No. 780,368. PATENTED JAN. 17, 1905.

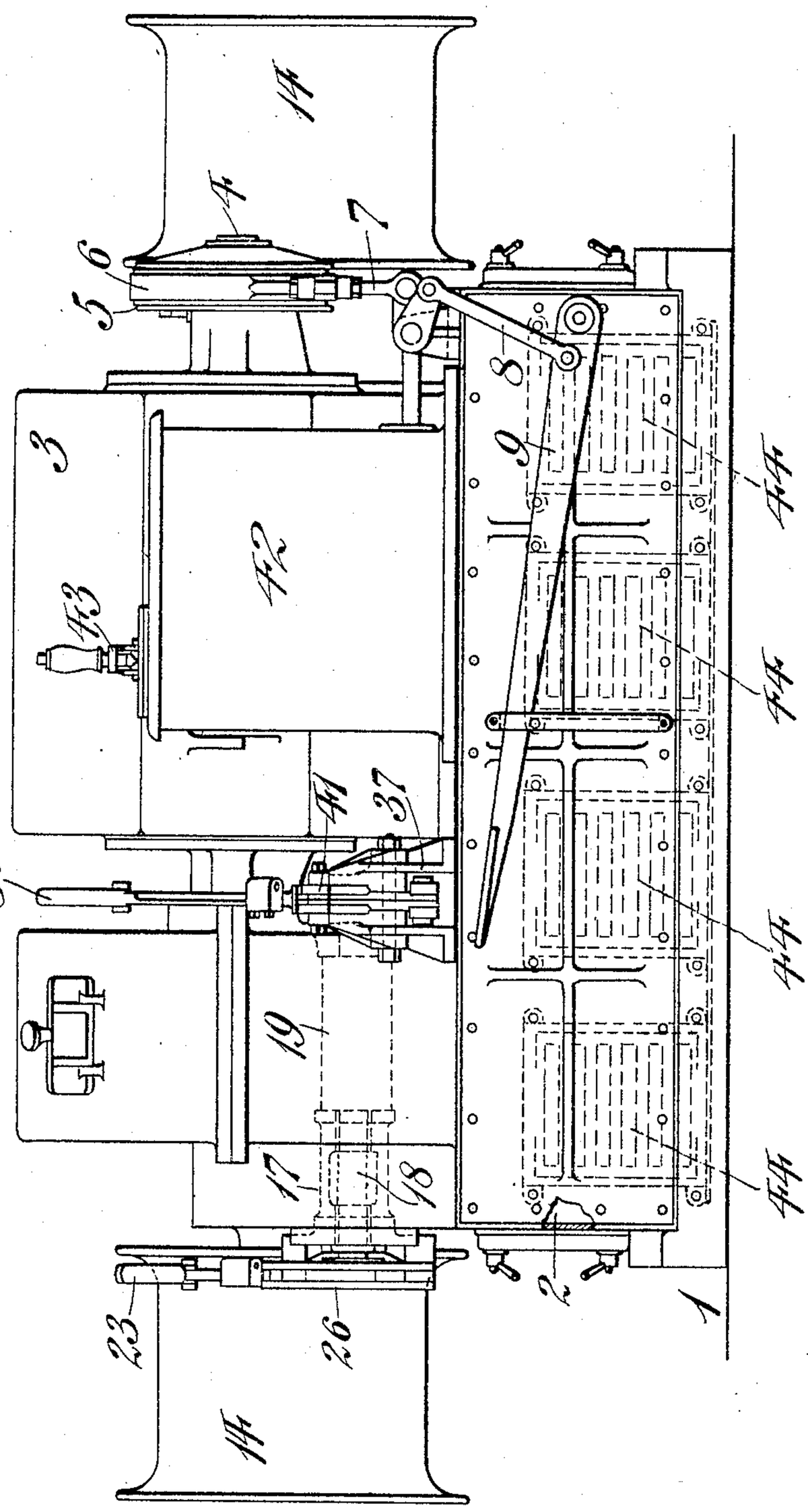
J. F. METTEN.

WINCH.

APPLICATION FILED JUNE 6, 1904.

6 SHEETS—SHEET 1.

Fig. 1.



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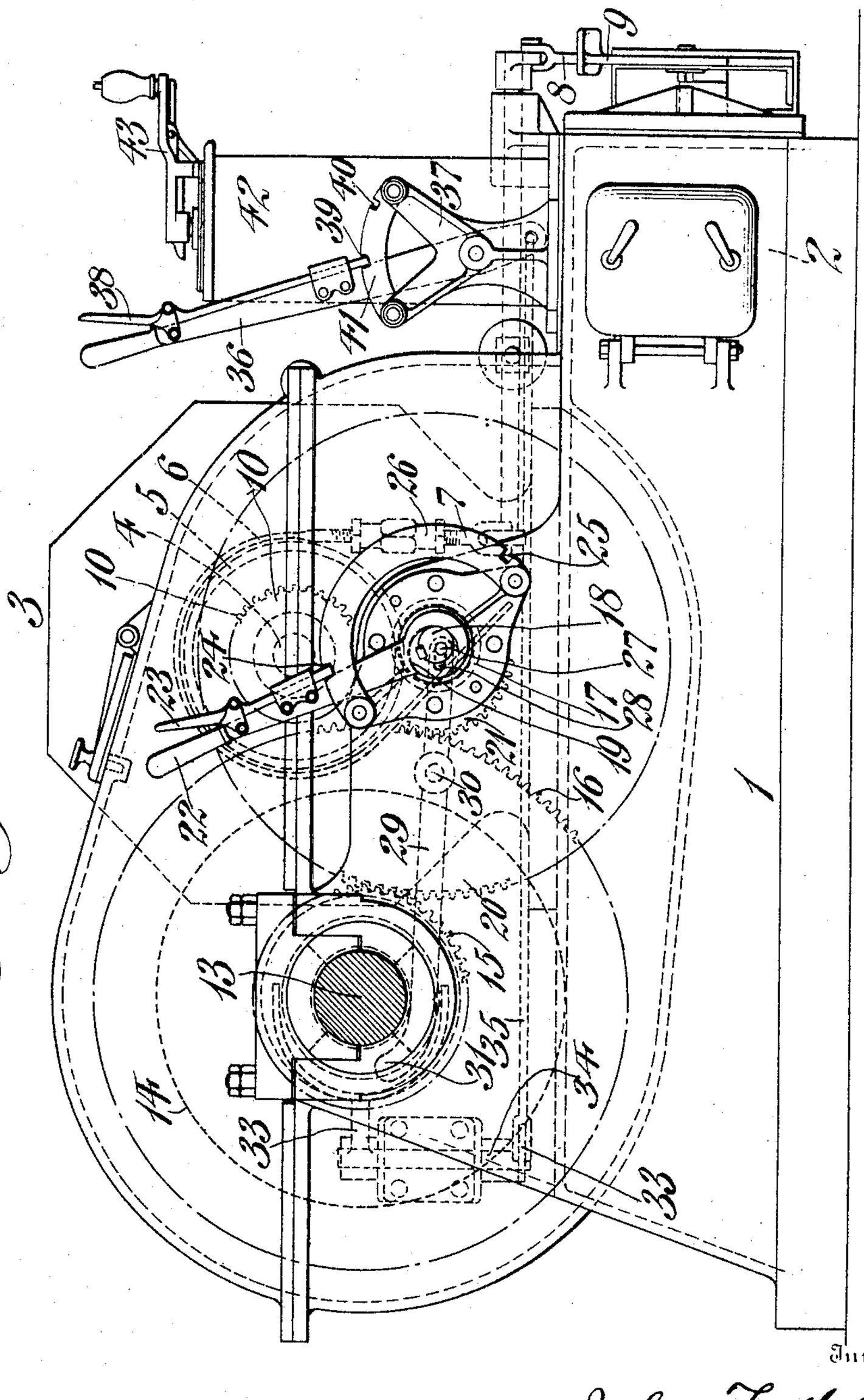
5 SHEETS—SHEET 2.

Fig. 2.



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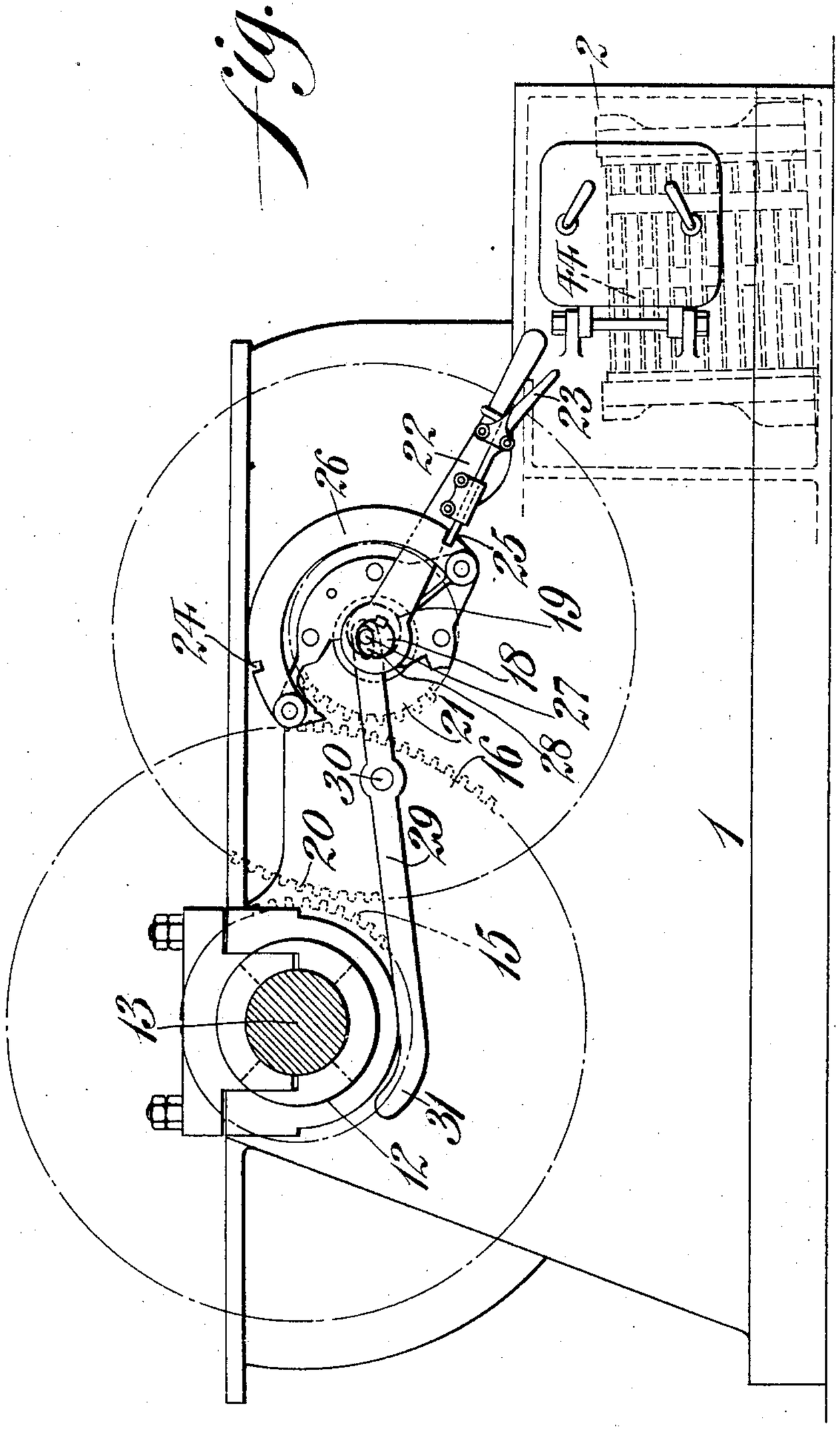
5 SHEETS—SHEET 3.

Fig. 3.



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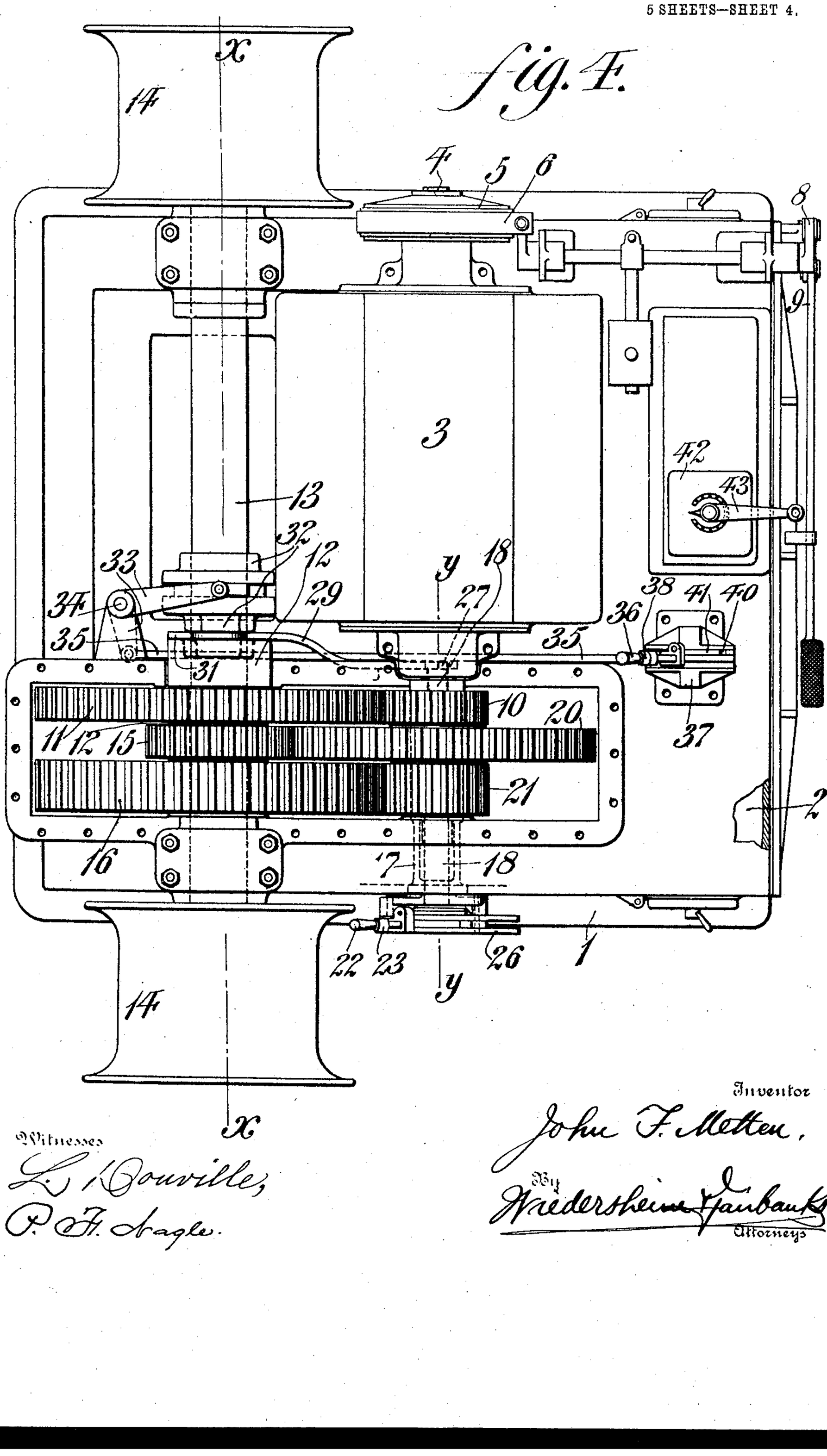
5 SHEETS—SHEET 4.

Fig. 4.



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5 SHEETS—SHEET 5.

Fig. 5.

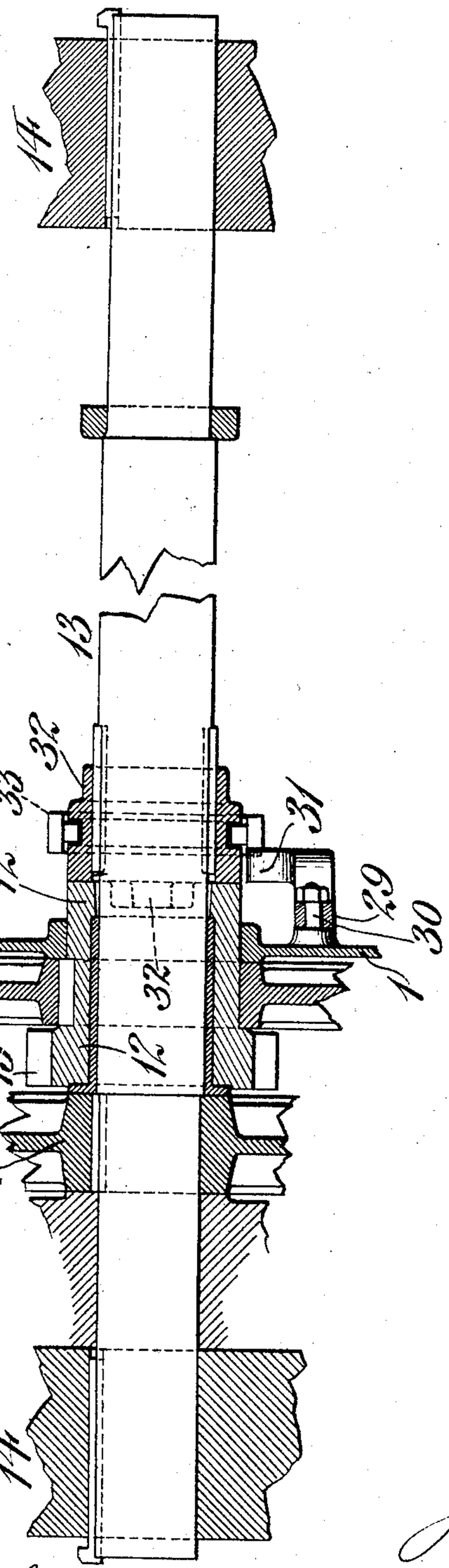

Fig. 6.

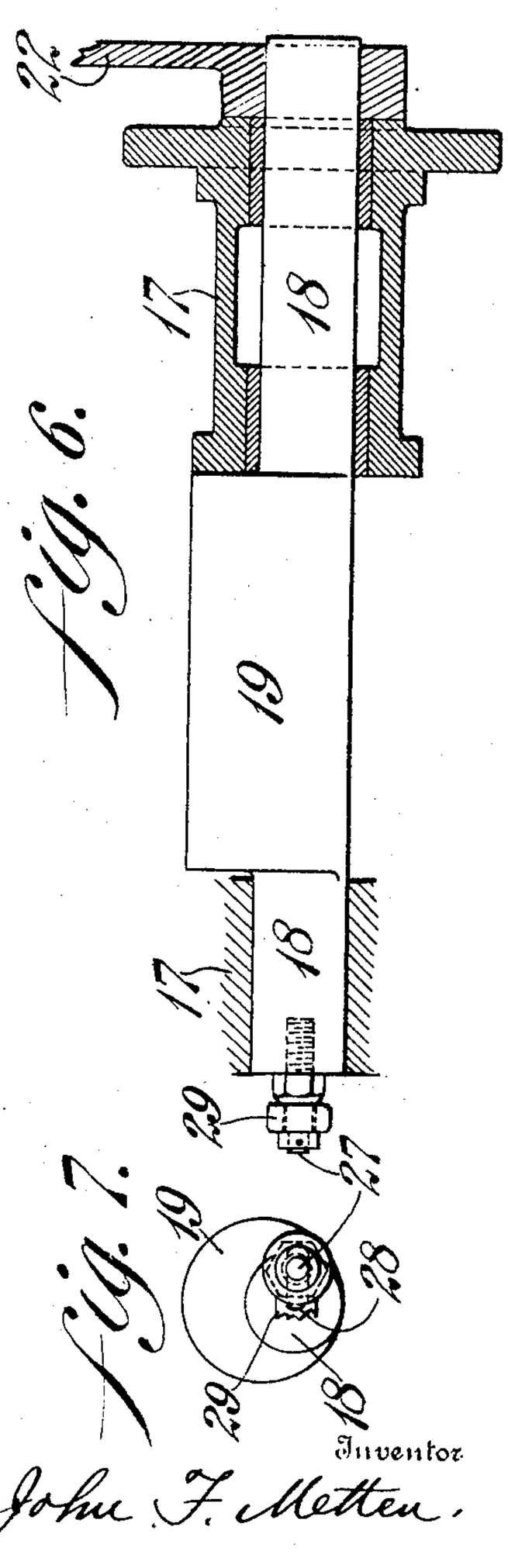

Fig. 7.

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No. 780,368. Patented January 17, 1905.

UNITED STATES PATENT OFFICE.

JOHN F. METTEN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE WILLIAM CRAMP & SONS SHIP AND ENGINE BUILDING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

WINCH.

SPECIFICATION forming part of Letters Patent No. 780,368, dated January 17, 1905.

Application filed June 6, 1904. Serial No. 211,229.

To all whom it may concern:

Be it known that I, JOHN F. METTEN, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a Novel Construction of Winches, of which the following is a specification.

My invention relates to winches, and particularly to those provided with a connected motor.

It consists in providing an improved variable-speed gear between the motor and the winch-drums and in providing safety devices by which any interlocking of the gear that would endanger the motor or its connections is prevented.

It further consists of novel features of construction, all as will be hereinafter fully set forth.

Figure 1 represents in end elevation a winch embodying my invention, Figs. 2 and 3 are side elevations of the same, and Fig. 4 is a plan view, parts of these three views being removed for clearness of illustration. Fig. 5 represents, on an enlarged scale, a fragmentary section through line *x x*, Fig. 4. Fig. 6 is a similar view through the line *y y* of that figure. Figs. 7 and 8 are respectively left and right elevations of the shaft shown in Fig. 6.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings, 1 designates the base or frame of a hoisting device or winch in the lower part of which may be provided a casing 2 for a resistance-box. Mounted on the frame 1 is a motor 3, having a projecting shaft 4, on one end of which is mounted a pulley 5, adapted to coöperate with a friction-band 6, connected, by means of suitable links 7 and 8, to a foot-lever 9. At the other end of the shaft 4 is a pinion 10, which meshes with a gear-wheel 11, secured by a spline or otherwise to a collar 12, rotatable on the shaft 13, at each end of which shaft is mounted a winch-drum 14. Also secured on the collar 12, adjacent the gear-wheel 11, is the pinion 15, adjacent which is a gear-wheel 16, secured to rotate with the shaft 13. Mounted to rotate in a bearing 17 in the frame 1 is a shaft 18, shown as having an eccentrically-extending portion 19, on which freely rotate the gear-wheel 20 and the pinion 21, which may be integral with or secured to each other. It will be understood that the construction of gearing operable in place of or with the clutch constitutes a system of back gearing and direct gearing, respectively providing for a change of speed.

At the outer end of the shaft 18 is a lever 22, by which the shaft may be rocked. As shown in Fig. 2, it is provided with the usual locking device 23, engaging in notches 24 25 in an arc-shaped rack 26. From the inner end of the shaft 18 projects a pin 27, engaging in a notch 28 of a lever 29, pivoted at 30 in the frame 1. The free end of the lever 29 is preferably curved upward, as shown at 31, and is adapted to be moved toward and from the shaft 13 for a purpose which will hereinafter appear. Mounted on the shaft 13 is a collar 32, adapted to enter into and engage with the collar 12, the two forming when engaged a jaw-clutch by which the gear-wheel 11 and pinion 15 are operatively connected to the shaft 13. The collar 32 is moved longitudinally on the shaft 13 by means of a bell-crank lever 33, shaft 34, and rod 35, which lead to a lever 36, pivoted in a bracket 37, secured on the frame 1. The lever 36 may have a locking device 38, engaging in notches 39 and 40 in the segmental rack 41, which forms part of the bracket 37. An ordinary controller 42, operated by a lever 43, is shown as mounted on the frame 1. It is of course unnecessary to show the connections of the controller and of the resistance-coils 44 with the motor 3, as these may be of any desired relation and form no part of the present invention.

The free end 31 of the lever 29 when inserted between the clutch members, as seen in Fig. 2, prevents movement of the clutch members. When the lever 29 is not thrown and the cluch members are brought into engagement, the space occupied by the free end 31 in Fig. 2 is occupied by the clutch members, and movement of lever 29 is checked at

this point, which checks the movement of the lever operating the back gearing, and hence prevents the insertion of the back gearing. One only of the two methods of connection—namely, direct and back gearing—may therefore be used at a time and accidental or even intentional connection of the other after one connection has been formed is prevented with manifest advantage in the protection of the machinery from accidental or intentional injury.

The operation is as follows: It is understood that when the current is turned on the motor 3, the pinion 10 on the motor-shaft, as well as the gear-wheel 11 and pinion 15 on the collar 12, will be continuously rotated. When the parts are in the position shown in Figs. 2 and 4 of the drawings, the rotation of the motor will be communicated through the pinion 10, gear-wheel 11, pinion 15, gear-wheel 20, and pinion 21 to the gear-wheel 16, which is keyed to the drum-shaft 13. In this case the drums 14 will be moved at a relatively low speed, due to the three reductions caused by the difference in number of teeth between the gear-wheels and the relatively small pinions. When the load on the winch is light or when for any reason it is desirable to rotate it at a higher speed, the lever 36 is thrown to the right of Fig. 2 of the drawings until the lock 38 engages in notch 40 on the rack 41. The effect of this is to cause jaws of the collar 32 to enter and engage the jaws in the collar 12, to which the gear-wheel 11 and pinion 15 are secured. It is obvious that to do this it is necessary to first remove the bar 29 from its proximity to the shaft 13, as in the position shown in Fig. 2 of the drawings. It prevents the entrance of the collar 32 into the collar 12. It is therefore necessary for the operator to first throw the lever 22 to the position shown in Fig. 3, so that its lock 23 engages with the notch 25 in the rack 26. The effect of this is to turn out the bar 29 as well as to rock the shaft 18, thereby releasing the gear-wheel 20 and the pinion 21 from their engagement with the pinion 15 and gear-wheel 16, respectively. The levers 23 and 36 having been thrown, as thus described, the rotation of the motor 3 is communicated to the shaft 13 by means of the pinion 10 and gear-wheel 11. In this case the pinion 15 and gear-wheel 16 rotate idly, while the gear-wheel 20 and pinion 21 are at rest. It is evident that the operation of these trains of gears is independent of the direction of motion of the motor, which may of course be provided with the usual reversing mechanism. I have shown the brake-band 6 as applied to a pulley 5, mounted on the motor-shaft 4; but it is obvious that a similar band may be mounted on any other rotating portion or that any other form of brake desired may be employed.

It is evident that various changes may be made by those skilled in the art which may come within the scope of my invention, and I do not, therefore, desire to be limited in every instance to the exact construction herein shown and described. It will be further apparent that the arrangement of the bearings for the shafts 13 and 18 is such that the boring or machining of the same can be readily effected without unnecessary handling of the parts. It will be further apparent that, if desired, the compound gearing can be omitted without departing from the spirit of my invention or that a single lever may be substituted for the two levers 22 and 36 shown.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A hoisting device comprising a motor, a pinion on the shaft of said motor, a drum-shaft, a drum or drums on said shaft, a gear-wheel free to rotate on said drum-shaft, a clutch adapted to connect said drum-shaft to said gear-wheel, a second gear-wheel fast on said drum-shaft, a train of gear intermediate said pinion and said fast gear-wheel, independent means for throwing said clutch and said train into and out of operative position, and means moving with one of said throwing means for preventing the operation of the other, whereby the simultaneous engagement of said clutch and said train is prevented.

2. A hoisting device comprising a motor, a pinion on the shaft of said motor, a drum-shaft, a drum on said shaft, a gear-wheel free to rotate on said drum-shaft, a clutch adapted to connect said drum-shaft to said gear-wheel, a second gear-wheel fast on said drum-shaft, a train of gear intermediate said pinion and said fast gear-wheel, a lever for throwing said clutch into and out of operation, a second lever for throwing said train into and out of engagement, and a bar moved by said second lever and operative to prevent the engagement of the members of said clutch when said train is in engagement.

3. A hoisting device comprising a motor, a pinion on the shaft of said motor, a drum-shaft, a drum on said shaft, a sleeve free to rotate on said shaft, a gear-wheel and a pinion fast on said sleeve, said gear-wheel being in mesh with the pinion on said motor, a clutch adapted to connect said drum-shaft with said sleeve, a gear-wheel fast on said drum-shaft, a rock-shaft parallel with said drum-shaft, a gear-wheel and a pinion secured to rotate together and mounted on said rock-shaft, said gear-wheel being adapted to mesh with the pinion on said drum-shaft and said pinion on the rock-shaft being adapted to mesh with the fast gear-wheel on said drum-shaft, and means for operating said clutch and for rocking said shaft whereby motion at different speeds may be communicated from said motor to said drum and whereby both the clutch and gearing cannot be engaged at the same time.

4. A hoisting device comprising a motor, a

pinion on the shaft of said motor, a drum-shaft, a drum on said shaft, a sleeve free to rotate on said shaft, a gear-wheel and a pinion fast on said sleeve, said gear-wheel being in mesh with the pinion on said motor, a clutch adapted to connect said drum-shaft with said sleeve, a gear-wheel fast on said drum-shaft, a rock-shaft parallel with said drum-shaft, a gear-wheel and a pinion secured to rotate together and mounted on said rock-shaft, said gear-wheel being adapted to mesh with the pinion on said drum-shaft and said pinion on the rock-shaft being adapted to mesh with the fast gear-wheel on said drum-shaft, manually-actuated means for throwing said clutch into and out of operation, independent manually-actuated means for rocking said shaft, and means movable with said shaft-rocking means for blocking the movement of said clutch.

5. A hoisting device comprising a motor, a pinion on the shaft of said motor, a drum-shaft, a drum on said shaft, a gear-wheel fast on said drum-shaft, a rock-shaft, a cylindric portion eccentric of said rock-shaft and gear-wheels on said cylindric portion operatively interposable between the pinion on the motor-shaft and said fast gear-wheel, whereby the rocking of said shaft acts to move said gear-wheels into and out of operative relation.

6. A hoisting device comprising a motor, a pinion on the shaft of said motor, a drum-shaft, a drum or drums on said shaft, a gear fast on said drum-shaft, a rock-shaft having an eccentric cylindric portion, a train of gear in part loosely mounted on said drum-shaft and in part loosely mounted on said cylindric portion, a wheel of said train mounted on said drum-shaft being in mesh with the pinion on the motor-shaft, a clutch for locking said wheel to the drum-shaft and manual means for throwing said rock-shaft, whereby motion is communicated from the pinion on said motor through said train of gear to the fast gear-wheel on the drum-shaft.

7. A hoisting device comprising a motor, a pinion on the shaft of said motor, a drum-shaft, a drum or drums on said shaft, a gear fast on said drum-shaft, a rock-shaft having an eccentric cylindric portion, a train of gear in part loosely mounted on said drum-shaft and in part loosely mounted on said cylindric portion, a wheel of said train mounted on said drum-shaft being in mesh with the pinion on the motor-shaft, a clutch for locking said wheel to the drum-shaft, manual means for throwing said rock-shaft, whereby motion is communicated from the pinion on said motor through said train of gear to the fast gear-wheel on the drum-shaft and means movable with said rock-shaft for preventing the engagement of said clutch when said train is in operative position.

8. A hoisting device comprising a motor, a pinion on the shaft of said motor, a drum-shaft, a drum or drums on said shaft, a gear fast on said drum-shaft, a rock-shaft having an eccentric cylindric portion, a train of gear in part loosely mounted on said drum-shaft and in part loosely mounted on said cylindric portion, a wheel of said train mounted on said drum-shaft being in mesh with the pinion on the motor-shaft, a clutch for locking said wheel to the drum-shaft, a lever for rotating said rock-shaft whereby motion is communicated from the pinion on said motor-shaft through said train of gear to the fast gear-wheel on the drum-shaft and means for locking said lever to retain said train of gear either in or out of operative position.

9. A hoisting device comprising a motor, a drum-shaft, gearing connecting said motor and said shaft, a water-tight casing forming a support for a portion of said hoisting device and inclosing said gearing on said shaft, said shaft extending out of said casing, a drum on said shaft exterior of said casing, manual controlling means also extending out of said casing, and a water-tight removable cover on said casing for access to said gearing.

10. In a hoisting device, a motor, a drum-shaft, direct and back gearing, each adapted to connect said motor and said drum-shaft, means for connecting each of said gearing operatively between said motor and said shaft and means moving with one said connecting means for preventing simultaneous connection of both the direct and back gearing.

11. In a drum hoisting device, a driving-shaft, a driven shaft, gearing and clutch mechanisms each adapted to connect the driving and driven shafts, and means for inserting said clutch in combination with means for inserting said gearing and rendering said clutch inoperative.

12. In a hoisting device the combination of a drive-shaft, a driven shaft, back gearing and clutch mechanisms adapted to connect said shaft and means for connecting said back gearing, and blocking said clutch.

13. In a hoisting mechanism, a driving-shaft, a driven shaft, longitudinally and angularly movable means respectively for connecting the two shafts, and a rock-shaft controlling the movement of the angularly-movable means and provided with an arm which coöperates with the longitudinally-movable means.

14. In a hoisting mechanism, a motor, a drum-shaft, gearing intermediate said motor and shaft and means movable longitudinally of said shaft for connecting said gearing therewith, in combination with means for simultaneously moving a portion of said gearing to connect said motor and shaft, and interposing a stop to said longitudinal movement.

15. In a hoisting mechanism, a motor, a drum-shaft, gearing and a clutch and gearing respectively for establishing connection between said motor and shaft, a lever and shaft

for moving said gearing into engagement and means movable with said shaft-checking movement of the clutch when the lever is thrown, and checking movement of the lever when the clutch is thrown.

16. In a hoisting mechanism, a motor, a drum-shaft, a plurality of means for connecting the drum and shaft at different relative speeds and angularly-movable means for preventing operation of each connecting means when any other connecting means has established connection.

17. In a hoisting-machine, a motor, a drum-shaft and a plurality of means for operatively connecting the same, each separately movable but each when connected blocking the connection of any other.

18. In a hoisting-machine, a motor, a drum-shaft, clutch and back gearing, means for connection between said motor and shaft and means for operating each of said connecting means and blocking the operation of the other.

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