W. C. STEVENS.

WELL DRILLING MACHINE.

APPLICATION FILED JAN. 22, 1908.

955,612.

Patented Apr. 19, 1910.

3 SHEETS—SHEET 1.

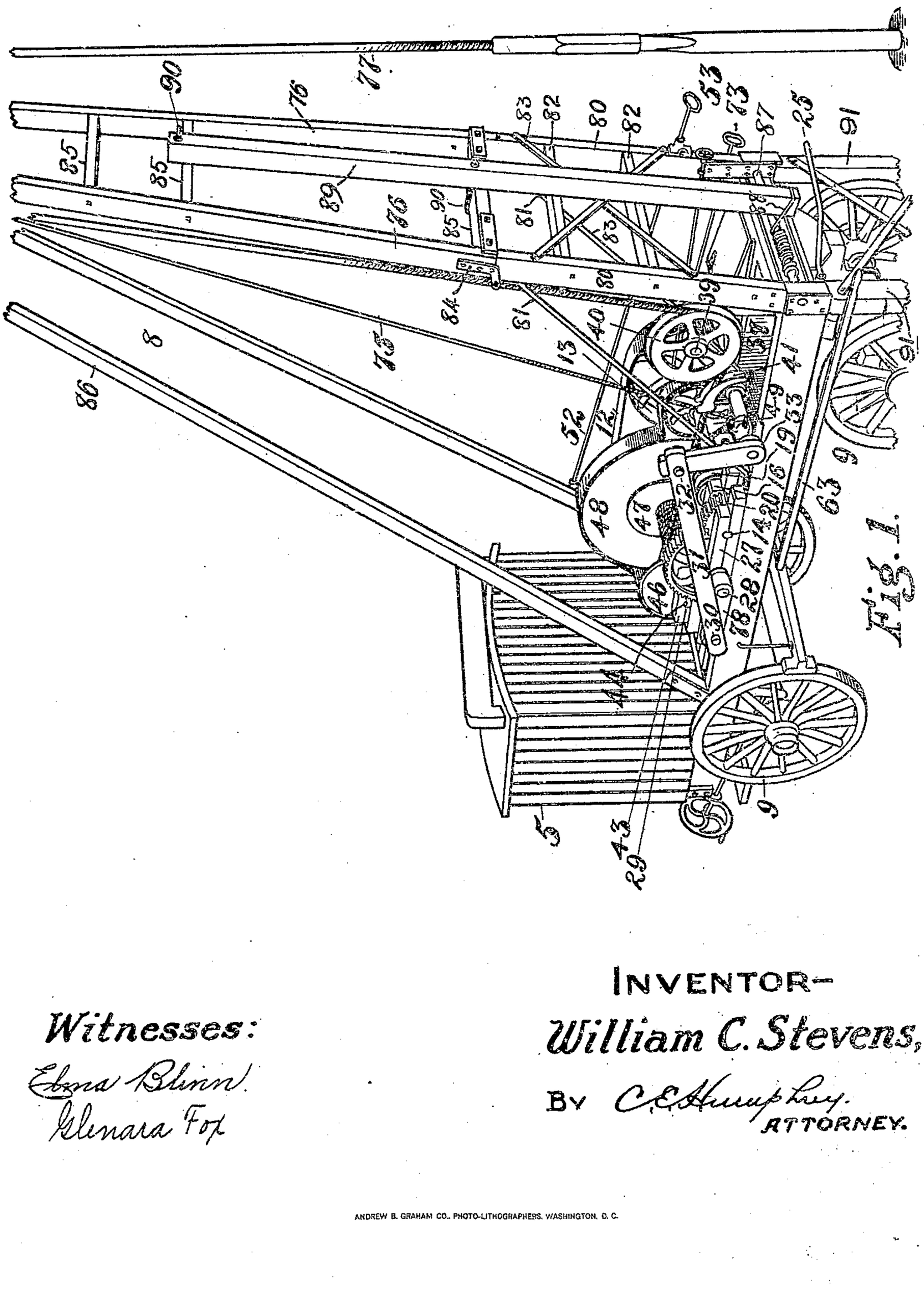

Fig. 1.

Witnesses:

Ebra Blinn.

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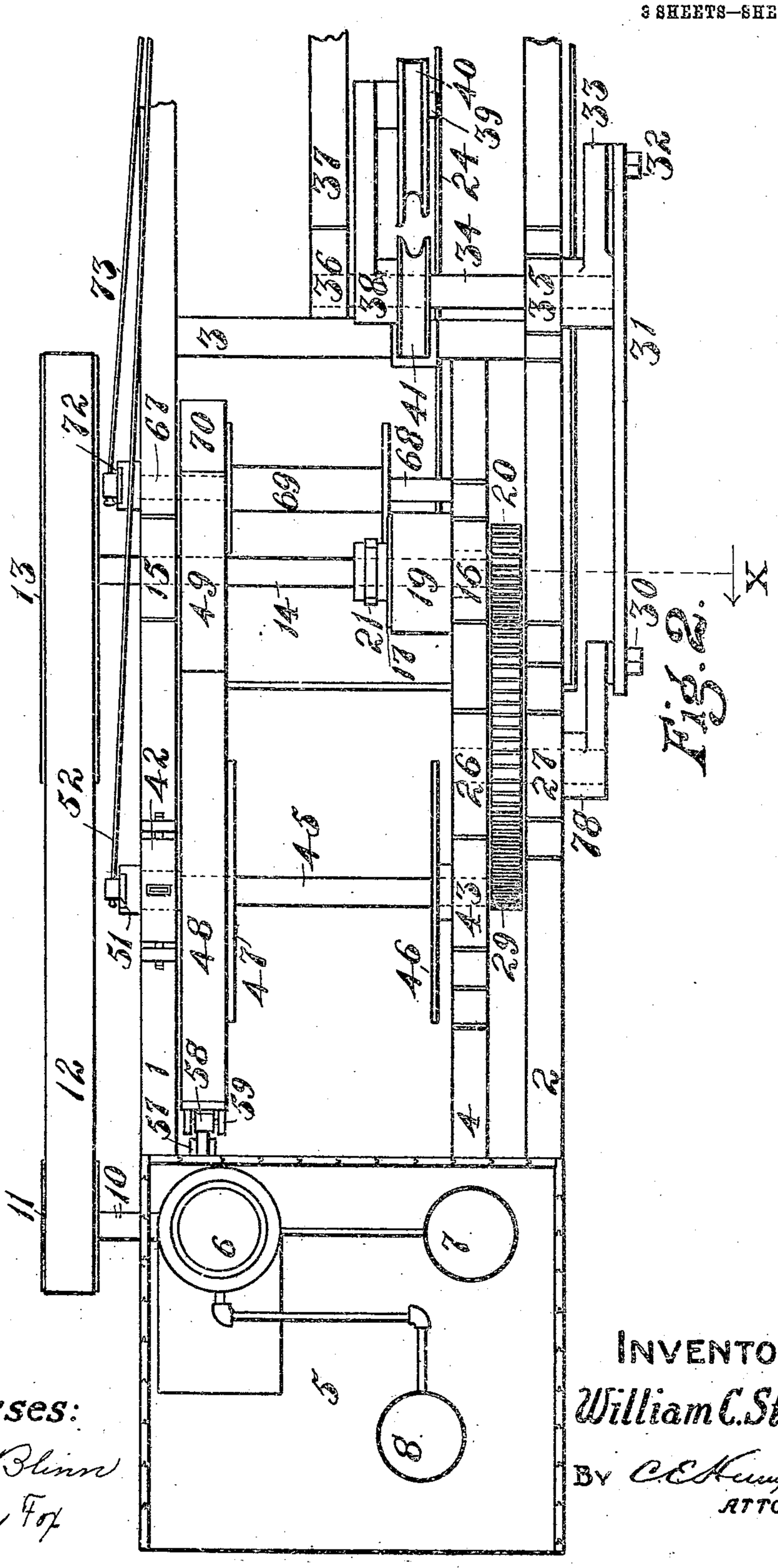

Fig. 2.

Witnesses:
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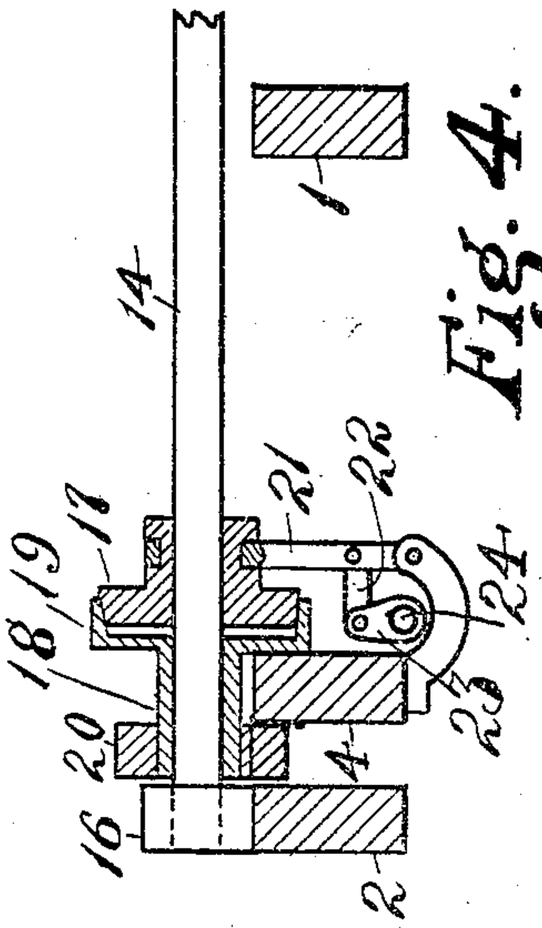

Fig. 4.

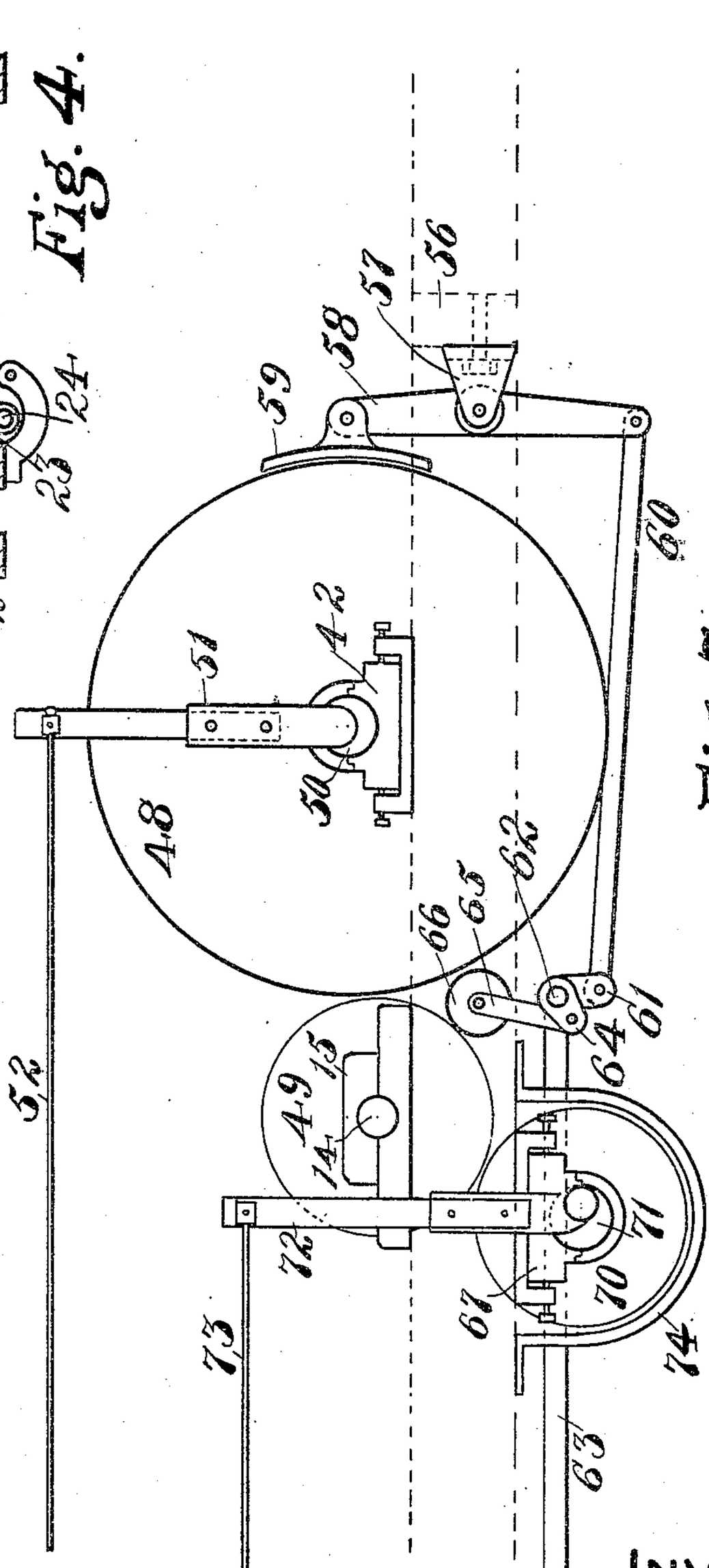

Fig. 3.

Witnesses:

Elma Blinn.

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UNITED STATES PATENT OFFICE.

WILLIAM C. STEVENS, OF AKRON, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE STAR DRILLING MACHINE COMPANY, OF AKRON, OHIO, A CORPORATION OF OHIO.

WELL-DRILLING MACHINE.

955,612. Specification of Letters Patent. Patented Apr. 19, 1910.

Application filed January 22, 1908. Serial No. 412,162.

To all whom it may concern:

Be it known that I, WILLIAM C. STEVENS, a citizen of the United States, residing at Akron, in the county of Summit and State of Ohio, have invented new and useful Improvements in Well-Drilling Machines, of which the following is a specification.

This invention relates to well drilling machines, and the objects thereof are to so construct the same as to eliminate certain defects or inefficiencies heretofore existing in machines of this character and to increase the general effectiveness of this type of devices.

In carrying into effect the foregoing objects, the invention contemplates preferably providing a device of this type with an internal combustion engine or electric motor as the means to be utilized in operating the same and it further contemplates so constructing the device that the operations of spudding, raising the tools from the well and manipulating the sand pump may be accomplished without either reversing the engine or shutting it down. By this is meant that while the engine is constantly running the device may be capable of performing the functions of spudding, or the tools may be raised from the well, or the sand pump employed indiscriminately without stopping the engine or reversing the motion thereof.

The invention further contemplates so arranging the details of construction of the device that the foregoing operations may be successfully accomplished and also contemplates further improvements and advantages constituting objects of this invention which will be more fully pointed out in the subjoined description.

A practical embodiment of my invention is illustrated in the accompanying drawings in which similar reference numerals indicate like parts in the different figures.

In the drawings, Figure 1 is a perspective view of so much of a well drilling machine as will illustrate this invention; Fig. 2 is a plan of the same; Fig. 3 a diagrammatic view in side elevation showing the position of certain of the operative parts and the gearing used; and, Fig. 4 is a cross sectional view on line X of Fig. 2.

Referring specifically to the drawings, the reference numerals 1 and 2 indicate two parallel longitudinal frames or sills extending the entire length of the device and extending between which is a transverse sill 3. Parallel with the sills 1 and 2 is a sill, referred to in the drawings by the reference numeral 4, extending to the sill 3. Mounted on the rear portions of the sills 1 and 2 is a cab or box 5 provided with a roof designed to inclose and protect a motor or internal combustion engine 6 customarily provided with a supply tank 7 and a second tank 8 designed to contain a cooling fluid such as water. The general frame of the machine is preferably supported upon ground wheels 9 as is usual in devices of this character, and it will be here stated that the rigging of the device beneath the frame is substantially the same as that employed in all well drilling machines. Mounted on the engine shaft 10 is a pulley 11 over which passes a belt 12 extending to and around a pulley 13 mounted on a shaft 14 rotatably supported in boxes 15 and 16 respectively mounted on the sills 1 and 2. The engine is designed to run continuously and drive the shaft 14 through the hereinbefore described mechanism at an approximately constant speed uninterruptedly and irrespective of the nature of the operation of the balance of the mechanism of the device.

Mounted on the shaft 14 is a tight member 17 of a clutch employed for transmitting motion from the constantly revolving shaft 14 to the balance of the mechanism of the device. The shaft 14 also carries a sleeve 18 on which is mounted the loose member 19 of the clutch and at its opposite end a pinion 20 positioned between the sills 2 and 4. The tight member 17 of the clutch is thrown into and out of operation with the loose member 19 by means of a lever 21, suitably fulcrumed, to which is connected by any suitable means, such as a link 22, a rocking arm 23 on a longitudinal shaft 24 provided at its outer end with an operating lever 25 by which clutching engagement between the members of the clutch is produced or terminated. From this it will be seen that when the members of the clutch are in operative engagement with each other the pinion 20 revolves with the shaft 14. Revolubly mounted in suitable boxes 26 and 27 respectively sustained on the sills 2 and 4 is a transverse shaft 28 on which is fixedly secured a spur gear 29 arranged to intermesh with the pinion 20 and receive motion thereby. On the outer end of

the shaft 28 is crank arm 78 arranged to revolve therewith. The outer end of the crank arm 78 bears a laterally-projecting pin 30 to receive one end of a connecting rod 31 the other end of which receives a pin 32 laterally projecting from the free end of a crank arm 33 fixedly secured on the projecting end of a shaft 34. This shaft 34 is mounted in suitable boxes 35 and 36, the journal box 35 being mounted on the sill 2 and the box 36 on a parallel sill 37 one end of which is supported by the cross sill 3. The shaft 34 also bears a crank arm 38 provided near its outer end with a pin 39 on which is freely mounted a spudding sheave 40. Mounted on the transverse sill 3 is a cable guide 41 preferably arranged in alinement with the spudding sheave 40 and constituting means for properly directing the cable to and around the lower portions of the spudding sheave 40. On the sills 1 and 4 are a pair of journal boxes 42 and 43, revolubly mounted in which is a shaft 44 bearing intermediate the sills 1 and 4 a cable reel 45 provided with side flanges 46 and 47. Fixedly secured to the flange 47 is a large friction wheel 48. Mounted on the shaft 14 is a friction driving pulley 49 adapted to frictionally engage the periphery of the friction disk 48. The shaft 44 where it passes through the box 42 is provided with an eccentric sleeve 50 to which is secured an arm 51 to the outer end of which is connected a suitably supported rod 52 provided at its free end with a manipulating handle 53. The object of mounting the end of shaft 44 in the eccentric sleeve 50 is to provide means whereby the friction disk 48 may be moved toward and away from the friction driving pulley 49 which is accomplished by the manipulation of the rod 52 which if moved toward the forward portion of the machine will cause the friction disk 48 to engage the periphery of the driving pulley 49 and cause simultaneous revolution of the cable reel 45 with the driving shaft 14. Fixedly secured to a transverse sill 56 extending between the sills 1 and 2 and immediately under the cab or box 5 is a hanger 57 in which is pivotally mounted a rocking arm 58 carrying at its upper end a brake shoe 59 so positioned that when the friction disk 48 is thrown away from the driving pulley 49 it will engage the shoe 59 and be held against revolution thereby. Pivotally attached to the lower end of the rocking arm 58 is an arm 60 connected at its opposite end to the free end of a rocking arm 61 fixedly mounted on a transverse shaft 62 suitably supported below the frame of the machine and arranged to be rocked by means of a lever 63. The transverse shaft 62 also bears a second rocking arm 64 to which is pivotally connected a link 65 bearing an idler roller 66 positioned approximately between the friction disk 48 and driving pulley 49.

The operation of this last described mechanism is as follows:—When the lever 63 is in the position shown in the drawings, the weight of the same on the shaft 62 will lock the rocking arm 58 against unintentional movement, thereby fixedly holding the brake shoe in a position to receive and operatively engage the periphery of the friction disk 48 when moved against it by means of the arm 51. When the lever 51 is thrown in the opposite direction the disk 48 will engage the driving pulley 49 and revolve in unison therewith but in an opposite direction. If it is desired to reverse the friction disk 48 and cable reel 45, the lever 51 is thrown into such a position as to separate the friction disk 48 from the driving pulley 49 and into engagement with the brake shoe 59 which securely and temporarily holds the cable reel against movement. The lever 63 is then raised which moves the rocking arm 61 causing the connecting rod 60 to move the lower end of the rocking arm 58 sufficiently to remove the brake shoe 59 from frictional engagement with the periphery of the friction disk 48. The movement of the lever 63 also moves the rocking arm 64 in the same direction causing it to force upwardly the link 65 which bears the idler 66 forcing the latter into frictional engagement with the peripheries of the friction disks 48 and 49, and acting as an interposed gear causes the revolution of the friction disk 48 and cable reel 45 in unison with the driving pulley 49 and in the same direction therewith, the friction disk 48 being free from the restraining influence of the brake shoe 59 as has already been described, thereby causing the lever 63 to perform the two-fold functions of releasing the brake on the friction disk 48 and simultaneously interposing an idler between it and the periphery of its driving member 49. Mounted in a journal box 67 on the under face of the sill 1 and also in a suitable box on the under face of the sill 4 is a rotatable shaft 68 bearing between the sills 1 and 4 a sand pump line reel 69 having secured to one of the flanges thereof a friction disk 70. The shaft 68 where it passes through the box 67 is provided with an eccentric sleeve 71 having attached thereto a lever 72 operated by means of a suitably supported rod 73. Surrounding the friction disk 70 is a fixed semi-circular band 74 acting as a brake by engaging the periphery of the friction disk 70. By manipulating the operating rod 73 the friction disk 70 may be moved into frictional engagement with the driving pulley 49, or when moved in the opposite direction into braking relation with the semi-circular band 74 so that the sand pump line 75 which

is wound on the reel 69 may be wound up by moving the disk 70 into operative engagement with the driving pulley 49, or the line may be permitted to unwind and be controlled in its unwinding by moving it into engagement with the braking member 74.

Mounted on the forward portion of the frame of the device is a jointed derrick, the lower portion of which comprises a pair of upwardly-extending forwardly-inclined posts 80, 80, supported on the forward ends of the sills 1 and 2 and held from movement by means of braces 81, 81. The posts 80 are held in proper relation to each other by means of cross bars 82 and oblique braces 83. Hinged to the upper end of the posts 80 by means of the members 84 is the second or upper section of the derrick consisting of upwardly-extending inwardly-converging members 76, 76, united by suitable cross bars 85 and supporting on its upper end pulleys (not shown) for the reception of the sand pump line 75 and the spudding cable 77. The upper section of the derrick is strengthened to resist the shock of the operation of the machine by two inclined braces 86. Extending between the forward ends of the sills 1 and 2 is a winch 87 around which a wire cable 88 is wound. Secured to the cross bars 85 of the upper section of the derrick by means of holdfast devices 90 is a lever 89, to the lower end of which the cable 88 is attached for bringing the upper section of the derrick to an upright position. When the machine is being conveyed from place to place the cable 88 is released from the lower end of the lever 89 and the upper section of the derrick is swung on its pivots 84 backwardly so as to rest on the top of the cab 5, the braces 86, 86, being removed to permit this operation. When the derrick is to be raised the cable 88 is attached to the lower end of the lever 89 and the winch 87 operated which draws the lower end of the lever 89 downward thereby raising the upper section of the derrick to an upright position, as shown in the drawings. The braces 86, 86, are then adjusted and the machine is ready for use.

In order to support the forward ends of the sills 1 and 2, I provide a pair of depending posts 91 under which suitable blocks or jack screws may be inserted to raise the machine sufficiently to remove the shock incident to the operation of the machine from the running gear of the device.

The operation of this device is as follows:—The engine or motor 6 being started, the driving shaft 40 is revolved thereby at any suitable or desired speed and it may be stated that the engine 6, pulleys 11 and 13 and shaft 14 can or will be constantly kept running. If it is desired to perform the operation of spudding, suitable tools are attached to the spudding cable 77 and lowered into the well. The handle 53 is then manipulated so as to throw the friction disk 48 into engagement with the brake shoe 59 thereby holding the spudding cable reel 45 against revolution. The fixed member of the clutch on the shaft 14 is then thrown into clutching relation with the loose member causing the pinion 20 to revolve the spur gear 29 and simultaneously therewith the crank arm 78. The motion of the crank arm 78 is communicated to the crank arm 33 by means of the connecting rod 31 which causes the spudding sheave 40 to oscillate in unison with the arm 38. The oscillation of the spudding sheave 40 causes the spudding cable 77 to perform its function of raising and dropping the tool in the well. When it is desired to raise the tool from the well, either for the purpose of renewing the same or for pumping out the comminuted particles produced by the operation of the tool, the lever 63 is raised which releases the friction disk 48 from the restraining influence of the brake shoe 59 and also interposes the idler roller 66 between the constantly revolving driving pulley 49 and the friction disk 48, causing the latter to revolve and wind up the spudding cable, thus raising the tool from the well. The sand pump is then inserted in the well and the friction disk 70 on the shaft 68 which carries the sand-pump-line-reel 69 is then released sufficiently from the braking member 74 by means of the operating lever 73 to permit the sand pump to be lowered to the bottom of the well from which it is raised by moving the disk 70 out of braking relation with the member 74 and into frictional engagement with the periphery of the driving member 49 which causes the reel 79 to rapidly wind up the sand-pump-line thereon, thereby raising the pump itself from the well. From the foregoing it will be seen that the mechanism described may be successfully operated and all the functions of the machine performed perfectly without either stopping the motion of the engine or reversing the same, an object not heretofore accomplished; in fact, substantially all engines used on well drilling machines are of the reversible type which is rendered necessary by virtue of the peculiar mechanism heretofore applied in devices of this character. From this it will be seen that a light internal explosive engine or motor may be employed which is only capable of running in one direction and whose operation is more perfect where it is not stopped for any reason and yet the manipulation of the device accomplished successfully while the motion of the engine is constant and in one direction.

What I claim and desire to secure by Letters Patent, is:—

1. A well drilling machine comprising a supporting frame, a power-generating in-

strumentality mounted on said frame arranged to run continuously during the operation of the machine, a rotatable shaft receiving continuous motion from said instrumentality, a clutch on said shaft, a gear connected with one member of said clutch, a second shaft mounted on said frame, a gear on said second shaft intermeshing with said first gear, a crank arm carried by said second shaft, a third shaft mounted on said frame, a spudding sheave supported to permit oscillatory movement thereof by said third shaft, means for connecting said crank-arm with said third shaft whereby motion is communicated thereto and means for moving the members of said clutch into and out of engaging relation, whereby the movement of said spudding sheave may be controlled irrespective of the operation of said power-generating instrumentality.

2. A well drilling machine comprising a supporting frame, a power generating instrumentality mounted on said frame arranged to run continuously during the operation of the machine, a revoluble shaft receiving continuous motion from said instrumentality, a driving disk on said shaft, a cable reel suitably mounted on said frame, a friction disk carried by said cable reel, means for moving said friction disk into frictional engagement with said driving disk, a brake positioned to engage said friction disk when said disk is moved away from engagement with said driving disk, mechanism for moving said brake out of contacting relation with said friction disk, an idler roller carried by said braking mechanism, and means adapted to simultaneously move said braking member out of engagement with said friction disk and said idler roller into frictional engagement with said disk and with said driving disk, whereby the motion of said friction disk and cable reel is reversed by the interposition of said idler roller simultaneously with the release of said brake from braking relation with said disk.

3. A well drilling machine comprising a supporting frame, a power generating instrumentality mounted on said frame arranged to run continuously during the operation of the machine, a revoluble shaft receiving continuous motion from said instrumentality, a driving disk on said shaft, a suitably-mounted cable reel provided with a friction disk, a brake positioned to engage said friction disk when out of contact with said driving disk, means for throwing said friction disk from engagement with said driving disk and into braking relation with said brake, an idler roller positioned between said driving disk and said friction disk, mechanism for simultaneously withdrawing said braking member from engagement with said friction disk and moving said roller into frictional engagement with the peripheries of said driving and friction disks whereby said friction disk and cable reel may receive motion directly from said driving disk or through said interposed idler roller, as desired.

4. A well drilling machine comprising a supporting frame, a power generating instrumentality mounted on said frame arranged to run continuously during the operating of the machine, a revoluble shaft receiving continuous motion from said instrumentality, a driving disk on said shaft, a suitably-mounted cable reel provided with a friction disk, means to throw said friction disk into and out of engagement with said driving disk, a brake to engage said friction disk when out of engagement with said driving disk, mechanism for moving said brake from said friction disk, a roller carried by said mechanism arranged to be interposed between said driving disk and said friction disk when said brake is removed from said friction disk, a sand-pump-line-cable suitably mounted on said frame, a friction disk carried by said last named reel, means to move said last-named disk into and out of engagement with said driving disk, and a brake to engage said sand-pump-line-cable-disk when out of engagement with said driving disk.

5. The combination in a well drilling machine, of a supporting frame, a power generating instrumentality mounted on said frame arranged to run continuously during the operation of the machine, a revoluble shaft receiving continuous motion from said instrumentality, a spudding arm mounted on said frame, means for connecting said spudding arm with said shaft, clutching mechanism interposed in said connecting means, a cable reel mounted on said frame, means for communicating motion from said revoluble shaft to said cable reel, braking mechanism arranged to lock said cable reel against revolution when not operated by said revoluble shaft, a reversing element means carried by said braking mechanism for interposing said reversing element between said revoluble shaft and said cable reel, a sand-pump-line-reel mounted on said frame, means for communicating motion from said revoluble shaft thereto, and braking mechanism for locking said last named reel when disconnected from said shaft.

6. The combination in a well drilling machine, of a supporting frame, a power-generating instrumentality arranged to run continuously during the operation of the machine, a rotatable shaft receiving continuous motion from said instrumentality, a clutch embodying two members one of which is rotated by said shaft, means for moving the members of said clutch into and out of clutching relation, a rotatable ele-

ment engaging one of the members of said clutch and receiving motion therefrom, a crank-arm carried by said rotary element, a spudding sheave suitably supported for oscillatory movement, means for transmitting motion from said crank-arm to said spudding sheave whereby the movement communicated by said clutch to said rotary element is transmitted to said spudding sheave, the movement of said sheave being interrupted by the disengagement of said clutch members irrespective of the operation of said power generating instrumentality.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WILLIAM C. STEVENS.

Witnesses:

C. E. HUMPHREY,

GLENARA FOX.