No. 668,811. Patented Feb. 26, 1901.

A. T. COOPER.

INTERLOCKING VALVE GEAR FOR STEAM BOILERS.

(Application filed Dec. 17, 1900.)

(No Model.) 2 Sheets—Sheet 1.

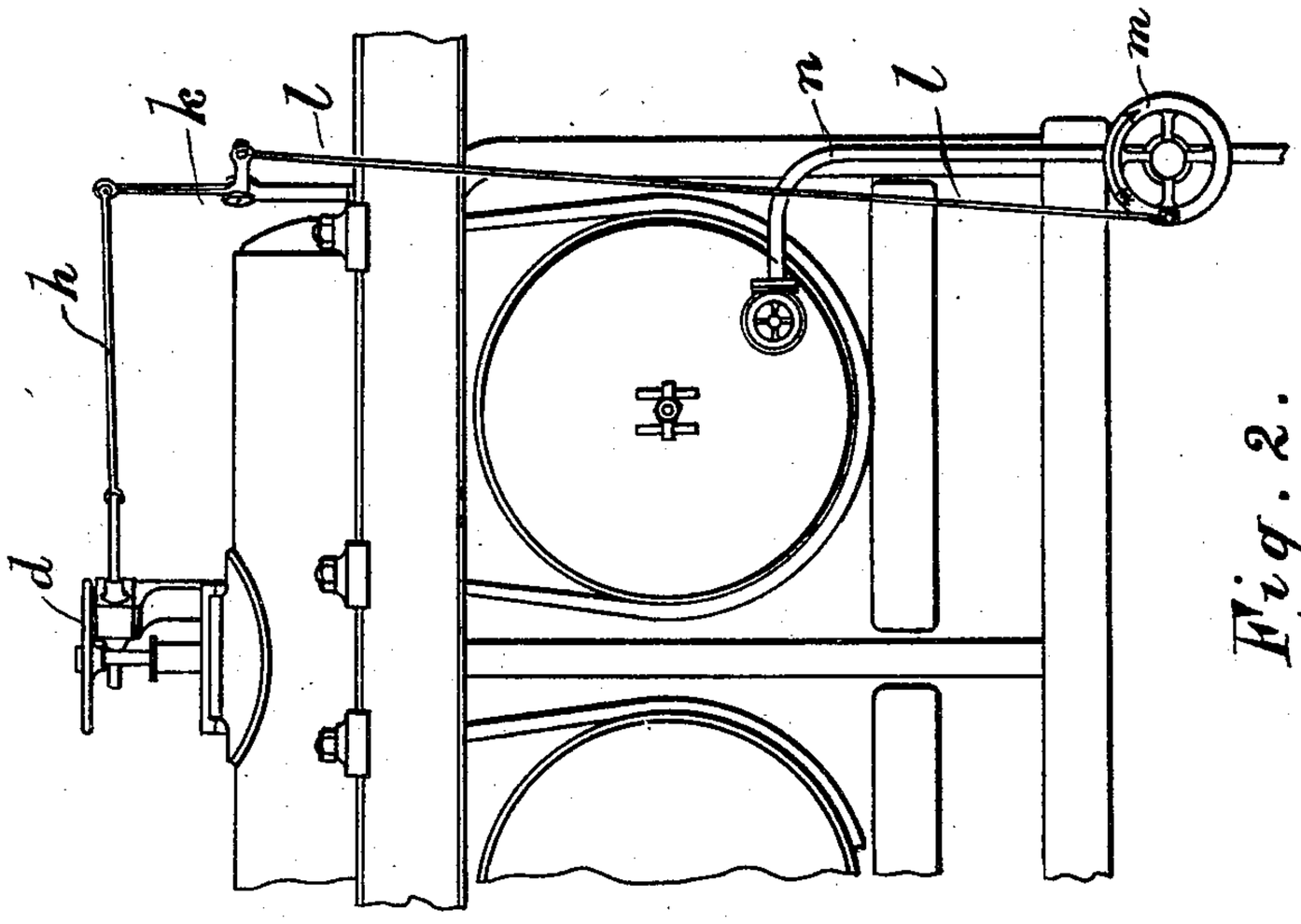

Fig. 2.

Fig. 1.

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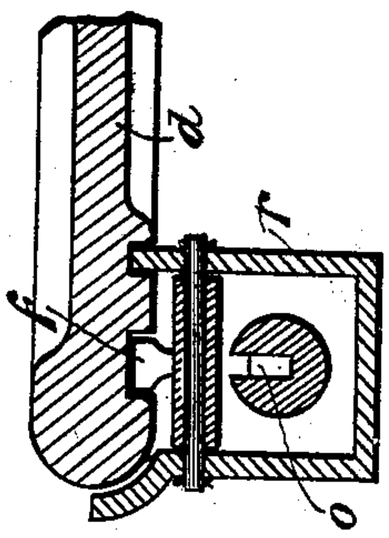

Fig. 4.

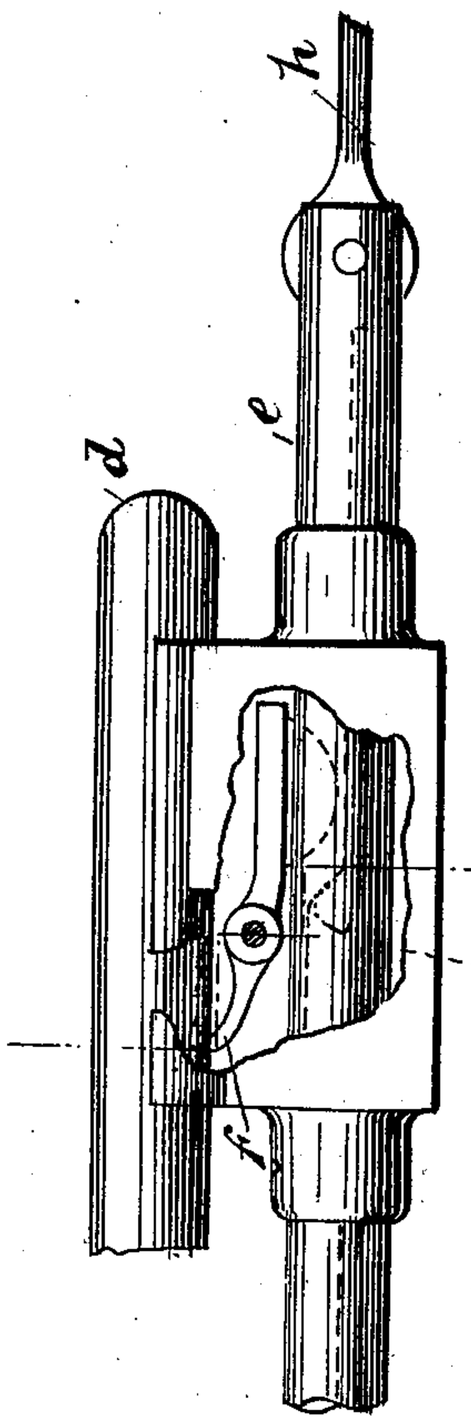

Fig. 3.

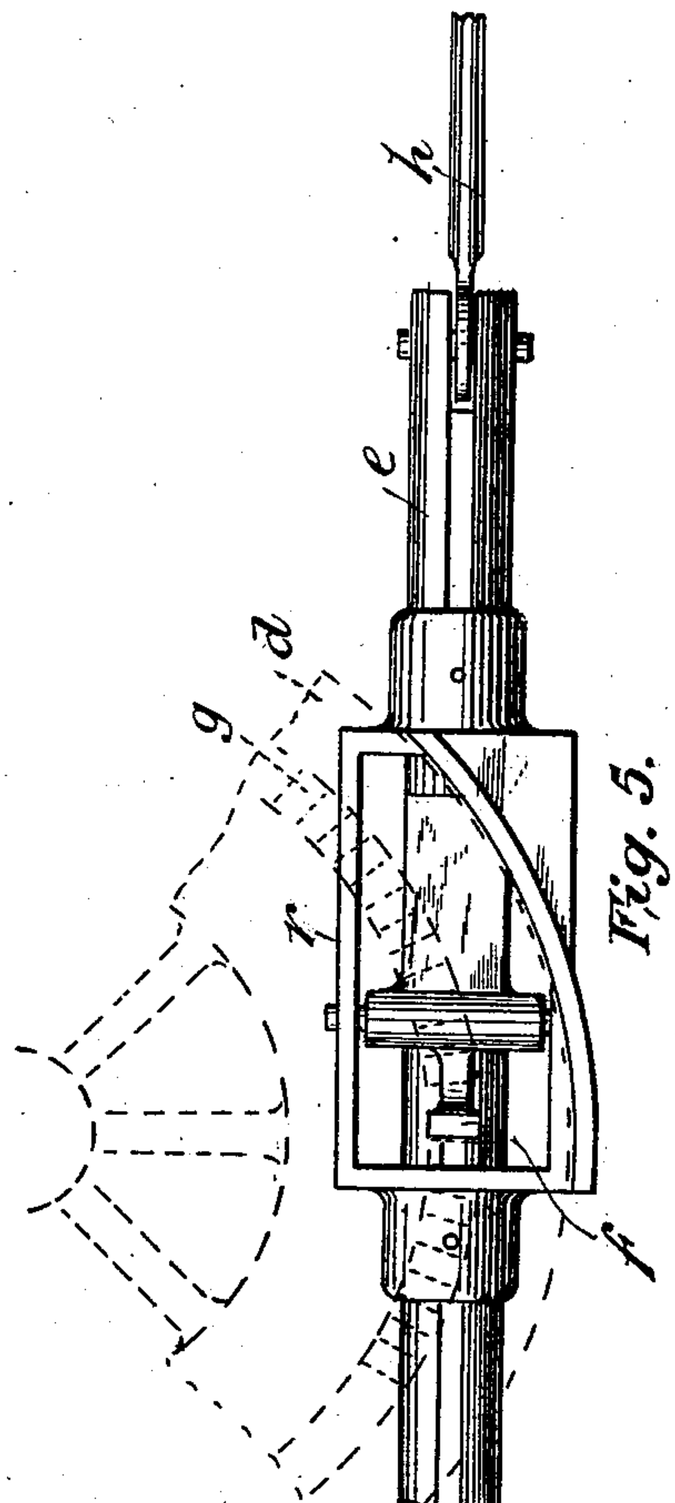

Fig. 5.

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ARTHUR THOMAS COOPER, OF READING, ENGLAND.

INTERLOCKING VALVE-GEAR FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 668,811, dated February 26, 1901.

Application filed December 17, 1900. Serial No. 40,163. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR THOMAS COOPER, electrical engineer, a subject of the Queen of Great Britain and Ireland, residing at Inglenook, Craven road, Reading, in the county of Berks, England, have invented certain new and useful Improvements in Connection with Interlocking Valve-Gear for Steam-Boilers, (for which I have made application for Letters Patent in Great Britain, No. 20,327, dated November 12, 1900,) of which the following is a specification.

This invention relates to improvements in connection with interlocking valve mechanism for use upon steam-boilers which have superheaters attached thereto or working in connection therewith, the object of the invention being to provide a means for insuring that the main steam-valve shall not be opened before the water has been first drained from the superheater by means of a draining-valve, the draining-valve being of the ordinary type, preferably that of a three-way valve, which serves also as a flooding-valve for admitting water into the superheater.

In ordinary tubular boilers of the Babcock and Wilcox type it is found desirable to employ in connection with the steam-superheater a flooding or water-charging pipe through which water flows from the drum when the three-way valve is opened. The lower end of this three-way valve is made to connect to a drain-pipe, so that before the steam is withdrawn from the main valve the draining-valve has been opened first to shut off the water from the drum and then to drain the water from the superheater and its connections.

In the accompanying sheets of explanatory drawings, Figure 1 is a part elevation showing my improved mechanism and connections attached to the three-way valve and the main valve. Fig. 2 is an end elevation of the same, while Figs. 3, 4, and 5 are enlarged details of the locking mechanism employed in connection with the main-valve hand-wheel.

To insure that the draining of the water from the superheater *a* shall be first effected by the opening of the three-way valve *b* to the drain *c* before the main valve *d* has been opened to allow steam to be drawn off, I provide a locking-lever *e*, which throws in or out of gear the pawl *f*, which engages with teeth *g*, formed in the rim of the hand-wheel *d*, the movement of the lever *e* being effected by rods and links *h k l*, such that when the hand-wheel *m* on the three-way valve *b* is opened the link *b*, attached to the hand-wheel *m*, is caused to move from one position to the other in such a manner as to lock or unlock the hand-wheel *d* by allowing the pawl *f* to be moved in or out of contact with the teeth *g*.

The water from the drum enters the superheater to flood the same from the pipes *n* when the hand-wheel *m* is moved to open the three-way cock in that direction, and when this cock by a suitable manipulation of the hand-wheel *m* is moved the connection with the boiler-drum can be shut off and also that with the drain, so as to retain the water within the superheater. When, however, the hand-wheel *m* is turned in the proper direction, the drain-pipe is placed in connection with one of the flooding-pipes *n* and the water drained from the superheater.

I mount my vibrating link *l* in such a position upon the hand-wheel *m* that when the drain and flooding pipes are placed in connection the main-valve wheel *d* is locked in its closed or shut-down position, so that it is impossible to withdraw steam from the boiler while the three-way valve *m* is open either to the drain or to the flooding pipes. When, however, the hand-wheel *m* is moved to shut off the drain after it has withdrawn the water from the superheater, that movement I make to carry over the links and levers *l k e*, so as to cause a projection *o* upon the sliding lever *e* to thrust against a weighted end of the pawl *f*, and thus to disengage the pawl from the teeth *g* of the hand-wheel *d*. Thus the pawl on the hand-wheel will only be disengaged from its ratchet when this hand-wheel is in one particular position, this position being reached only by turning the hand-wheel of the three-way valve from the flooding position of the valve past the draining position of the same and thence on to the shut position of the valve *b*.

When it is desired to provide for an interval between the movement of the draining and the closing positions of the valve *b*, so as to insure a sufficient time for draining the superheater completely of water, I sometimes

employ a slow-motion actuating-gear in the form of a worm and worm-wheel for setting the valve-spindle in motion, and to prevent any tampering with the locking-pawl *f* I prefer to inclose it in a box or casing *r*, and I make the hand-wheel with a projecting flange on the under side, which covers the side of the casing in a manner to prevent the introduction of any foreign article which might remove the pawl from its position. I mount the pawl *f* in one convenient manner on the casing *r*, as shown in Fig. 4, and I cause the weighted end to work upon a cut-away portion or in a slot formed in the rod *e*, as shown in Figs. 3, 4, and 5.

I modify the method of actuating my locking-gear to suit the type of hand wheel or lever which may be employed upon any particular valve, and I vary the linkage and connecting members for joining the movement of the one valve-wheel to the other to suit the size of boiler and type of superheater and valves to which such locking mechanism is to be applied.

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

1. In mechanism for use in connection with the valves of steam-boilers and superheaters, the combination of a ratchet and pawl with the hand-wheel or actuating member of the main-steam-valve spindle, a sliding pawl-actuating rod, and links attached to the hand-wheel or controlling-lever of the flooding-valve of the superheater, substantially as described.

2. In steam-boilers and superheaters, the combination of a three-way valve for flooding and draining the superheater, with links and rods actuated by the movement of the spindle of the three-way valve substantially as described.

3. In steam-valves for use upon boilers and superheaters, in combination a main-steam-valve wheel provided with a ratchet on its under surface, a pawl for engagement with such ratchet, and a moving rod for actuating the weighted end of the pivoted pawl substantially as described.

4. In steam-boilers and superheaters, in combination, a main steam-valve having a ratchet upon its under surface, with a pawl capable of engaging therewith; a sliding rod for actuating the pawl, with a casing for inclosing the pawl and actuating portion of the sliding rod, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

ARTHUR THOMAS COOPER.

Witnesses:

G. CROYDON MARKS,

ALBERT E. PARKER.