

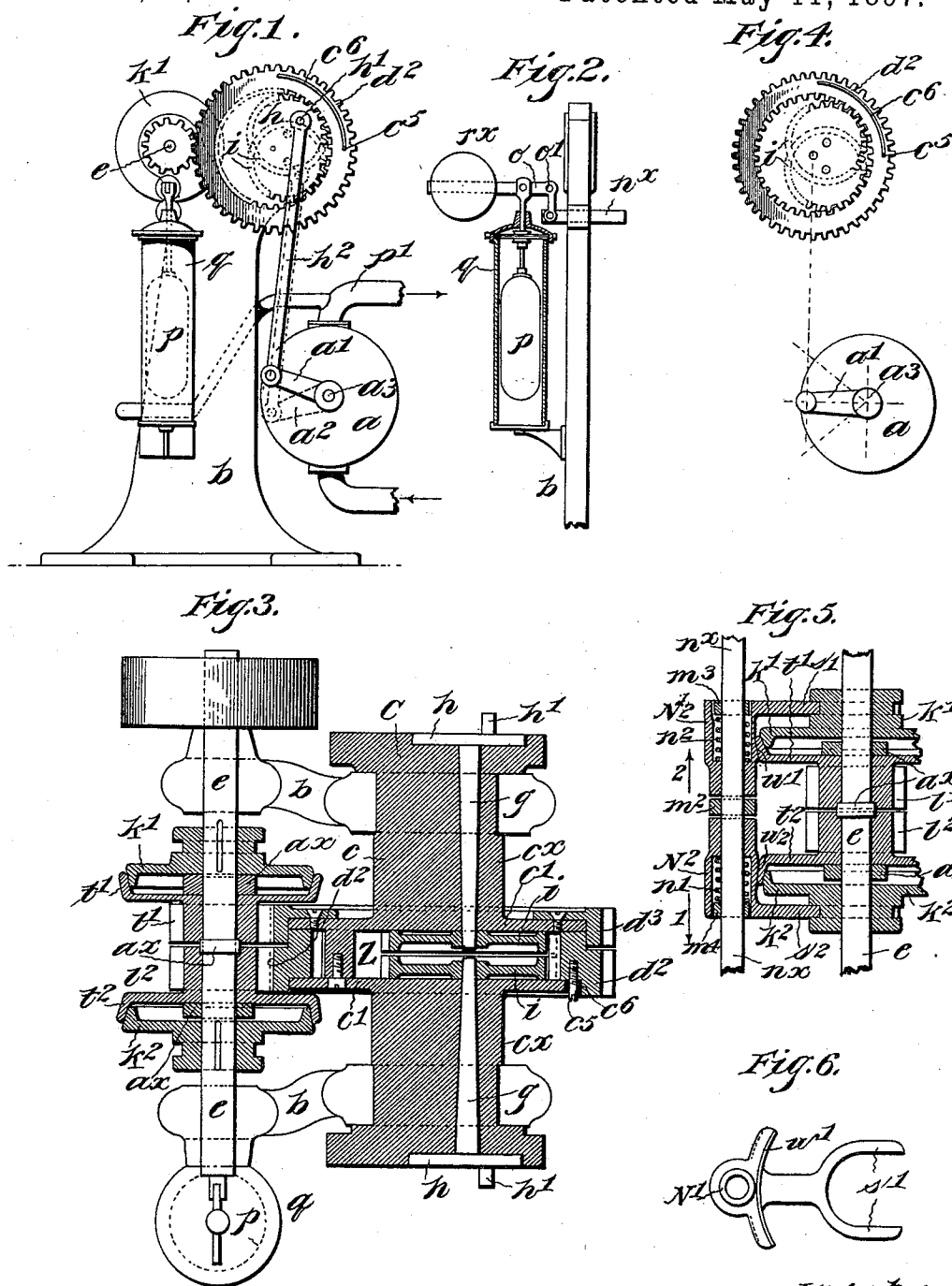
(No Model.)

W. HARTMANN.

MECHANISM FOR REGULATING OPERATION OF DRIVING ECCENTRICS OF
PUMPING OR OTHER ENGINES.

No. 582,202.

Patented May 11, 1897.



Witnesses:
C. S. O'Neil
M. J. L. Higgins.

Inventor:
Wilhelm Hartmann.
By *Henry Ott*
Attorney.

UNITED STATES PATENT OFFICE.

WILHELM HARTMANN, OF OFFENBACH-ON-THE-MAIN, GERMANY.

MECHANISM FOR REGULATING OPERATION OF DRIVING-ECCENTRICS OF PUMPING OR OTHER ENGINES.

SPECIFICATION forming part of Letters Patent No. 582,202, dated May 11, 1897.

Application filed November 27, 1896. Serial No. 613,675. (No model.) Patented in Germany March 8, 1894, No. 80,540.

To all whom it may concern:

Be it known that I, WILHELM HARTMANN, a subject of the King of Prussia, German Emperor, residing at Offenbach-on-the-Main, Germany, have invented certain new and useful Improvements in Mechanism for Governing or Regulating the Operation of the Driving Eccentric or Crank Shafts of Pumping or other Engines, (for which Letters Patent have been obtained in Germany, No. 80,540, dated March 8, 1894;) and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates to mechanism for governing or regulating the operation of the driving eccentric or crank shafts of pumping and other engines and for starting and stopping the operation of the same, and particularly to means for displacing the eccentric or crank of the driving crank-shaft of the nature described in my application for patent of the United States, filed November 4, 1892, Serial No. 450,962.

The invention has for its object the controlling of the operation of pumping and other engines, either by hand or automatically, by varying the position of the eccentric or crank pin relatively to the axis of its shaft, whereby the speed or reciprocation of the element connected with and controlled by said eccentric or crank pin is correspondingly varied or stopped when said eccentric or crank pin is brought to a position coaxial with its shaft.

The invention has for its further object the provision of means whereby the displacement or adjustment of the eccentric or crank pin relatively to the axis of its shaft is controlled, as in the case of pumping-engines, by the pressure of the liquid forced thereby.

To these ends the invention consists in structural features and in the combination of cooperating elements, as will now be fully described, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation illustrating my invention applied to pumping-engines. Fig. 2 is a sectional end elevation of the devices

for controlling the operation of the pump-shaft through the medium of the pressure of the liquid forced by the pump. Fig. 3 is a sectional plan view of Fig. 1; and Figs. 4, 5, and 6 are detail views.

In the above drawings, a indicates the pump, (in this case supposed to be a twin pump,) and a' a^2 the cranks on the pump-shaft a^3 .

A suitable frame, from which the pump is or may be supported, is provided with bearings for a driving-shaft e and the crank-shaft C , to the wrist-pins h' of which the wrist-pins on the cranks a' and a^2 of the pumping-shaft a are connected, as shown in Fig. 1.

The crank-shaft C is composed of two similar sections or parts c and c^x , respectively, each provided at their proximate ends with a circular flange or web c' , the two sections being rigidly connected by any suitable means, so as to leave between their proximate ends a substantially circular chamber Z , Fig. 3.

To the flange c' of the shaft-section c is bolted an externally-toothed ring d^3 , and on the like flange of shaft-section c^x is loosely mounted an internally and externally toothed ring d^2 . The flange c' on shaft-section c^x is provided with a segmental slot c^6 near its periphery, into which extends a pin c^5 , that projects from the toothed ring d^2 , for purposes presently to be explained. Each of the shaft-sections c c^x is furthermore provided with a bearing eccentric to their major axes for the reception of a crank-spindle g , that carries at its outer end a disk h , provided with a wrist-pin h' , connected, as above stated, to the like pins of the cranks on the pump-shaft. At their inner ends the crank-spindles c and c^x carry each a pinion i , both in gear with the internal teeth of the loose toothed ring d^2 . The relative arrangement of the spindles g and their wrist-pins h' is such that the latter will move synchronously to and from the axis of rotation of the shaft C when said spindles are revolved in one or the other direction by the pinions i through the medium of the toothed ring d^2 , as hereinafter described.

The driving-shaft e carries two pinions l' and l^2 , respectively in gear with the external teeth of the rings d^3 d^2 , said pinions being loose on said driving-shaft and held against endwise motion thereon by suitable collars a^x , Figs. 3 and 5. The pinions l' l^2 are locked to

the driving-shaft e through the medium of suitable friction-clutches controlled by variations from a normal pressure determined by the load on the float p . To this end each pinion l' and l^2 is provided with a tapered or internally and externally coned friction-disk t' t^2 , respectively, adapted to be engaged by corresponding disks k' and k^2 , taking into said disks t' and t^2 , said disks k' k^2 revolving with and having motion lengthwise on the driving-shaft e . The clutch-disks k' k^2 are each provided with a peripherally-grooved hub for the forked end of a shifting lever s' and s^2 , Figs. 5 and 6. Each lever has a sleeve (marked N' and N^2) provided with a segmental brake-shoe w' w^2 , Figs. 5 and 6, the face of which is inclined in accordance with the outer transversely-inclined periphery of the friction-disks t' t^2 of pinions l' and l^2 .

The sleeves N' N^2 on levers s' s^2 are loosely mounted on a sliding bar n^x , that is connected with the rod of float p by means of a weighted bell-crank lever o , having a fixed fulcrum, as o' , Fig. 2, or in any other desired manner, so as to be actuated by the vertical movements of the float, and between said sleeves the bar n^x has secured thereto an adjustable actuating-collar m^2 . The outer end of the bore of the sleeves N' N^2 is enlarged for the reception of a coiled spring n' n^2 , respectively, on bar n^x , one end of said springs having bearing on the sleeve and the other on adjustable collars m^3 or m^4 , secured to said bar n^x . When the bar n^x is in a normal position, Fig. 5, both sleeves N' and N^2 are held by their springs against the actuating-collar m^2 , or practically so, the clutch-disks k' and k^2 engaging the corresponding disks t' t^2 of pinions l' and l^2 , whereby said pinions are locked to the driving-shaft e and cause the toothed ring d^3 and the shaft C , together with the toothed ring d^2 and wheels i i , to revolve synchronously without revolving the spindles g .

The operation of the pressure-regulating device is as follows: Assuming that the normal pressure in float-chamber q falls, causing the float to sink, the shifting bar n^x will move in the direction of arrow 2, Fig. 5, carrying with it the sleeve N' , whose brake-shoe w' will engage friction-disk t' and stop the rotation of pinion l' , clutch-disk k' being at the same time disengaged from disk t' . As the tendency of the sleeve N^2 under the stress of its spring n^2 is to follow the movement of bar n^x , the friction-clutch k^2 will be more firmly pressed against disk t^2 , causing toothed ring d^2 to revolve independently of shaft C , it being supposed that the driving-shaft e revolves continuously, whereby both wheels i are revolved, and therethrough the crank-disk spindles g , moving the cranks toward or to their full-stroke position, at which time the pin c^5 on toothed ring d^2 will have reached the end of the slot c^6 , thereby locking crank-shaft C to said ring and causing both to revolve. The operation of the pump at full stroke causes the pressure and float in float-chamber q to

rise again, thereby moving bar n^x in the direction of arrow 1 to a normal position, Fig. 5, in which both pinions l' and l^2 are locked to shaft e by their friction-clutches k' k^2 under the stress of the springs n' n^2 , as above set forth. If, on the other hand, the pressure in float-chamber q should rise above a normal pressure, the corresponding rise of the float will move bar n^x in the direction of arrow 1, Fig. 5, the brake-shoe w^2 will lock pinion l^2 against rotation and disengage clutch k^2 from disk t^2 , thereby stopping the rotation of toothed ring d^2 , while clutch-disk k' will be moved in engagement with disk t' of pinion l' , and as the ring d^2 is stationary and the shaft C revolves the wheels i will also be revolved, thereby moving the wrist-pins on the disks of spindles g toward the axis of rotation of shaft C or to a normal position, at which time the pin c^5 will again be in the end of slot c^6 in the flange c' of shaft-section c^x , when the toothed ring will revolve with said shaft, and as the work of the pump is gradually reduced a corresponding reduction in the pressure in float-chamber q will take place, causing the float p to sink and return the bar n^x to a normal position.

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

1. The combination with a crank-shaft composed of two rigidly-connected sections provided with a bearing eccentric to their major axis, crank-spindles movable in said bearings, a pinion at the proximate ends of said spindles, an externally-toothed ring rigidly secured to the inner end of one of said sections, an externally and internally toothed ring revoluble about the like end of the other section, the internal teeth of such ring in gear with the pinions on the crank-spindles, a revoluble shaft and two driving-pinions loose thereon in gear with the aforesaid rings; of a friction-clutch for each of said driving-pinions, and means controlled by power derived from the crank-shaft to automatically operate said clutches and lock one or the other or both driving-pinions to their shaft, substantially as and for the purpose set forth.

2. The combination with a fluid-forcing device, a crank-shaft composed of two rigidly-connected sections provided with a bearing eccentric to their major axis, crank-spindles revoluble in said bearings and connected with said fluid-forcing device, a pinion at the proximate ends of the spindles, an externally-toothed ring rigidly secured to the inner end of one of the crank-shaft sections, an externally and internally toothed ring revoluble about the like end of the other section, the internal teeth of such ring in gear with the pinions on the crank-spindles, a revoluble shaft and two driving-pinions loose thereon in gear with the aforementioned toothed rings, and means controlled by the pressure of the fluid forced to automatically lock one or the other or both driving-pinions to their

shaft, substantially as and for the purpose set forth.

3. The combination with a fluid-forcing device, a crank-shaft composed of two rigidly connected sections provided with a bearing eccentric to their major axis, crank-spindles revoluble in said bearings and connected with said fluid-forcing device, a pinion at the proximate ends of the spindles, an externally-toothed ring rigidly secured to the inner end of one of the crank-shaft sections, an externally and internally toothed ring revoluble about the like end of the other section, the internal teeth of such ring in gear with the pinions on the crank-spindles, means for limit-

ing the amplitude of rotation of the revoluble ring, a revoluble shaft and two driving-pinions loose thereon and in gear with the aforementioned toothed rings, and means controlled by the pressure of the fluid forced to automatically lock one or the other or both driving-pinions to their shaft, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

WILHELM HARTMANN.

Witnesses:

DEAN B. MASON,
FRANK H. MASON.