

No. 712,028.

Patented Oct. 28, 1902.

W. A. P. WERNER.
REGULATING GEAR.

(Application filed May 22, 1902.)

(No Model.)

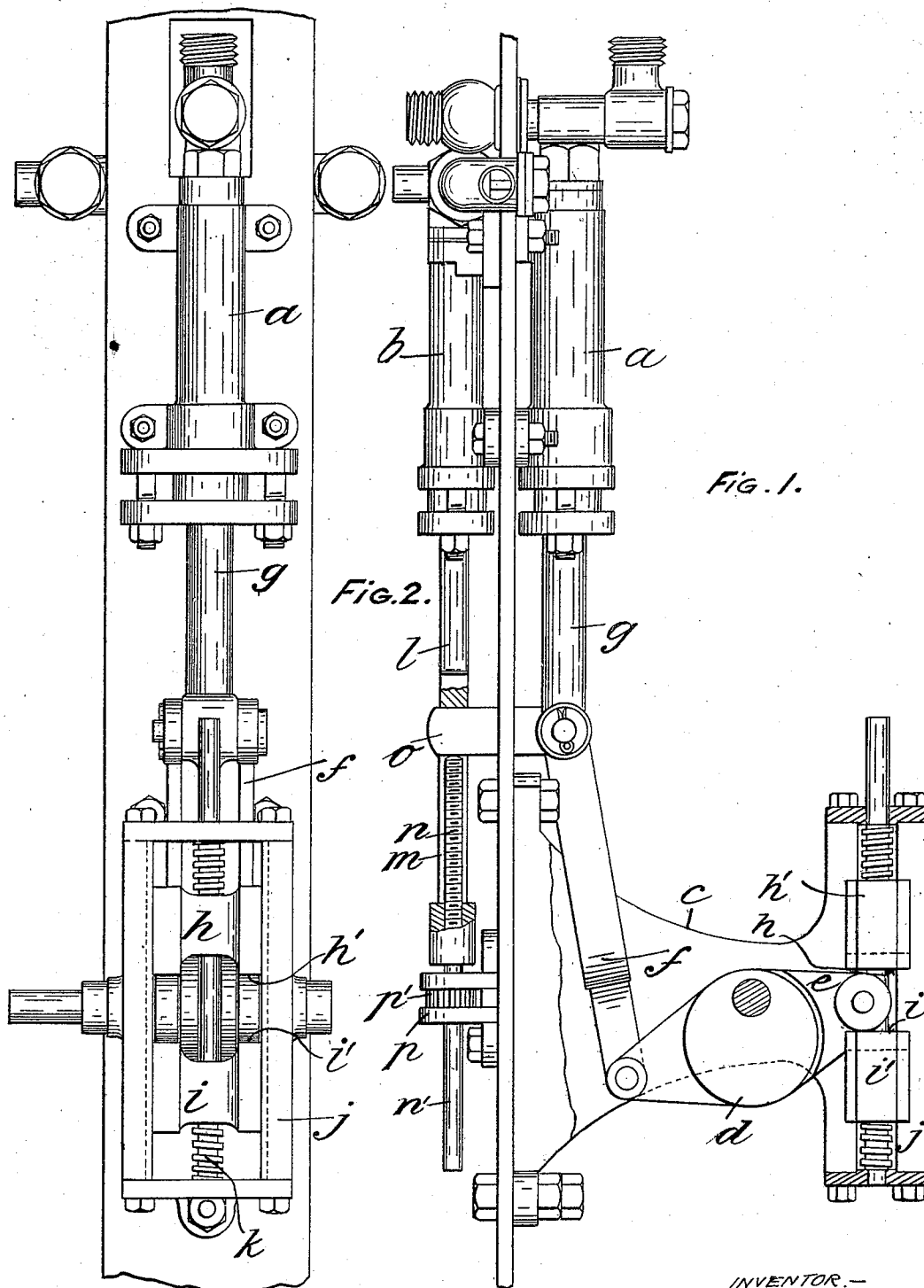


Fig. 1.

Fig. 2.

WITNESSES:—
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UNITED STATES PATENT OFFICE.

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REGULATING-GEAR.

SPECIFICATION forming part of Letters Patent No. 712,028, dated October 28, 1902.

Application filed May 22, 1902. Serial No. 108,562. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM ARTHUR PERCY WERNER, a citizen of Great Britain, residing at 4 Harpur street, Theobald's road, London, England, have invented certain new and useful Improvements Relating to Regulating-Gear, (for which I have applied for patent in Great Britain, No. 12,004, bearing date June 12, 1901,) of which the following is a specification.

This invention relates to regulating-gear for the regulation or adjustment of the stroke of reciprocating parts, and particularly for the regulation or adjustment of the stroke of pumps such as are employed for feeding water to steam-generators.

The invention has for its object to provide means for regulating or adjusting the length of stroke by hand or automatically, so that the rate or amount of feed may be altered or stopped, as required, and so as to avoid the disadvantages attendant upon the use of other regulators which are employed in connection with pumps having a constant stroke.

According to the invention the reciprocating movement is communicated by means of a lever, one of whose extremities is secured to the reciprocating part, while the opposite extremity serves as a fulcrum, and the lever is operated by such means as an eccentric or crank. The fulcrum of the lever is retained in position by means of two oppositely-disposed bearing-faces, which are capable of separation one from the other in order to release the fulcrum, so that instead of the movement of the eccentric, crank, or other driving part resulting in a full reciprocation of the pump or reciprocating part a movement will result to the fulcrum to an extent dependent upon the separation of the bearing-faces. It will be understood that if the separation of the bearing-faces permits of a full movement of the fulcrum the opposite extremity of the lever, which in that event acts as a fulcrum, is held stationary, so that thereby the reciprocation of the pump, piston, or plunger may be entirely stopped or reciprocated, as required, to give the necessary amount of feed. The separation of the bearing-faces of the fulcrum may be effected

by hand or automatically from a regulator or governor. According to the invention, also, when providing means for varying the stroke of a reciprocating part from some other associated reciprocating or rotating part an axial slot is provided in the reciprocating part to be driven, within which a screwed spindle passes and in which a projecting part may project to communicate the movement. The screwed spindle may be screwed more or less into the longitudinal slot, so as thereby to provide a lost motion for the projecting part to any extent required, the length of the slot being such that the projecting part may reciprocate idly within the slot, and thereby communicate no movement. The upper extremity of the screwed spindle may be arranged to slide within a bracket and may be provided with a keyway, so that a key may be employed to secure a pinion to the spindle as a means for rotating it by hand or automatically from a regulator or governor.

The invention also consists in the detailed constructional features hereinafter described as applied.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 represents in elevation a combined feed-water pump and oil-pump provided according to the invention. Fig. 2 is a plan corresponding thereto, in which the plunge of the feed-water pump is shown in the opposite position to that indicated in Fig. 1.

In carrying the invention, as illustrated in the drawings, into effect in the provision of a feed-water pump *a* and oil-pump *b* for use on a steam-generator fired with liquid fuel I arrange the pumps *a* and *b* side by side, with the cylinder and pistons parallel. In proximity to the pistons I provide a double bracket *c*, suitably secured in position and carrying an eccentric *d*, upon which a lever *e* is mounted. One extremity of this lever is connected to a bifurcated link *f*, whose opposite extremity is secured to the head of the piston or plunger *g* of the feed-water pump *a*. The opposite extremity of the lever *e* forms a fulcrum and is arranged between two oppositely-disposed bearing-faces *h* and *i*, provided upon blocks *h' i'*, sliding within guides *j*, but mount-

ed axially also upon a spindle screwed with right and left hand threads, as illustrated in both figures, so that upon the rotation of the screwed spindle the blocks *h' i'* may be separated within the guides *j*. The screwed spindle aforesaid may be rotated by any suitable hand-operated gear or by any other gear deriving motion through pressure in the steam-generator or from the governor of the motor.

The invention is not limited to the particular arrangement of the lever *e* illustrated, for it is obvious that such may be modified without departing from the invention. For example, the eccentric could be mounted on the lever at its lower extremity, and the plunger could then be connected thereto midway between the eccentric and the upper fulcrum.

The piston or plunger *l* of the oil-pump *b* has its head provided with a longitudinal slot *m*, through which axially passes a screwed spindle *n*. A projecting arm *o*, provided upon the feed-pump plunger *g*, projects within this slot *m* and communicates reciprocating motion to the plunger *l*. The outer end *n'* of the screwed spindle *n* slides within a fixed bracket *p*, which is recessed so as to form two lateral parts, between which a pinion *p'* is arranged upon the spindle *n*, which pinion is keyed to the spindle, so that on its rotation the opposite extremity of the spindle is screwed into or out of the slot *m*, so as to provide a lost motion to a more or less extent for the projecting arm *o*. The pinion *p'* may be operated by hand or by automatic means.

In operation it will be understood that motion is communicated to the eccentric or crank *d*, upon which the lever *e* before referred to is arranged, so that one extremity—that is, the lower extremity—of the lever *e* is reciprocated, and if the opposite upper extremity of the lever *e* is retained by means of the bearing-faces *h i* the full extent of reciprocation will be communicated to the feed-pump plunger *g*. Should the blocks *h' i'* be separated, however, the fulcrum of the lever *e* reciprocates on the rotation of the eccentric *d*, so that the reciprocation of the feed-pump plunger *g* is restricted. If the bearing-faces *h* and *i* are separated to the maximum extent, no movement is communicated to the feed-pump plunger *g*. The movement of the feed-pump plunger *g* effects the movement of the oil-pump plunger *l* to an extent corresponding to the length of the screwed spindle *n*, projecting into the slot *m* within the plunger-head. If the extremity of the screwed spindle *n* passes fully into the slot, the full extent of the movement is communicated to the oil-pump plunger *l*, that is communicated to the plunger *g*; but if the screwed spindle *e* is withdrawn from the slot no movement whatever is communicated to the oil-pump plunger.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. Apparatus for regulating the stroke of reciprocating parts such as the plungers of feed-water pumps, comprising in combination, a lever, means for giving to said lever at one point a constant reciprocation, a member connected to said lever at another point, said member being capable of reciprocation by said lever, a fulcrum on said lever capable of movement on reciprocation thereof, and means for limiting the path taken by said fulcrum on the reciprocation of said lever, substantially as described.

2. Apparatus for regulating the stroke of reciprocating parts such as the plungers of feed-water pumps, comprising in combination, a lever, means for giving to said lever at one point a constant reciprocation, a member connected to said lever at another point, said member being capable of reciprocation by said lever, a fulcrum on said lever capable of movement on reciprocation thereof, means for limiting the path taken by said fulcrum on reciprocation of said lever, said means comprising two surfaces, and means for adjusting the distance apart of said surfaces, substantially as described.

3. Apparatus for regulating the stroke of reciprocating parts such as the plungers of feed-water pumps, comprising in combination, a lever, means for giving to said lever at one point a constant reciprocation, a member connected to said lever at another point, said member being capable of reciprocation by said lever, a fulcrum on said lever capable of movement on reciprocation thereof, means for limiting the path taken by said fulcrum on reciprocation of said lever, said means comprising two blocks, and means for adjusting the distance apart of said blocks consisting of a screwed spindle with threads in opposite direction passing through the respective blocks, substantially as described.

4. Apparatus for regulating the stroke of reciprocating parts such as the plungers of feed-water pumps, comprising in combination, a lever, an eccentric upon which said lever is mounted, a rotating shaft upon which said eccentric is secured, a member connected to said lever at one point, said member being capable of reciprocation by said lever, a fulcrum on said lever capable of movement on reciprocation thereof, means for limiting the path taken by said fulcrum on reciprocation of said lever, substantially as described.

5. Apparatus for regulating the stroke of reciprocating parts such as the plungers of feed-water pumps, comprising in combination, a lever, an eccentric upon which said lever is mounted, a rotating shaft upon which said eccentric is secured, a member connected to said lever at one point, said member being capable of reciprocation by said lever, a fulcrum on said lever capable of movement on reciprocation thereof, means for limiting

the path taken by said lever, said means comprising two surfaces, and means for adjusting the distance apart of said surfaces, substantially as described.

5 6. Apparatus for regulating the stroke of reciprocating parts such as the plungers of feed-water pumps, comprising in combination, a lever, an eccentric upon which said lever is mounted, a rotating shaft upon which
10 said eccentric is secured, a member connected to said lever at one point, said member being capable of reciprocation by said lever, a fulcrum on said lever capable of movement on reciprocation thereof, means for limiting the
15 path taken by said lever, said means comprising two blocks, and means for adjusting the distance apart of said blocks consisting of a screwed spindle with threads provided in opposite directions passing through the respec-
20 tive blocks, substantially as described.

7. Apparatus for regulating the stroke of reciprocating parts such as the plungers of feed - water pumps, comprising in combination, a lever, an eccentric upon which said lever is centrally mounted, a rotating shaft
25 upon which said eccentric is secured, a member connected to one end of said lever, said member being capable of reciprocation by said lever, a fulcrum on the other end of said
30 lever capable of movement on reciprocation thereof, means for limiting the path taken by said fulcrum on reciprocation of said lever, substantially as described.

8. Apparatus for regulating the stroke of reciprocating parts such as the plungers of feed - water pumps, comprising in combination, a lever, an eccentric upon which said lever is centrally mounted, a rotating shaft
35 upon which said eccentric is secured, a member connected to one end of said lever, said member being capable of reciprocation by said lever, a fulcrum on the other end of said lever capable of movement on reciprocation thereof, means for limiting the path taken by
40 said lever, said means comprising two surfaces, and means for adjusting the distance apart of said surfaces, substantially as described.

9. Apparatus for regulating the stroke of reciprocating parts such as the plungers of feed - water pumps, comprising in combination, a lever, an eccentric upon which said lever is centrally mounted, a rotating shaft
50 upon which said eccentric is secured, a member connected to one end of said lever, said member being capable of reciprocation by said lever, a fulcrum on the other end of said lever capable of movement on reciprocation thereof, means for limiting the path taken by
55 said lever, said means comprising two blocks, and means for adjusting the distance apart of said blocks consisting of a screwed spindle with threads provided in opposite directions passing through the respective blocks, sub-
60 stantially as described.

10. Apparatus for regulating the stroke of

reciprocating parts such as the plungers of feed - water pumps, comprising in combination, a lever, means for giving to said lever at one point a constant reciprocation, a reciprocating part connected to said lever at another
70 point, said part reciprocating by said lever, a fulcrum on said lever capable of movement on reciprocation thereof, means for limiting the path taken by said fulcrum on the reciprocation of said lever, a second reciprocating
75 part, means for connecting said second reciprocating part to the first reciprocating part to permit of a lost motion of the first reciprocating part, substantially as described.

11. Apparatus for regulating the stroke of plungers of feed-water pumps, comprising in combination, a lever, means for giving to said lever at one point a constant reciprocation, a reciprocating part connected to said lever at
80 another point, a fulcrum on said lever capable of movement on reciprocation thereof, means for limiting the path taken by said fulcrum on the reciprocation of said lever, a plunger connected to said reciprocating part,
85 a second plunger arranged parallel to the first, and means for connecting said second plunger to the first plunger to permit of a lost motion of the first, consisting of a slot in the second plunger, a projecting arm carried by
90 the first plunger, and a screw carried by said second plunger and projecting within the said slot, substantially as described.

12. Apparatus for regulating the stroke of plungers of feed-water pumps, comprising in combination, a lever, an eccentric upon which said lever is mounted, a rotating shaft upon which said eccentric is secured, a reciprocating part connected to said lever at one point,
100 said reciprocating part being capable of reciprocation by said lever, a fulcrum on said lever capable of movement on reciprocation thereof, means for limiting the path taken by said fulcrum on the reciprocation of said lever, a plunger connected to said reciprocating
105 part, a second plunger arranged parallel to the first, and means for connecting said second plunger to the first plunger to permit of a lost motion of the first, consisting of a slot in the second plunger, a projecting arm carried
110 by the first plunger, and a screw carried by said second plunger and projecting within the said slot, substantially as described.

13. Apparatus for regulating the stroke of plungers of feed-water pumps, comprising in combination, a lever, an eccentric upon which said lever is centrally mounted, a rotating shaft upon which said eccentric is secured, a reciprocating part connected to one end of said lever, said reciprocating part being capable
120 of reciprocation by said lever, a fulcrum on the other end of said lever capable of movement on reciprocation thereof, means for limiting the path taken by said fulcrum on the reciprocation of said lever, a plunger
125 connected to said reciprocating part, a second plunger arranged parallel to the first,

and means for connecting said second plunger to the first plunger to permit of a lost motion of the first, consisting of a slot in the second plunger, a projecting arm carried by the first plunger, and a screw carried by said
5 second plunger and projecting within the said slot, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM ARTHUR PERCY WERNER.

Witnesses:

WILLIAM EDWARD EVANS,
KATHLEEN KING.