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PATENT SPECIFICATION

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The Patents, Designs, and Trade Marks Act, 1911.

COMPLETE SPECIFICATION.

"Improvements in or relating to Wind Engines or Motors".

I, HAROLD CHRISTIAN EBBRIDGE, of 8, Mount Pleasant, Valentine Road, Kings Heath, Birmingham, in the County of Warwick, England, a British Subject, do hereby declare the nature of this invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:-

1.

47080

The present invention has relation to wind engines or motors and is primarily adapted or designed for operating water-lifting pumps whereby said pumps are caused to raise the water more efficiently, at all speeds of the wind wheel, than was heretofore the case. The present wind engine or motor is however, applicable for generating power for various purposes.

According to the present invention, the slidable pump-rod or slidable vertical power-shaft which is contained within the engine-supporting tower is adapted to slidingly co-operate with a circular or equivalent endless groove, channel, rib or element which is rigidly carried by the wind-wheel shaft in a plane at right angles thereto and in eccentric relation to said shaft in such a manner that upon the rotation of the wind-wheel shaft and consequent eccentric revolution of the endless groove, channel, rib, or other element, the upper extremity of the vertical power-shaft, or a part directly carried thereby in aligned extension directly engaging the eccentric groove or member, is caused to reciprocate in its longitude, and no lateral or other movement is imparted to the vertical power-shaft or the part carried thereby. In this manner a direct pull and thrust is always imparted to the power shaft. The power shaft conveniently reciprocates immediately beneath the horizontal wind wheel shaft and a circular disc or plate carried by that member in a plane at right angles to the shaft axis, is provided with a circular eccentric groove the periphery of which at

one point lies adjacent the horizontal shaft. With this construction it will be seen that the speed of the vertical shaft is varied during its upward and downward strokes when the wind wheel is rotating normally at a fixed speed and this is very desirable in connection with water pumping or lifting apparatus. When the eccentric groove is disposed in its lowest position beneath the wind wheel shaft the first or initial movement of the eccentric groove say through a quarter of a shaft revolution, imparts a quick or accelerated movement to the vertically sliding power shaft to immediately set the water bucket in operation. The next quarter of a revolution the vertical power shaft approaches the wind wheel shaft and the speed of the former shaft is decreased as the load is the greatest. This fast or accelerated initial upward movement of the vertical power shaft and slower or retarded final upward movement operating with a uniform wind wheel speed is desirable in all forms of water lifting pumps or apparatus.

The horizontal wind wheel shaft may have bearings in a somewhat rectangular open frame which is carried by a vertical hollow mast tube rotatably mounted in an upper part or turntable of the tower. In this invention a plain bearing is provided adjacent the upper extremity of the hollow mast tube and a ball-thrust bearing is accommodated in connection with or adjacent the lower extremity of the mast tube to absorb the downward thrust of the latter member. By arranging the ball-thrust bearing at the lower extremity of the mast tube as aforestated, said

bearing is readily accessible for adjustment or alteration purposes without interfering with the wind engine proper. The tail of the engine or motor adapted to trail in the wind and so cause the wind wheel to face the wind may be pivotally connected to the aforementioned frame carrying the wind wheel shaft and be controlled by spring provision in such a manner that on the wind wheel being moved by the wind slightly away from its normal position in relation to the tail, braking mechanism is set gently in action and upon said wind wheel being moved by a very strong wind into substantially parallel relation to the tail the braking mechanism is very vigorously applied to prevent the wrecking of the apparatus.

In order that this invention may be clearly understood and readily carried into practice, reference may be had to the appended explanatory sheet of drawings upon which:-

Figure 1 is a side elevation of a wind engine or motor constructed according to this invention illustrating fragments of the wind wheel and tail and the upper extremity of the tower carrying the engine or motor.

Figure 2 is a sectional elevation looking from the rear of the engine and taken on the line aa.

Figure 3 is a sectional elevation illustrating the wind wheel braking mechanism hereinafter described.

Figure 4 is a plan view of the engine or motor.

In a convenient embodiment of the present invention the wind wheel 1 is mounted upon a horizontal shaft 2 which is journalled in bearings 3 provided ins rectangular frame or structure 4 which is carried by the vertical hollow mast tube 5 rotatably mounted in the upper part of the tower 6. The rectangular frame 4 wherein the wind wheel shaft 2 is journalled involves two vertical parts 7 accommodating the wind wheel shaft bearings 3 and upper and lower connecting parts indicated by the numerals 4 and 8 the lower connecting part 8 being rigidly carried by the mast tube 5 through the medium of this bearing member 9. Rigidly mounted upon the wind wheel shaft 2 and within the rectangular frame 4, 7, 8, is a circular disc 10 capable of rotation within the frame and a circular groove or path 11 is cut or formed oppositely and symmetrically on each face of this disc. This circular groove or path 11 has one point in its periphery disposed adjacent the shaft 2 and the opposite point considerably removed therefrom as shewn in the Figure 2. Two vertical guides or channels 12 are employed and are disposed one at each side of the circular disc 10 in adjacency with and attached to the vertical parts 7 of the rectangular frame structure. The upper extremity of the power shaft 13 is provided with dual link members 14 the upper extremities of which link members 14 are provided with rollers 15 or ball bearings adapted to co-operate with the eccentric grooves 11 in the circular disc 10 and further roller 16 or ball bearings or parts on the links 14 are adapted to slidingly co-operate with the aforementioned vertical grooves or channels 12. The dual links 14 as afore-

stated are attached to the upper extremity of the vertical power shaft 13 and slidingly operate within the mast tube bearing part 9 and in the operation of the engine these links 14 and the shaft 13 always remain in vertical alignment and so a direct pull and thrust is imparted to said power shaft. The roller or ball bearings upon the dual links 14 co-operating with the eccentric grooves 11 cause the power shaft 13 to be reciprocated and as hereinbefore stated when the wind wheel 1 is rotated at a uniform s eed, the power shaft 13 in its upward stroke from the position shown in Figures 1 and 2 firstly has a quick or accelerated movement and afterwards a slower movement for the purpose aforestated. The power shaft 13 at some position along its length conveniently at 17 has a rotatable or swivel connection enabling one part of the shaft to rotate in relation to an adjacent part to permit of the swivelling of the wind wheel 1 through the medium of the mast tube bearings. The mast tube 5 as aforestated is of hollow construction and the dual links 14 are adapted to extend into the upper bearing part 9 on said mast tube and be connected with the power shaft 13 concentrically positioned within the mast tube. If desired a balance weight 18 may be provided on the circular disc 10 mounted upon the wind wheel shaft 2 and this balance weight may be of arc-shape or configuration extending along approximately one-third of the periphery of the disc conveniently that part of the disc opposed to the eccentric path or channel 11. The power shaft 13 is adapted to slidingly operate immediately beneath the wind wheel shaft 2 as aforestated, and with the present excentric circular

path 11 the power shaft can be arranged to give a speed or acceleration at the bottom of the stroke which is three times greater than that at the top of the stroke.

The tail 19 is pivotally mounted to the rectangular frame construction 4, 7, 8 at 20 and is normally held at right angles to the plane of the wind wheel 1 by a spring 21 (Figure 4) attached at its one extremity to the tail 19 and at its other extremity to an outwardly projecting arm 22 adapted to be fixedly attached to the connected frame 4, 7, 8 If the wind wheel 1 is moved by the wind angularly from its normal position in relation to the tail 19 a link and lever mechanism is set in operation by the relative movement of the tail in relation to the rectangular frame 4, 7, 8 to close a brake band 23 Figure 3 on to a drum 24 rigidly carried by the wind wheel. Conveniently one extremity of this brake band 23 is rigidly attached to a fixture 25 carried by the rectangular frame and the other extremity of the brake band 23 is controlled by inclined cam or like co-acting faces 26 and the arrangement is such that upon the wind wheel 1 assuming a position slightly removed from its normal position in relation to the tail 19 the brake 23 upon the wind wheel is slightly applied and upon said wind wheel being swung into parallel or substantially parallel with the tail 19 consequent upon a gale or very strong wind the band brake 23 is caused to very tightly grip the brake drum 24 to prevent the wrecking or over-running of the engine. The tail 19 is connected to the brake 23 through the medium of a small link 27 and further link and lever

mechanism, 28, 29, 30, 31, 32 the last mentioned member of which has the inclined face 26. The levers 28 and 30 are pivoted to the frame 4, 7, 8 and the link 27 is attached to a part of the tail extended beyond the tail pivot point 20. The tail 19 may be drawn or moved into a position in parallel or substantially parallel relation with the wind wheel 1 by means of a chain attached at 34 to the tail passing around pulleys 35 and thence into the mast tube 5 as shown in Figure 2, being attached to a collar 36 slidingly mounted upon said mast tube 5 and which collar is slidingly operated by suitable connection means 37, 38 from the bottom of the tower. By so moving the tail 19 into parallel relation to the wind wheel 1 the latter member is not presented facially to the wind and the aforementioned brake 23 is also effectively applied. The tail can be set in this manner when it is not desired to utilise the engine or motor. A ball thrust bearing may be mounted around the lower extremity of the mast tube 5 and in this position said bearing is very accessible.

The circular disc or like wheel 10 aforestated may if desired be employed for driving a dynamo mounted upon the upper part 4 of the rectangular frame or other suitable part by means of an endless band or said disc or wheel may be toothed around its periphery or otherwise constructed for driving said dynamo or for transmitting its power for other purposes. Suitable gearing may be incorporated between the wind wheel 1 and its shaft 2 whereby said wheel may run at a different speed to the shaft, conveniently a faster speed for heavy work.

With regard to the groove or path 11 the one half of same on a diametrical line passing through the spindle 2 is of semi-circular configuration to obtain the desired quick lift aforedescribed, but the remaining half of the groove or path may be of any desired configuration as the speed of the return or downward movements of the power shaft and similar movements of the pump bucket is of little importance. A complete circular groove or path is however found quite satisfactory for both the upward and downward movements of the power shaft.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:

1. A wind engine or motor having or including an element adapted to be rotated from or by the wind wheel and provided with an endless groove channel, rib or like element with which a part attached to or co-operating with the power shaft is adapted to slidingly co-operate, the said part being itself slidably mounted or guided substantially as herein set forth.

2. A wind engine or motor having or including a wheel disc or like device mounted upon the wind wheel shaft or a shaft driven therefrom, and endless cam groove, channel, rib or like element on said wheel disc or like device, a part or member slidable within or upon vertical guides immediately above the power shaft, and rollers, ball bearings

or like members provided upon the part or member adapted to slidably engage the endless cam groove, channel, rib or like element for the purpose set forth.

3. A wind engine or motor as set forth in either of the foregoing claims in which that part or section of the endless groove, rib or like element adapted to raise the slidable part during its rotation is of semi-circular formation and the return or opposite part or section is also preferably of similar formation to constitute a complete circle the centre of which is eccentric to the centre of the element carrying it.

4. A wind engine or motor as set forth in any of the foregoing claims including a rectangular frame mounted upon a mast tube rotatable within the upper part of the tower the said frame being adapted to accommodate the wheel disc or like device and from or carry the guides for the slidable part attached to the power shaft co-operating with said wheel disc or like device.

5. A wind engine or motor as set forth in any of the foregoing claims involving a wheel disc or like device such as 10 having an eccentric groove such as 11 the centre of the device 10 being disposed immediately above the power shaft centre for the purpose set forth.

6. A wind engine or motor as set forth in claim 4, in which the mast tube is provided with a ball thrust bearing adjacent to its lower extremity.

47080

7. A wind engine or motor as set forth in any of the foregoing claims braking means such as 23, 24 operated by the tail through the medium of the link and lever mechanism such as 27, 28, 29, 30, 31, 32 and 25.

8. The improved wind engine or motor substantially as herein set forth and illustrated.

Dated at Kellington this 5th day of December 1921

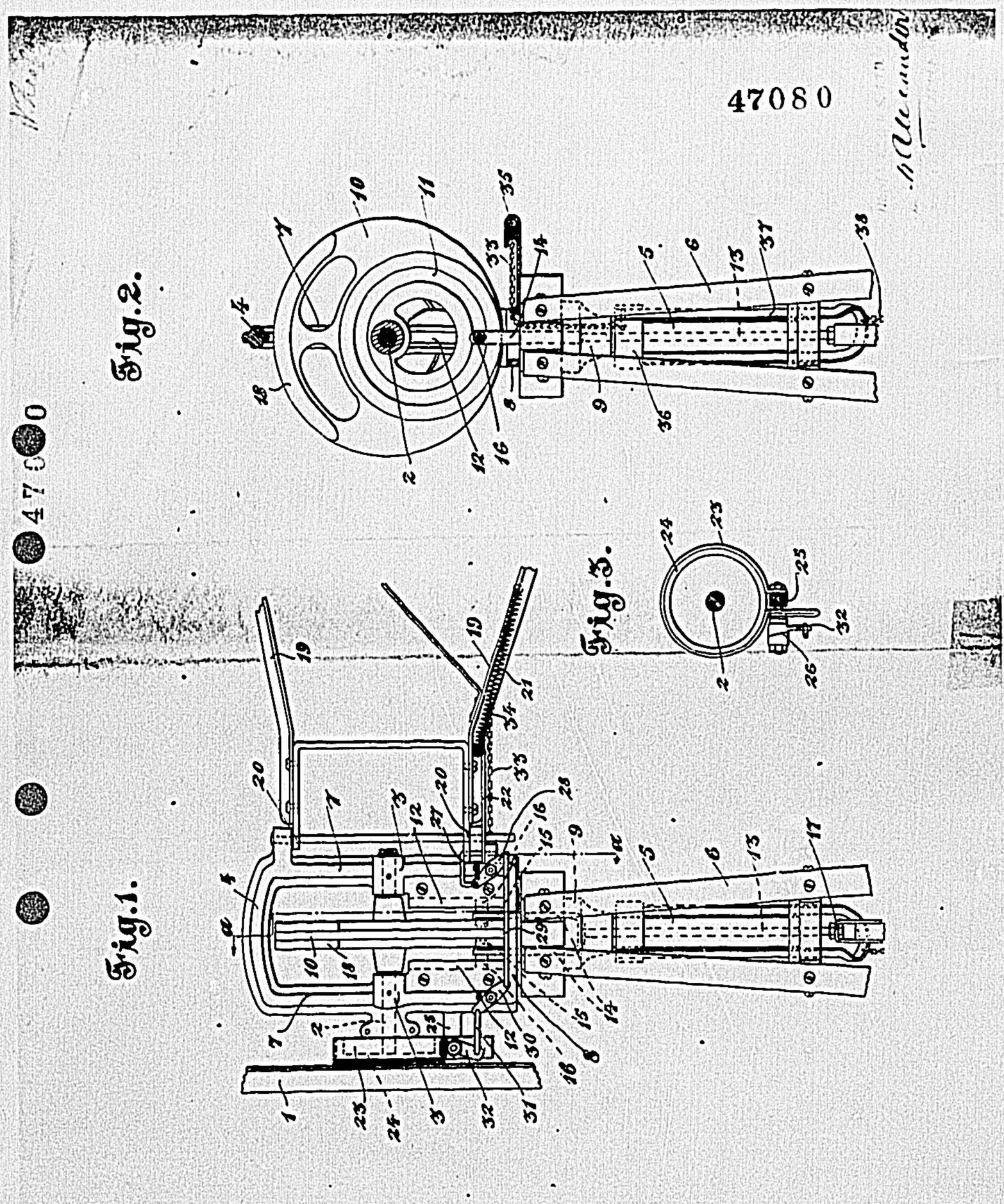
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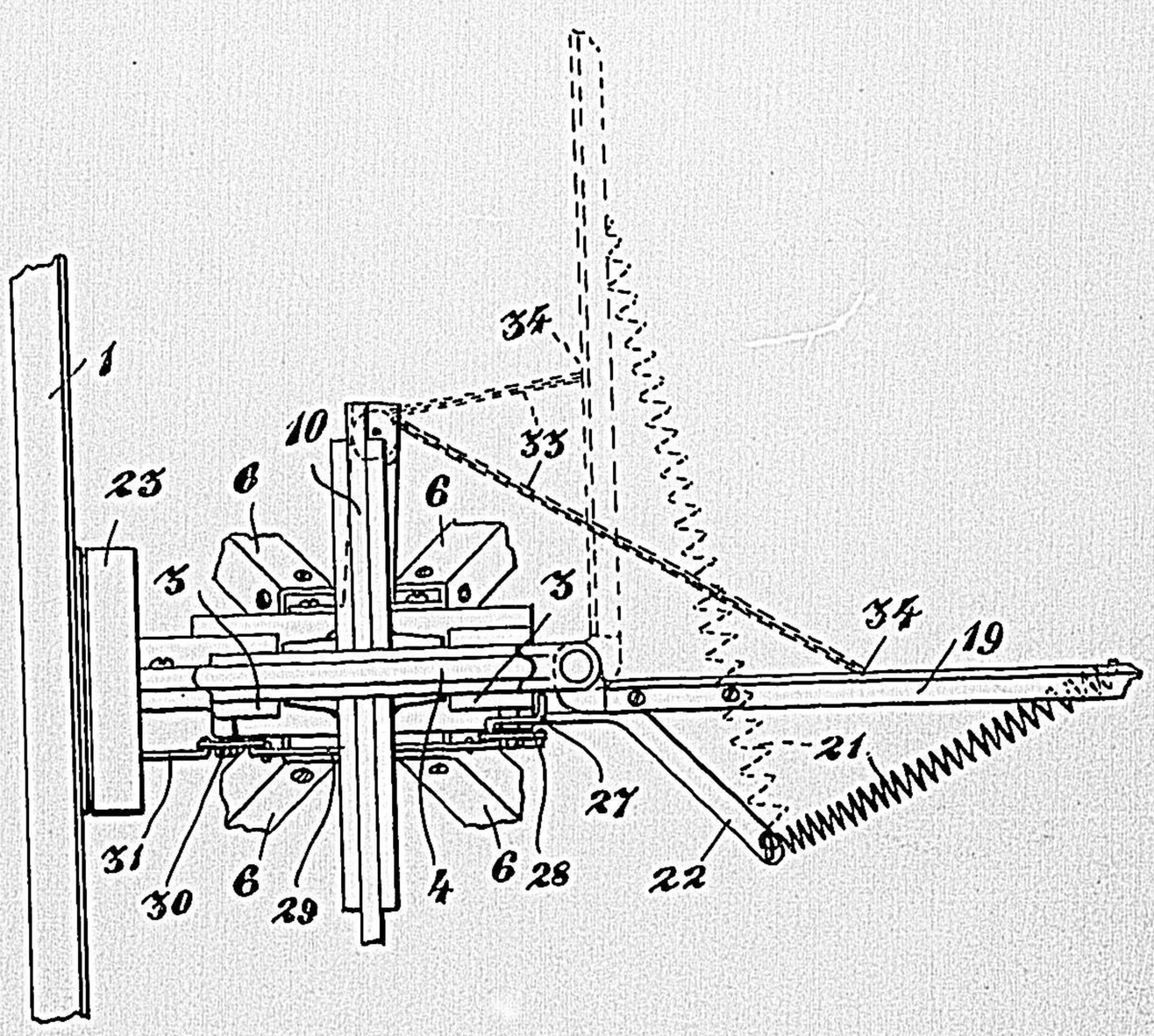
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NOTE: Owing to the original drawing being inconveniently large, this photostatic reduction has been prepared for insertion in this volume. The original drawing may be found in a special book in this room - see Notice.

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Fig. 4.



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