

No. 837,190.

PATENTED NOV. 27, 1906.

J. CAMPBELL.
HOISTING MACHINE.
APPLICATION FILED JAN. 14, 1905.

4 SHEETS—SHEET 1.

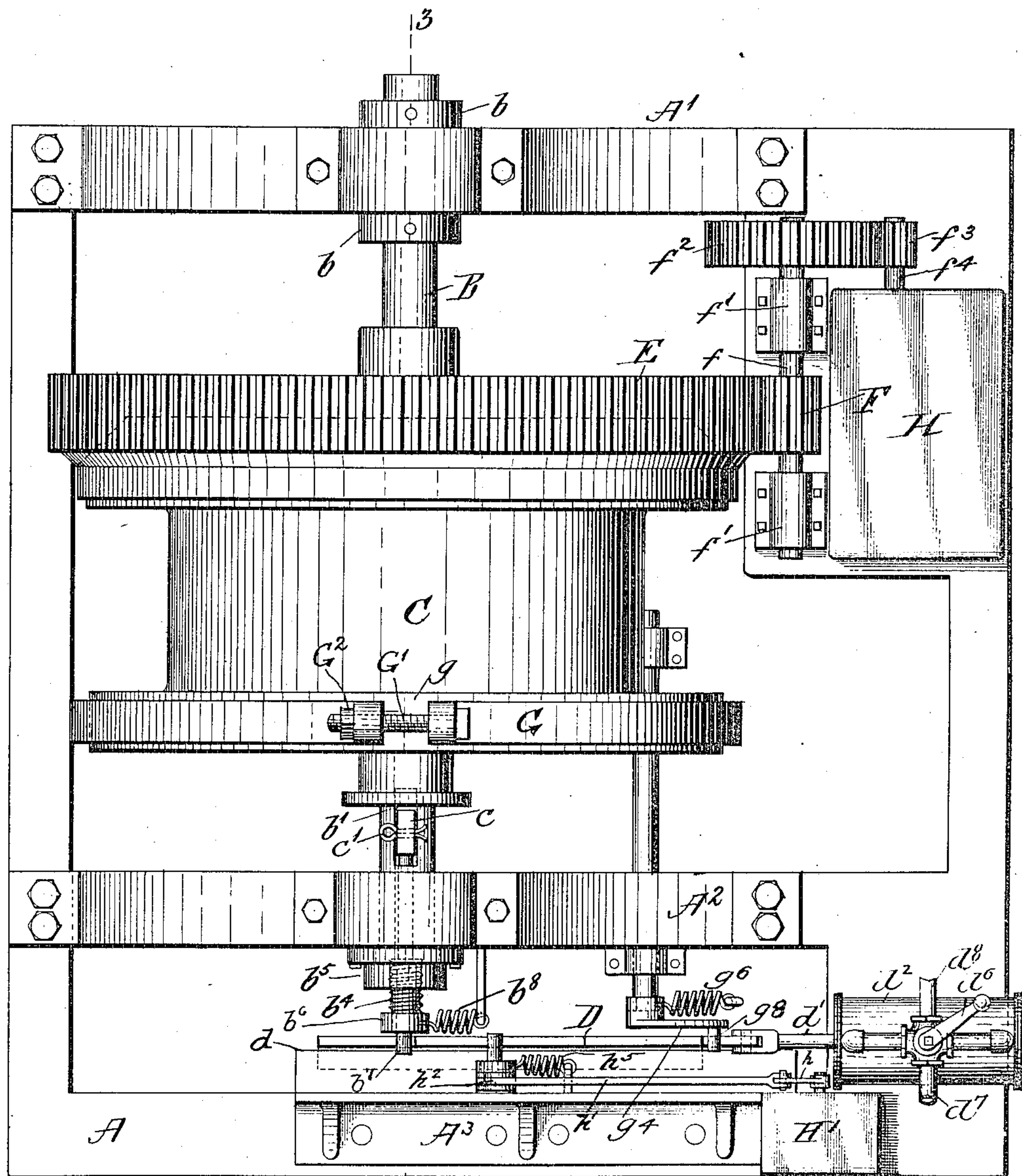


Fig. 1.

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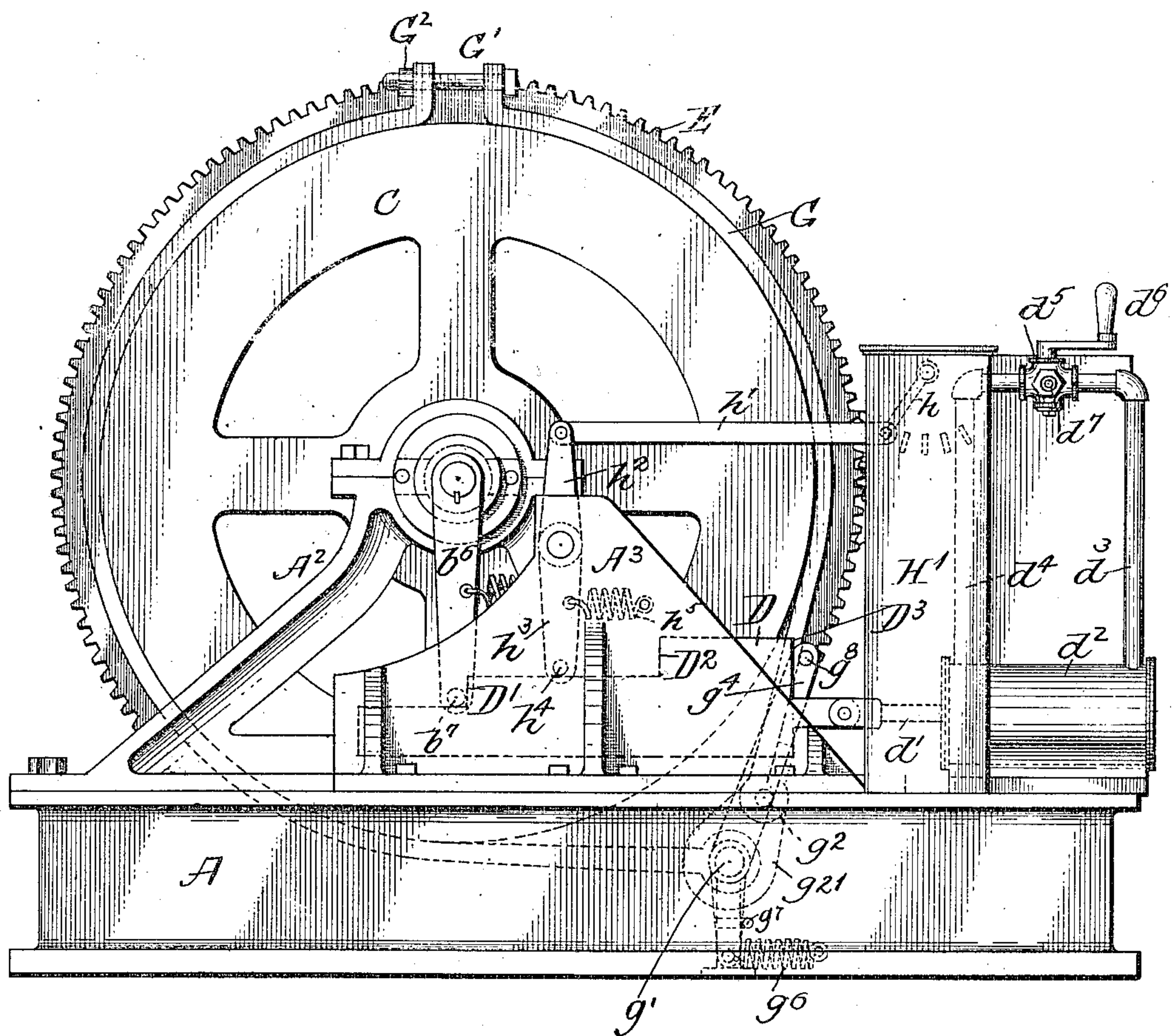


Fig. 2.

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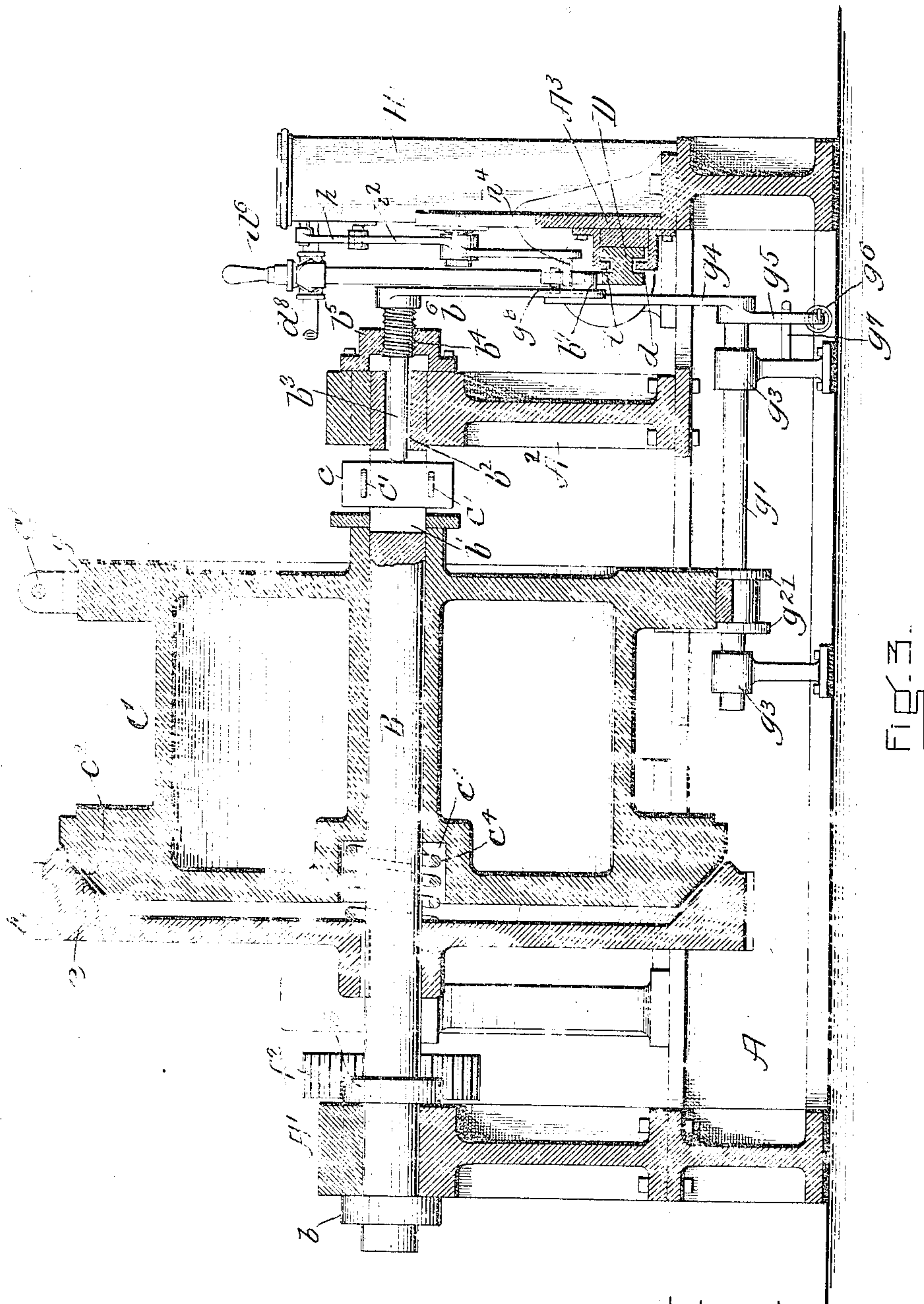
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4 SHEETS—SHEET 3.



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4 SHEETS—SHEET 4.

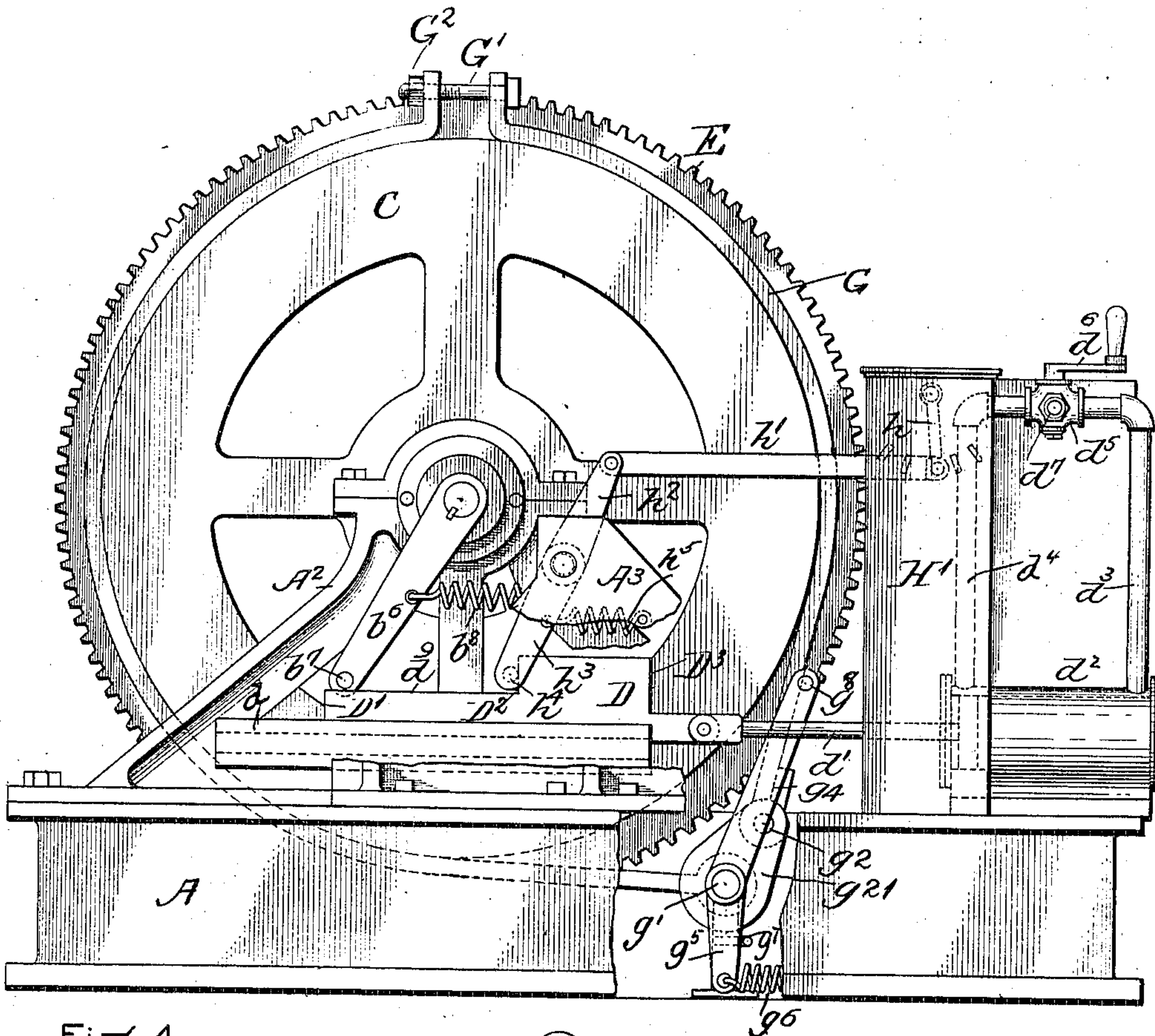


Fig. 4.

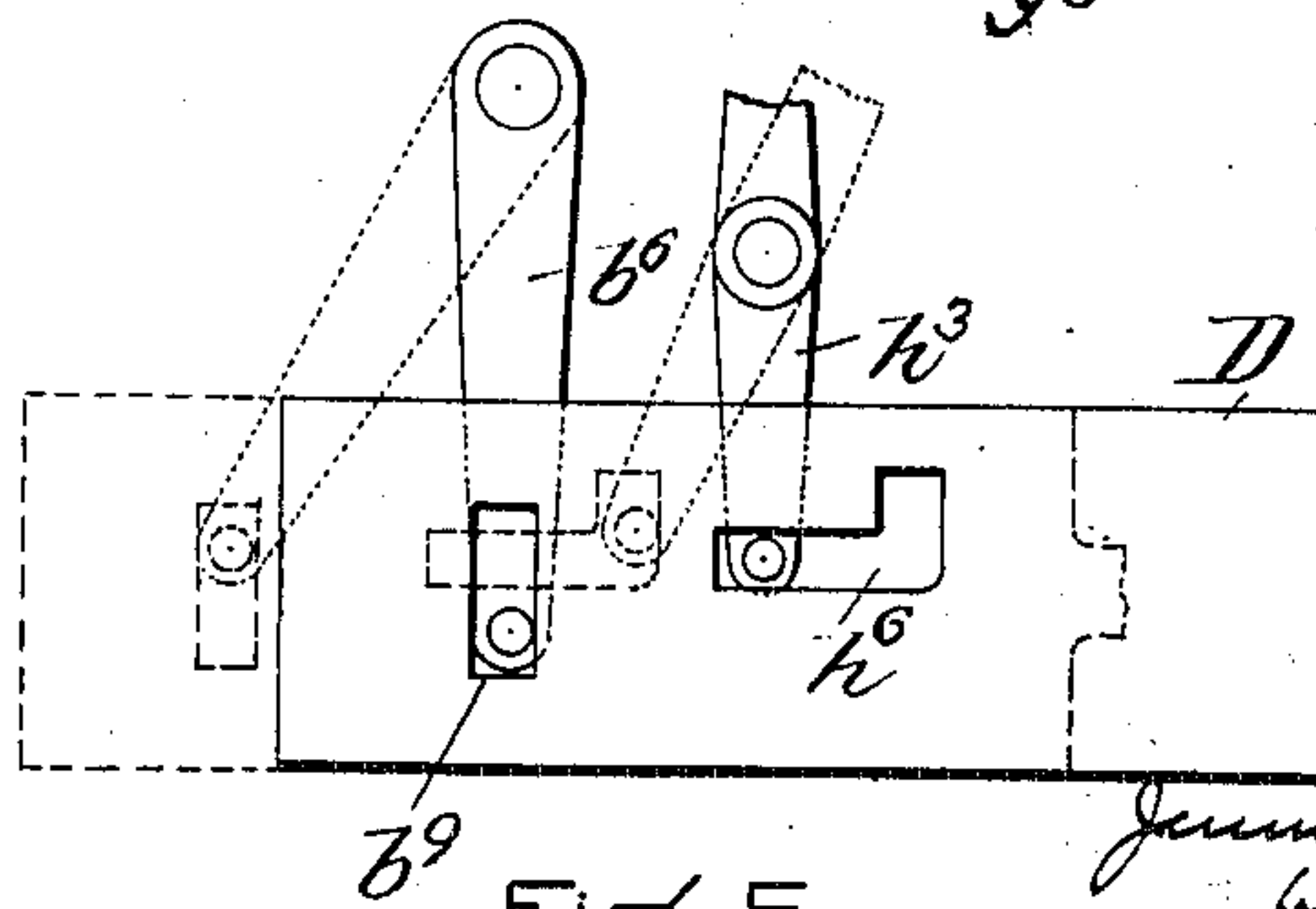


Fig. 5.

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UNITED STATES PATENT OFFICE.

JEREMIAH CAMPBELL, OF PROVIDENCE, RHODE ISLAND.

HOISTING-MACHINE.

No. 837,190.

Specification of Letters Patent.

Patented Nov. 27, 1906.

Application filed January 14, 1905. Serial No. 241,087.

To all whom it may concern:

Be it known that I, JEREMIAH CAMPBELL, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented a new and useful Improvement in Hoisting-Machines, of which the following is a specification.

My invention is primarily an improvement in starting and stopping mechanisms, but is especially adapted for use with hoisting-engines for steam-shovels. The requirements of a hoisting apparatus for such shovels are that the shovel may be easily started upward, may be held in any elevated position, or may be released and lowered under control of a brake, and it is also desirable that this mechanism shall be at all times under the easy control of a single operator. For this purpose I have shown means operated, preferably, by steam or compressed air, whereby not only is connection easily made between the driving member of a clutch and a source of power, but also between the driving and the driven members of a clutch, and at such time as the power has been released from the winding-drum the drum will be under brake control. These purposes are all fulfilled by the construction shown in the drawings forming a part of this specification, in which—

Figure 1 is a plan; Fig. 2, a side elevation of a device embodying my invention, Fig. 3 being a longitudinal section on line 3-3 of Fig. 1; and Fig. 4, a side elevation corresponding to Fig. 2, being in a different position from that of Fig. 2. Fig. 5 shows a detail of the slide.

A is the bed or frame on which the various parts are mounted, A' A² being supports furnishing bearings for the shaft B, on which the hoisting-drum and the power-gear are mounted, the two being provided with clutch-surfaces, as below described. The shaft B is provided with fixed collars b, one on each side of the bearing A', to prevent endwise motion of the shaft. At its farther end the shaft is slotted, as at b', and a block c is located within said slot to engage the end of the hoisting-drum C. This block c is held within the slot in the shaft by cotter-pins c'. From the slot b' to the adjacent end of the shaft there is a passage b², through which projects a pin b³, threaded at its outer end b⁴, where it passes through a threaded opening in a cap b⁵, attached to the support A². At-

tached to the outer end of the pin b³ is a lever-arm b⁶, hanging downwardly therefrom into position to be engaged by a cam-slide D in the manner to be hereinafter described, this lever-arm carrying a roll b⁷ at its lower end. A spring b⁸ maintains the arm b⁶ in a normally operative position.

The hoisting-drum C is of ordinary construction. It is free to slide on the shaft B and also to turn thereon. It is provided, preferably, with a conical surface c² for engagement with the driving member of the clutch. The driving member of the clutch comprises a power-driven gear E, having a surface e adapted to be engaged by the surface c² on the drum C when the drum and gear are in contact, and so rotate the drum.

The construction so far described is such that the turning of the lever-arm b⁶ from its position in Fig. 2 to its position in Fig. 4 against the force of the spring b⁸ and the consequent advancement of the pin b³ and block c will cause the engagement of the clutch-surface c² with the clutch-surface e and the consequent rotation of the drum by the rotating gear E.

Power is applied to the gear E in the form of my invention shown by means of a pinion F on the shaft f, mounted in bearings f', supported from the bed A. The shaft f carries at one end a gear f², in mesh with a pinion f³ on the shaft f⁴, which may be the prolongation of the axis of the armature of an electric motor or which may receive power in any other desired way. In the form of my invention shown, H represents a portion of the housing for a motor suitable for the purpose.

To separate the members of the clutch, the spring b⁸ returns the lever-arm b⁶ to its normal position when the force moving it has been withdrawn, and the clutch members are caused to separate by a spring c⁴, located about the shaft B and in a chamber c³ in the drum C and bearing against the gear E.

To stop the drum C and hold it from turning, a brake-surface g is provided upon its periphery, around which is passed a brake-strap G, comprised, as shown in the drawings, of two parts connected by the bolt G' and nut G². One end of this strip is attached to the rod g', the other end to a pin g², carried by arms g³, attached to the said rod and moved thereby. This rod g' is mounted to turn in bearings g³ on the bed A and carries at its outer end an upwardly-projecting lever-arm g⁴ and a downwardly-projecting le-

ver-arm g^5 . A spring g^6 is connected at one end to the arm g^5 and at the other end to an eye on the bed A. It keeps the brake from binding on the drum, but in a normally operative position. A pin g^7 limits the distance which the spring g^6 can move the brake-arm.

The upwardly-projecting lever-arm g^4 carries a roll g^8 , and this construction is such that by throwing the arm g^4 to the right (see Fig. 2) the brake G will be bound tightly about the brake-surface g of the drum C, the spring g^6 returning it to its released position when it is free. In order to adjust the brake-strap G for wear or stretch, I prefer to make it of two parts, which are joined together by means of a bolt G' , so that as the parts elongate with use the nut G^2 may be turned up to bring the ends of the parts together and shorten the strap.

Within a housing H' is an electrical controller, which may be of any desired form, the arm h , by means of which resistances are cut out, being operated by a link h' , connected with one arm h^2 of a lever fulcrumed upon the support A^3 . The arm h^3 of the lever carries on its end a roll h^4 , which lies in the path of the slide D. A spring h^5 , fastened to the lever-arm h^3 and connecting with a portion of the frame, holds the lever in a normally operative position. Thus it will be seen in the form of my invention shown there are three levers or lever-arms capable of being moved by the same part, which part, as will now be explained, engages loosely therewith—viz., the lever-arm b^6 , by means of which the position of the clutch is controlled, the lever-arm g^4 , by means of which the brake is controlled, and the lever-arm h^3 , by means of which power is supplied through the controller to operate the gear E. The part shown for operating these levers or lever-arms is the cam-slide D, mounted in guideways d , attached to the upright A^3 , so that it may be moved horizontally. The slide is operated in the construction shown by means of a connecting-rod d' , by which it is connected with a piston within the cylinder d^2 . This cylinder has a pipe d^3 connecting one end, and a pipe d^4 connecting the other end, with a four-way cock d^5 , operated by means of a handle d^6 . d^7 is the steam or air inlet, and d^8 the exhaust. The construction of this four-way cock is such that either end of the cylinder may be connected with the steam or air supply, the other end of the cylinder being at the same time connected with the exhaust, or the steam or air supply may be cut off entirely, as circumstances require. The construction of this valve is not explained further, as it is of a character well known.

The cam-slide D is provided with abutments D' and D^2 , the abutment D' being at the proper level to engage the roll b^7 on the

end of the lever-arm b^6 and the abutment D^2 being of proper level to engage the roll h^4 on the end of the lever-arm h^3 . The rear end D^3 of the slide is sufficiently high to serve also as an abutment and engage the roll g^7 on the brake-arm g^4 , and the slide D is so proportioned with regard to the position of these abutments D' , D^2 , and D^3 and the lever-arms b^6 , g^4 , and h^3 that in the preferred operation of the device the slide in being moved to the left (see Fig. 2) will immediately engage the lever-arm b^6 and cause the engagement of the driven member of the clutch with its driving member, so that the drum is in position to be turned immediately upon the application of power. A continuation of the movement of the slide D to the left will cause power to be applied by the engagement of the abutment D^2 with the lever-arm h^3 of its lever to throw the arm h of the controller, so as to cut out resistance and cause the proper application of power to the power-shaft f . At the same time the lever-arm b^6 will preferably be turned so as to rest on the surface d^9 . This operation of the slide D is caused by simply turning the handle d^6 to connect the source of steam or compressed-air pressure with the pipe d^3 , so that the piston within the cylinder d^2 will drive the slide forward sufficiently far for the purpose, such position being shown in Fig. 4.

When the shovel or whatever the load may be has been hoisted sufficiently high and it is desired to maintain the load in its hoisted position, the cock d^5 is turned so as to exhaust the steam or air from the pipe d^3 , sufficient steam being let into the pipe d^4 to withdraw the cam-slide D sufficiently far to shut off power from the power-shaft by turning back the arm h or its equivalent, leaving the lever-arm b^6 upon the surface d^9 and the clutch-surfaces engaged. A further withdrawal of the slide D releases the arm b^6 , so that the clutch-surfaces separate, and the brake acts upon the drum to allow the shovel to descend slowly, its rapidity depending upon how far the slide D is caused to move the brake-arm g^4 . Thus by the simple manipulation of the handle d^6 the shovel may be hoisted or lowered or maintained in any position.

The means for operating the lever-arms referred to is shown as a slide; but this is, in effect, a cam, which by virtue of its action on the several cam-rolls b^7 , g^8 , and h^4 accomplishes the desired movements of the parts connected therewith.

Instead of the springs which retract the lever-arms b^6 and h^3 the slide may be made with suitable slots, as shown in Fig. 5 at b^9 and h^6 . The slide D may also be provided with a similar slot to operate the brake-arm, if thought best.

I have shown my invention embodied in a machine operated by compressed air or

steam; but it is evident that my invention really consists in the operation of the clutch, the application of power, and the application of a brake by the same instrumentality, and in a certain predetermined cycle of movements such that by the one means, whether it be compressed air or steam or a single lever capable of moving such an instrumentality as the slide D, the proper sequence of events will necessarily follow. It is also evident from this that while a slide, such as the slide D, may be desirable for use in this connection other means of connecting the various arms and levers may be substituted without departing from the substance of my invention. Moreover, it will be apparent to any one skilled in the art that instead of the electrical means indicated for applying power to the drum a motor of any other character may be substituted, the starting-lever or its equivalent in such case being connected to a proper throttle or other means of connecting the apparatus with a suitable source of power.

What I claim as my invention is—

1. In a hoisting mechanism, a drum, a clutch adapted to connect said drum with a power-shaft, said power-shaft and means for starting and stopping it, and a means adapted to operate said clutch and said starting and stopping mechanism, whereby said drum shall be connected with said power-shaft and thereafter power may be applied to said power-shaft, as described.

2. In a hoisting-machine, a drum, a power-actuated means for operating said drum, a clutch adapted to throw said drum into and out of operative connection with its said operating means, mechanism for controlling said clutch, mechanism for controlling said drum-operating means, and a movable cam adapted to engage with said clutch-operating mechanism and the mechanism controlling the said drum-operating means whereby said drum through said clutch will be thrown into operative connection with its said controlling means and thereafter the operation of the drum be effected.

3. In a hoisting-machine, a drum, a power-actuated means for operating said drum, a clutch adapted to throw said drum into and out of operative connection with its said operating means, a brake for controlling said drum, mechanism for controlling said clutch, mechanism for controlling said drum-operating means, mechanism for controlling said brake, a cam presenting a series of surfaces or parts adapted to engage with said clutch-controlling mechanism, the said mechanism controlling said drum-operating means and the mechanism controlling said brake, and means for operating said cam.

4. In a hoisting-machine, a drum, a power-actuated means for operating said drum, a clutch adapted to throw said drum into and

out of connection with its said operating means, a brake for controlling said drum, mechanism for controlling said clutch, mechanism for controlling said drum-operating means, mechanism for controlling said brake, and a power-driven member presenting a series of surfaces or parts adapted in proper succession to engage with, or be moved into a position of disengagement with respect to said clutch-controlling mechanism, said mechanism controlling said drum-operating means and the mechanism controlling said brake.

5. In a hoisting-machine, a drum, a power-actuated means for operating said drum, a clutch adapted to throw said drum into and out of operative connection with said operating means, a brake for controlling said drum, mechanism for controlling said clutch, mechanism for controlling said drum-operating means, mechanism for controlling said brake, all of which mechanisms comprise in part levers arranged in such order of succession as to be successively engaged by a single actuating member, said actuating member and means for operating the same.

6. In a hoisting-machine, a drum, a power-actuated means for operating said drum, a clutch adapted to throw said drum into and out of operative connection with said operating means, a brake for controlling said drum, mechanism for controlling said clutch, mechanism for controlling said drum-operating means, mechanism for controlling said brake, all of which mechanisms comprise in part levers, a cam-slide D adapted to successively engage said levers for operating the parts controlled thereby, and means for controlling said slide.

7. In a hoisting-machine, a drum, a power-actuated means for operating said drum, a clutch adapted to throw said drum into and out of operative connection with its said operating means, a brake for controlling said drum, mechanism for controlling said clutch, mechanism for controlling said drum-operating means, mechanism for controlling said brake, all of which mechanisms comprise in part levers, means for automatically retaining said levers in a normally operative position, and means for operating said levers in proper order of succession, whereby the operative parts of the machine are caused to operate as described.

8. In a hoisting mechanism, a shaft, and a drum and clutch mechanism mounted on said shaft, a brake mechanism adapted to control the operation of said drum and a power mechanism adapted to be applied to the driving member of said clutch, and means whereby said clutch may be engaged, said brake may be operated, and power may be connected to and disconnected from said drum, said means comprising a slide, and suitable connections between said slide, said clutch mechanism, said brake-operating

mechanism, and said power-applying mechanism, and means whereby said slide is operated, as set forth.

9. In a hoisting-machine, a means for starting, stopping and controlling a hoisting-drum comprising a part common to each of said mechanisms, and means for operating it comprising a cylinder and piston with suitable connections whereby compressed air or its equivalent is caused to operate the piston therein.

10. In a hoisting apparatus, a clutch mechanism, a freely-rotating drum forming a part thereof, means for causing the engagement of the parts of said clutch, comprising a threaded pin, and an arm connected thereto, a lever, a power-controller connected therewith, and a brake having a suitable operating-lever, said clutch-throwing arm, said power-lever, said brake-lever, each having a portion lying in a common plane, and means movable in said plane for operating them in a predetermined order, as described.

11. In a hoisting apparatus, a clutch mechanism, a freely-rotating drum forming part thereof, means for engaging said drum and the other portions of said clutch mechanism, a lever, a power-controller connected therewith, and a brake mechanism, and a part adapted to control the position and the rotatability of said drum and the rotation of said clutch mechanism, whereby the movement of said part in one direction will cause the clutch to engage and the brake to release the drum, and power to be applied thereto, and the reverse movement thereof will cause a reverse of said operations.

12. In a hoisting-machine, a drum, a power-actuated means for operating said drum, a clutch adapted to throw said drum into and out of operative connection with its said operating means, a brake for controlling said drum, mechanism for controlling said clutch, mechanism for controlling said drum-

operating means, mechanism for controlling said brake, all of which mechanisms comprise in part levers, and means loosely engaging with said levers in proper order of succession, whereby the operative parts of the machine are caused to operate as described.

13. In an apparatus of the kind described, a winding-drum provided with a brake, a source of motive power, a clutch on the axis of said drum to connect the source of motive power with the said drum, means to control the said motive power, and unitary means to successively operate the brake, the clutch, and the controlling means.

14. In an apparatus of the kind described, a prime mover, controlling means for the same, a winding-drum, a clutch on the axis of said drum to connect the said drum with the prime mover, a brake adapted to retard said drum, and unitary means to successively operate the brake, the clutch, and the controlling means for the said prime mover.

15. In a hoisting-machine, a drum, a prime mover, a clutch, one member of which is integral with said drum, the other member of which is operated by said prime mover, a slide, a power-motor adapted to move said slide, and means adapted to be engaged and operated by said slide whereby said clutch will be thrown to connect said prime mover with said drum.

16. In a hoisting-machine, a prime mover, a drum, a clutch, one member of which is integral with said drum, the other member being operated by said prime mover, a brake and a starter for said mover, and means common to said clutch, said brake and said prime-mover starter whereby said parts are successively operated, as described.

JEREMIAH CAMPBELL.

In presence of—

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