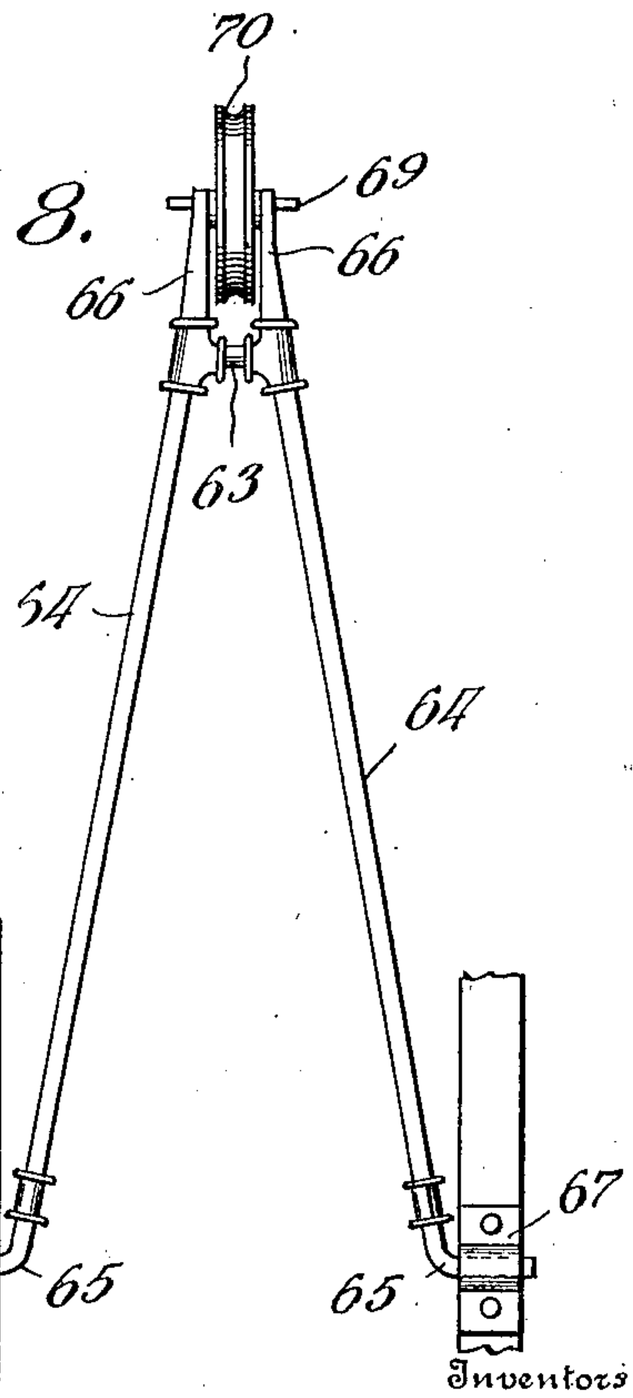


Fig. 8.



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5 SHEETS—SHEET 4.

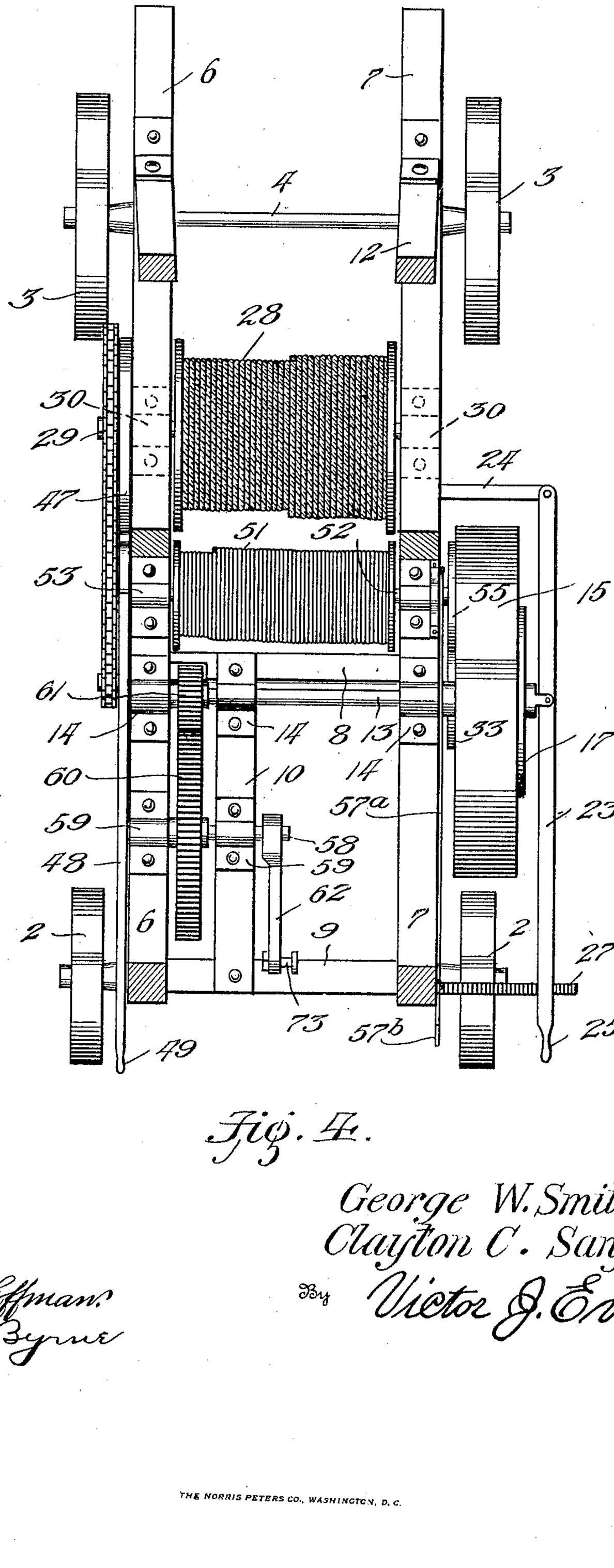

Fig. 4.

Witnesses

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5 SHEETS—SHEET 5.

Fig. 5.

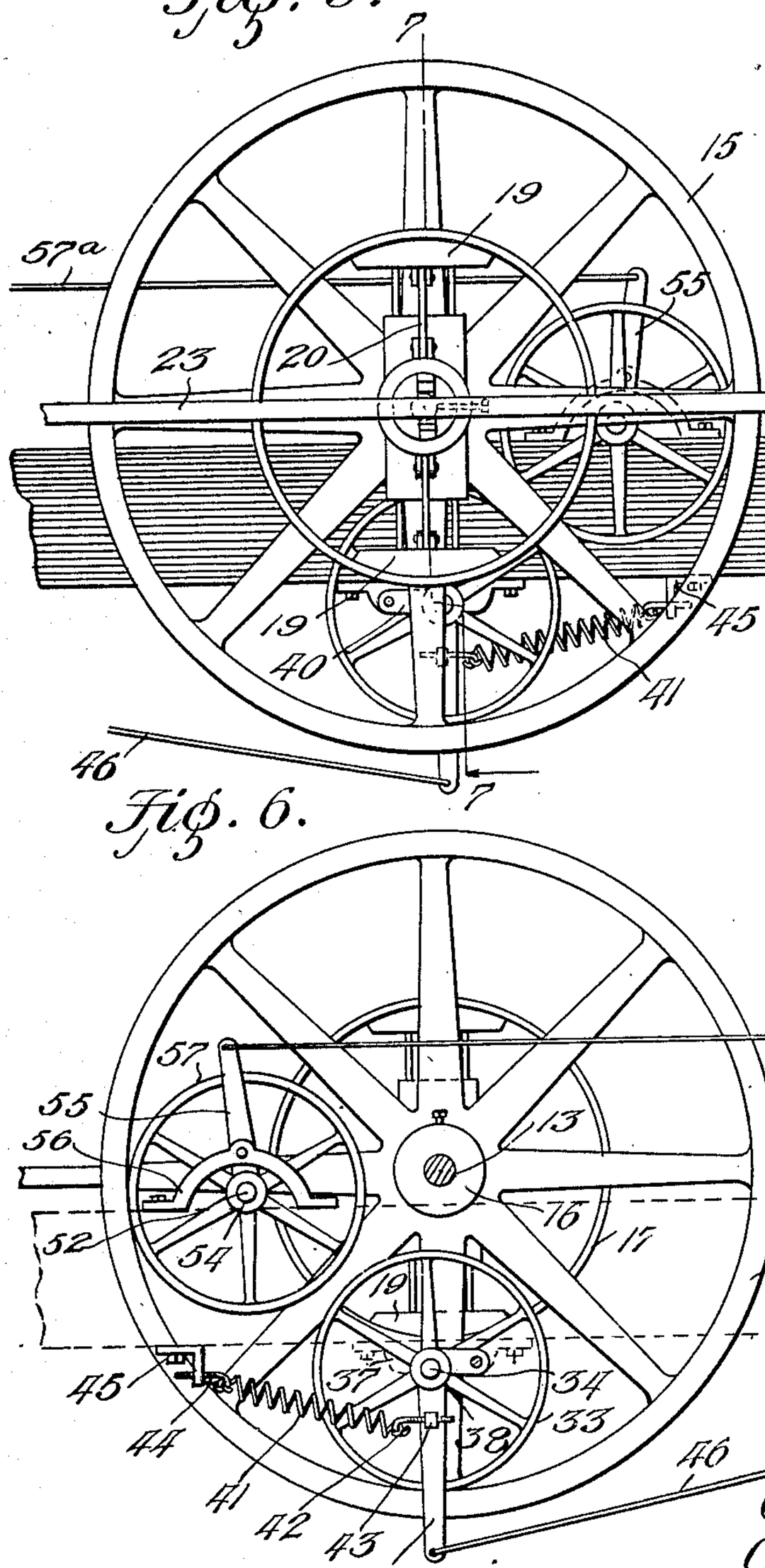
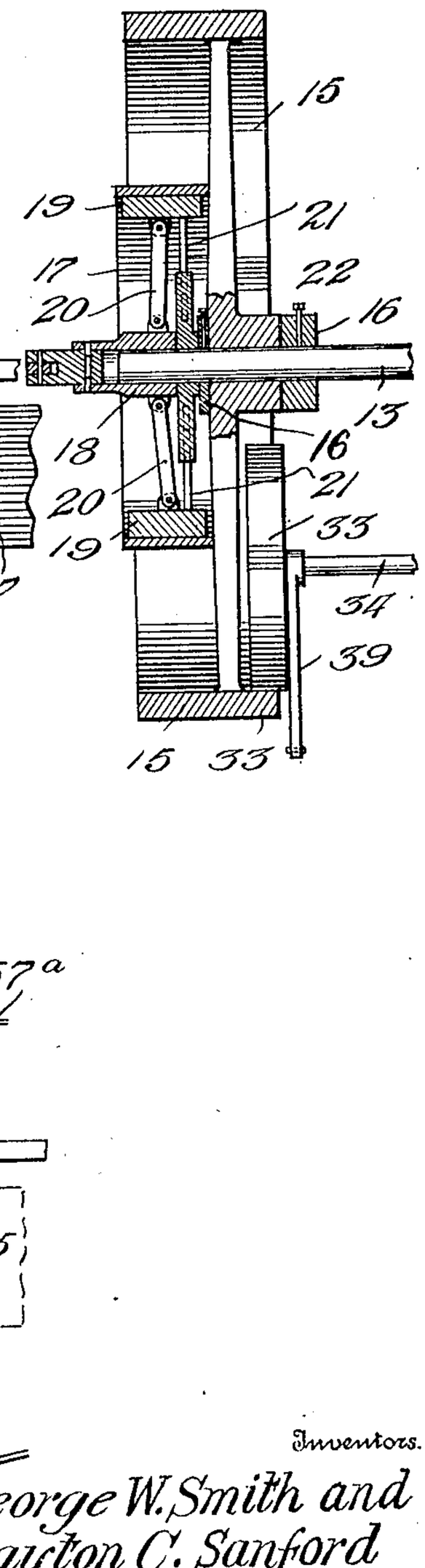


Fig. 6.

Fig. 7.



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UNITED STATES PATENT OFFICE.

GEORGE W. SMITH AND CLAYTON C. SANFORD, OF NEW HAVEN, OHIO.

WELL-DRILLING MACHINE.

No. 925,960. Specification of Letters Patent. Patented June 22, 1909.

Application filed December 14, 1907. Serial No. 406,559.

To all whom it may concern:

Be it known that we, GEORGE W. SMITH and CLAYTON C. SANFORD, citizens of the United States, residing at New Haven, in the county of Huron and State of Ohio, have invented new and useful Improvements in Well-Drilling Machines, of which the following is a specification.

The invention relates to an improvement in well drilling machines, comprehending specifically a portable well drilling apparatus in which the walking beam ordinarily used in this class of structures is dispensed with and an adjustable wheel substituted therefor, whereby the drill chain may be drawn from exactly the same point above in all positions of the operating crank and the machine arranged in much closer proximity to the work.

The machine is also constructed to dispense with guy ropes or wires for steadying the machine in operation, as all strains incident to the use of the machine emanate from the center of the frame.

Figure 1 is a view in side elevation of a well drilling machine constructed in accordance with our invention, the invention being illustrated in condition for spudding. Fig. 2 is a similar view, illustrating the invention in condition for drilling. Fig. 3 is a view in front elevation. Fig. 4 is a top plan view, the pole mast or derrick and ladder being removed. Fig. 5 is a view in side elevation of the gear through which power is transmitted to the main shaft, sand line reel and drilling cable reel. Fig. 6 is a similar view, looking at the gear from the opposite side. Fig. 7 is a section on the line 7—7 of Fig. 5, looking in the direction indicated by the arrow. Fig. 8 is a detail plan view of the spudding lever. Fig. 9 is a side elevation of the forward end of the spudding lever and the means by which it is connected to the crank arm. Fig. 10 is a side elevation of the means adapted to be used in connection with the temper screw. Fig. 11 is a section on the line 11—11 of Fig. 10, looking in the direction indicated by the arrow.

Referring to the drawings by reference numerals, 2 designates a pair of front and 3 a pair of rear supporting wheels, upon the axles 4—5 of which is mounted the main frame of the drilling machine. The main frame consists of longitudinal beams or girders 6—7 and transverse beams or girders 8—9, all being suitably connected and braced. A supporting bar 10 is suitably secured to the transverse beams or girders 8—9. A pole mast or derrick 11 of suitable construction is secured to the front end of the main frame, and is supported and braced in position by means of a ladder 12.

A main shaft 13 is journaled in bearings 14 secured to the upper surface of the longitudinal beams or girders and supporting bar 10. The main shaft 13 is driven through the medium of a band wheel 15 which is connected to any source of power, preferably carried by the main frame. The band wheel 15 is loosely journaled upon the main shaft 13 between collars 16, and is provided with an annular member 17 which is secured to the spokes thereof concentric to the main shaft 13, and which forms one member of a clutch adapted to fix the band wheel 15 to the main shaft 13. The other member of the clutch consists of a collar 18 feathered upon the main shaft 13 and shoes 19 connected to the collar by links 20 and adapted to be forced into frictional contact with the inner surface of the member 17 when it is desired to connect the main shaft with the band wheel 15, and to be moved out of contact with said member when it is desired to disconnect the main shaft from the band wheel. The shoes 19 are guided and steadied in their movements by means of rods 21, which are secured to the shoes and slidably engage in sockets in a member 22. The clutch is adapted to be operated through the medium of a lever 23 which is suitably connected to the collar 18, and which is pivotally secured to an arm 24 projecting laterally from the longitudinal beam or girder 7. The free end of the lever is formed to provide an operating handle 25, and is provided with a dog 26 adapted for engagement with the teeth of a rack 27 which projects laterally from the longitudinal beam or girder 7. Inasmuch as the lever 23 is provided with the dog 26 adapted for engagement with the teeth of the rack 27, the shoes 19 may be held in or out of engagement with the member 17 against accidental movement, thereby avoid-

ing all liability of the accidental starting or stopping of the operating parts of the machine. A drilling cable reel 28 is mounted upon a shaft 29 journaled in bearings 30 secured to the upper sides of the longitudinal beams or girders 6—7. The shaft 29 projects laterally in one direction beyond the main frame, and this projecting portion is provided with a large gear wheel 31 and a brake wheel 32. Motion is transmitted to the drilling cable reel 28 through the medium of a pulley 33, a shaft 34 and a sprocket chain 35. The sprocket chain 35 passes over the large gear wheel 31 and over a smaller gear wheel 36 mounted on the shaft 34. The shaft 34 is journaled in a bearing 37 secured to the under side of the longitudinal beam or girder 6 and in a bearing 38 of an inverted elbow lever 39. The short arm 40 of the elbow lever 39 is pivotally secured to the longitudinal beam or girder 7, whereby the line of the shaft 34 may be shifted. The pulley 33 is keyed to the shaft 34 and is located within the plane of the band wheel 15, whereby when the line of the shaft is shifted in one direction, the pulley is moved into frictional engagement with the inner surface of the rim of the band wheel.

When it is desired to rotate the drilling cable reel 28, the line of the shaft 34 is shifted to move the pulley 33 into engagement with the band wheel 15, and when it is desired to stop the rotation of the reel the line of the shaft is shifted in the reverse direction to withdraw the pulley from engagement with the band wheel. The pulley 33 is normally retained out of engagement with the band wheel 15 by means of a coiled contractile spring 41, which has one of its ends secured to the long arm of the elbow lever 39 through the medium of a hook 42 which threadedly engages a boss 43 upon the lever. The other end of the spring is secured to the longitudinal beam or girder through the medium of a hook 44 which has threaded engagement with a bracket 45. As the hooks 42 and 44 have, respectively, threaded engagement with the elbow lever 39 and the longitudinal beam or girder 7, the tension of the spring may be readily and quickly regulated. The line of the shaft 34 is shifted to move the pulley 33 into engagement with the band wheel 15 through the medium of a pull rod 46 which is secured at one of its ends to the long arm of the elbow lever 39 and its other end to an elbow lever 46^a disposed at the forward end of the machine within convenient reach of the operator. Rotation of the drilling cable reel 29 is adapted to be controlled through the medium of a brake which consists of a band 47 and a lever 48. The band 47 encircles the brake wheel 32 and has one of its ends secured to the longitudinal beam or girder 6 and its other end to the lever 48. The lever 48 is fulcrumed upon the longitudinal beam or girder 6 and has its free end formed to provide an operating handle 49 which is disposed at the forward end of the machine within convenient reach of the operator. The lever 48 is provided with a dog, not shown, adapted for engagement with a rack 50 secured to one side of the pole mast or derrick and the longitudinal beam or girder 6.

A sand line reel 51 is mounted upon a shaft 52 which is journaled at one of its ends in a bearing 53 secured to the upper surface of the longitudinal beam or girder 6. The other end of the shaft 52 is journaled in a bearing 54 of a lever 55. The lever 55 is pivotally secured to a bracket 56 secured to the upper surface of the longitudinal beam or girder 7. The lever 55 is pivotally mounted at a point between its ends and the bearing 54 is disposed at a point below the pivot, whereby a slight movement of the lever will change the line of the shaft 52. A pulley 57 is secured to the shaft 52 and is disposed within the plane of the band wheel 15, whereby when the line of the shaft is shifted in one direction, the pulley is moved into frictional engagement with the inner surface of the rim of the band wheel. When it is desired to rotate the sand line reel 51, the line of the shaft 52 is shifted to move the pulley 57 into engagement with the band wheel 15, and when it is desired to stop the rotation of the reel the line of the shaft is shifted in the reverse direction to move the pulley out of engagement with the band wheel. The line of the shaft 52 is shifted through the medium of a pull rod 57^a which is secured at one end to the lever 55 and which has its other end formed to provide a hand grip 57^b disposed at the forward end of the machine within convenient reach of the operator. The pull rod 57^a passes through a guide bracket 57^c at the forward end of the machine.

A stud shaft 58 is journaled in bearings 59 secured to the upper surface of the supporting bar 10 and the longitudinal beam or girder 6. The stud shaft 58 is connected to the main shaft 13 through the medium of a large pinion 60 and a small pinion 61, the large pinion being secured to the stud shaft and the small pinion to the main shaft. A crank arm 62 is secured to the stud shaft 58 and is adapted to be operated in a vertical plane extending centrally and longitudinally of the machine. The temper screw and spudding lever are adapted to be operated through the medium of the crank arm 62.

The spudding lever consists of a head 63, arms 64 secured to the head and diverging rearwardly therefrom and terminating in journals or trunnions 65, and arms 66 which extend forwardly from the head. The journals or trunnions 65 of the spudding lever

are mounted in bearings 67 which are secured to the upper surfaces of bars 68 which are secured at their forward ends to the pole mast or derrick at points spaced upwardly from the longitudinal beams or girders, and at their lower ends to the longitudinal beams or girders, the bars being therefore inclined downwardly and rearwardly. The bearings 67 are located above and slightly in advance of the drilling cable reel, the free end of the spudding lever being disposed adjacent the front of the machine. A journal 69 is secured between the ends of the arms 66 and projects laterally in both directions beyond the same. A sheave 70 is mounted upon the journal 69 between the arms 66, and a link 71 is pivotally secured to the projecting ends of the journal. The lower end of the link is provided with an elongated slot 72 adapted for the reception of a bolt 73 secured to the crank arm 62. The front or free end of the spudding lever is adapted to be oscillated vertically in view of its connection with the stud shaft 58. The cable 74 which is wound upon the reel 28, passes under the sheave 70 and over a crown pulley 75 journaled in the upper end of the pole mast or derrick 11, the free end of the cable being, as usual, connected to a drill 76. During the spudding operation, the spudding lever is used, and when it is desired to drill, the spudding lever is removed and the temper screw 77 is substituted therefor. The temper screw is connected to the crank 62 through the medium of a bar 78 and a chain 79, the chain extending over a pulley 80, which is journaled between a pair of levers 81, which are pivotally mounted at a point intermediate the ends of the pole mast or derrick 11, whereby the pulley 80 may be drawn into and out of operative position. The levers 81 are adapted to be operated through the medium of a handle 82 extending downwardly from one of the levers. The movements of the levers 81 are limited by means of pins 83 secured to the pole mast or derrick 11 and passing through the arcuate slots 84 in arms 85, the arms being secured to the levers.

A cable 86 is wound about the reel 51 and passes over a pulley 87 which is journaled at the upper end of the pole mast or derrick 11, the free end of the cable being secured to a bailer 88 of the usual construction.

From the above detailed description taken in connection with the drawings the operation of the various parts of the apparatus will be fully and clearly apparent.

Having fully described and illustrated our invention, what we claim as new is:

1. A well drilling machine including a main frame, a cable reel journaled thereon, a pole mast, a crown pulley journaled on the pole mast, a cable wound about the reel and passing over the crown pulley, a drill secured to the cable, a crank arm, a spudding lever comprising a head, arms secured to the head, journals secured to the arms, bearings on the main frame to receive the journals, arms projecting from the head in a reverse direction, a sheave journaled between said last mentioned arms and under which the cable is adapted to pass, and a connection between the crank arm and the spudding lever.

2. A well drilling machine including a main frame, a reel journaled on the frame, a pole mast, a pulley journaled on the pole mast, a cable wound about the reel and passing over the pulley, a crank arm, a spudding lever comprising a head, arms secured to and diverging rearwardly from the head and terminating in journals, arms projecting forwardly from the head, a sheave journaled between the forwardly projecting arms, and a connection between the crank arm and the spudding lever.

3. A well drilling machine including a main frame, a reel journaled on the frame, a pole mast, a pulley journaled on the pole mast, a cable wound about the reel and passing over the pulley, a crank arm, inclined bars secured at their lower ends to the frame and at their upper ends to the pole mast, bearings secured to the upper surfaces of the inclined bars, a spudding lever comprising a head, arms secured to and diverging rearwardly from the head and terminating in journals mounted in the bearings, arms projecting forwardly from the head, a sheave journaled between the forwardly projecting arms, and a connection between the crank arm and the forwardly projecting arms.

4. A well drilling machine including a main frame, a pole mast, pulleys journaled on the pole mast, a lever pivotally mounted on the pole mast, a pulley journaled on the lever, inclined bars secured at their lower ends to the frame and at their upper ends to the pole mast, bearings secured to the inclined bars a spudding lever journaled in the bearings, a sheave journaled on the spudding lever, a main shaft journaled on the frame, a band wheel loosely mounted on the shaft, a clutch by means of which the band wheel may be fixed to the shaft, a reel journaled on the frame, a bearing secured to the frame, an elbow lever pivotally mounted by its short arm on the frame and provided with a bearing alining with the first-named bearing, a shaft journaled in the bearings, a connection between the shaft and the reel, a pulley mounted upon the shaft and disposed within the band wheel, a spring adjustably secured at its ends to the frame and to the lever, another bearing secured to the frame, a bracket secured to the frame, a lever pivotally mounted upon the bracket and provided at its lower end with a bearing alining with said other bearing, a shaft journaled in the last named bearings, a reel mounted

upon the shaft, a pulley secured to the shaft and disposed within the band wheel, means by which the levers may be operated, a stud shaft journaled on the frame, a connection between the stud shaft and main shaft, a crank arm carried by the stud shaft, and a connection between the crank arm and the spudding lever.

In testimony whereof, we affix our signatures in presence of two witnesses.

GEORGE W. SMITH.
CLAYTON C. SANFORD.

Witnesses:
ALTON SNYDER,
N. S. CLARK.