No. 701,542. Patented June 3, 1902.

T. CLARKSON.

REGULATOR FOR STEAM GENERATORS.

(Application filed July 20, 1899.)

(No Model.) 2 Sheets—Sheet 1.

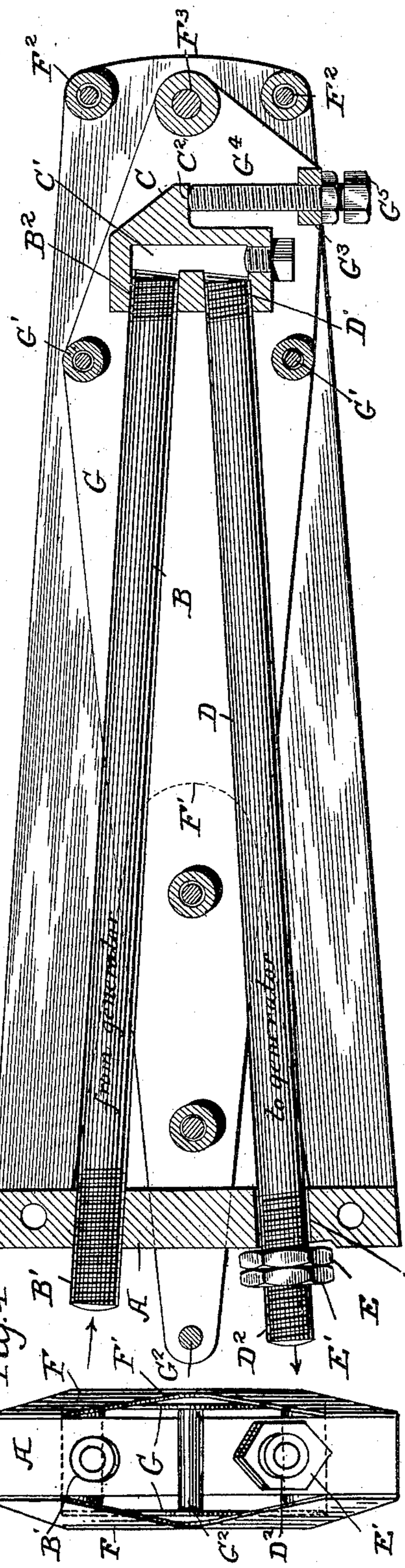

Fig. 1.

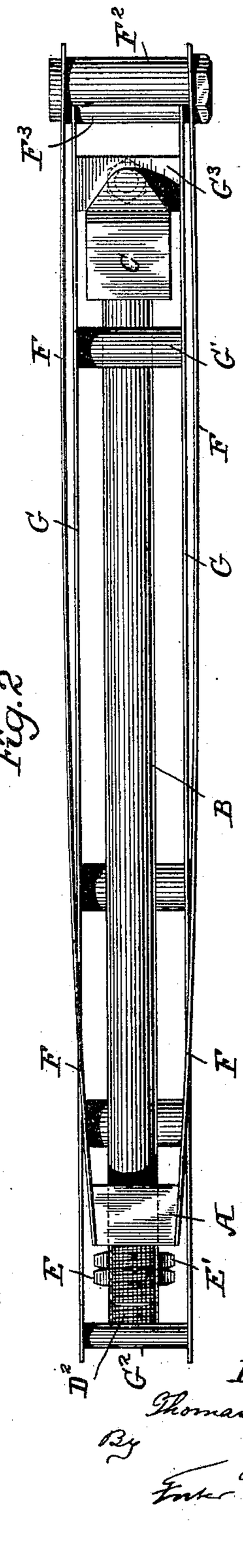

Fig. 2.

Fig. 4.

Witnesses
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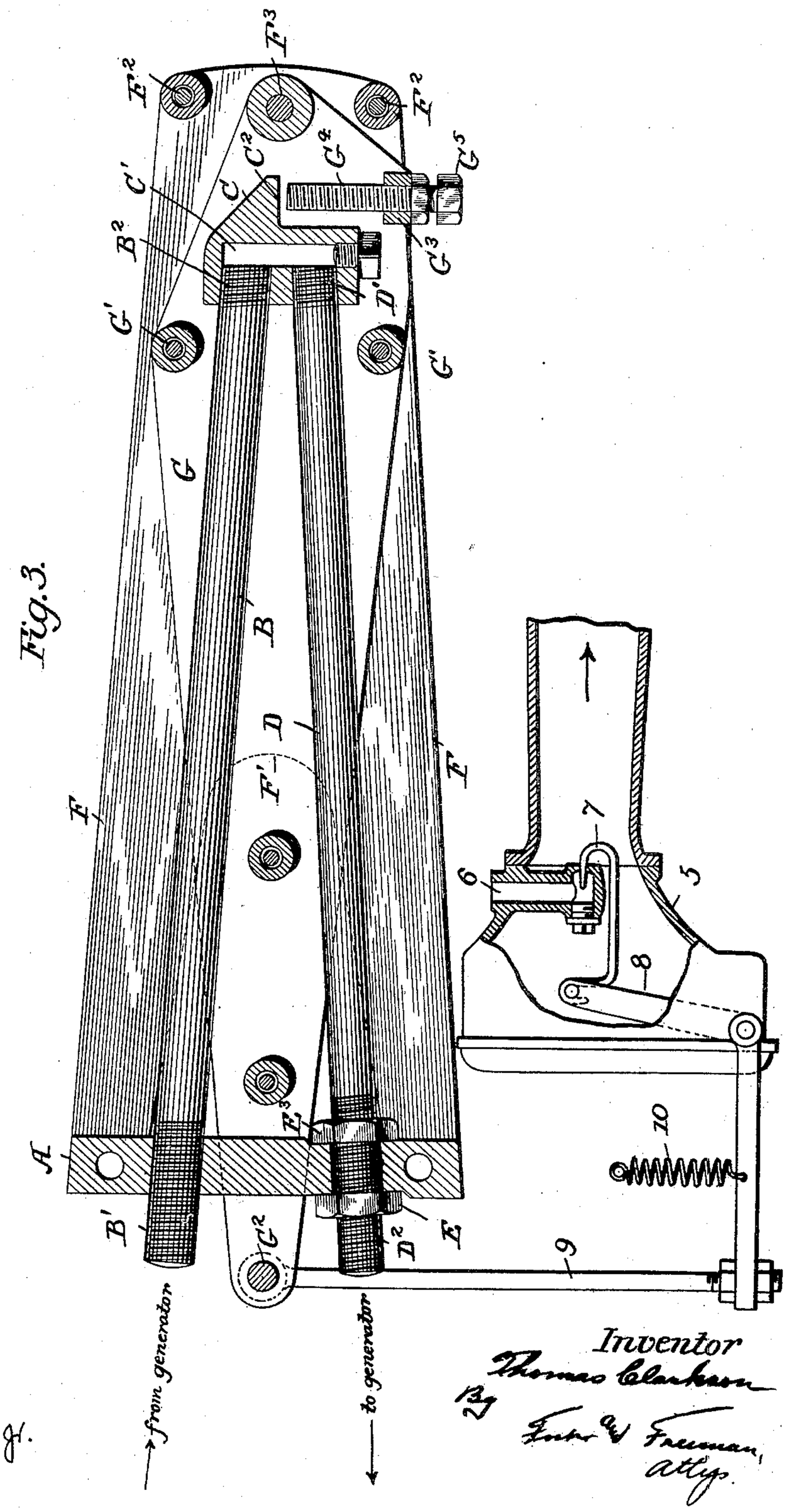

Fig. 3.

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UNITED STATES PATENT OFFICE.

THOMAS CLARKSON, OF LONDON, ENGLAND.

REGULATOR FOR STEAM-GENERATORS.

SPECIFICATION forming part of Letters Patent No. 701,542, dated June 3, 1902.

Application filed July 20, 1899. Serial No. 724,547. (No model.)

To all whom it may concern:

Be it known that I, THOMAS CLARKSON, a subject of the Queen of England, residing at London, England, have invented certain new and useful Improvements in or Relating to Regulators for Steam-Generators, (for which I have made application for Letters Patent in Great Britain under No. 5,775, dated March 16, 1899,) of which the following is a specification.

This invention relates to regulators for steam-generators; and its object is to construct a regulator which will control the supply of heat to the generator in accordance with the temperature of the contents of the generator at that point in the latter where the regulator is connected.

According to this invention two tubular metallic members having different coefficients of expansion are disposed in the path of the contents of the generator and the steam or other fluid from the generator led through them. The metallic members are so arranged that when the temperature of the contents of the generator or the temperature of the generator itself reaches or exceeds a certain limit the members, owing to their difference of expansion, will act as a lever, which will move so as to put in action mechanism which will control the supply of heat to the generator—as, for example, by shutting off the supply of fuel to an oil or similar burner.

In the accompanying drawings, Figure 1 is a sectional elevation of one construction of the improved regulator. Fig. 2 is a plan of the same. Fig. 3 is a sectional elevation of a modified construction, showing also part of a burner the valve of which is connected to the regulator. Fig. 4 is an end view of Fig. 1 looking from left to right and on a reduced scale.

Like letters indicate like parts in all the figures.

Referring now to Figs. 1 and 2, A represents a bar which is secured rigidly in position wherever desired and forms the main support of the regulator, and into this bar A is screwed one end B′ of a brass tube B. The other end B^2 of this tube is screwed into a steel block C, hollowed out, as at C′, and provided with a shoulder or projection C^2. Through a hole A′ in the bar A is passed an iron tube D, one end, D′, of which is screwed into the block C, the other end, D^2, projecting through the hole A′ in the bar A. The end D^2 of the tube D is screw-threaded and carries a nut E and a lock-nut E′. If steam is now allowed to pass in at the end B′ of the tube B, through the hollow C′ in the block C, through the tube D, and out at the end D^2, the tubes B and D will expand, but in different ratios, with the result that the tube D will be drawn out from the hole A′ in the bar A, and the nut E will butt up against the face of the bar A. If the expansion still continues, the block C will be moved downward, owing to the expansion of the brass tube B being greater than that of the iron tube D, the tubes acting as a lever. This movement is utilized by the following mechanism to bring about control of the heat to the generator.

Projecting from the bar A and lying on either side of the tubes B and D are arranged two plates F, which are cut away, as indicated in dotted lines at F′. At their free ends the plates F are connected by bolts F^2, another bolt F^3, which passes through the two plates, serving as the pivot for a lever formed of two plates G, which lie on either side of the tubes B and D and with their pivoted ends between the plates F. The plates G are connected together by bolts G′, and the free ends of these plates pass out from the openings F′ in the plates F and are joined together by a bolt G^2, preferably on the side of the bar A remote from that on which the pivot of these plates is situated. Between the plates G and securely attached to them near the pivot F^3 and in a suitable position in relation to the block C is a bar or block G^3, through which passes a set-screw G^4, the end of which lies beneath the shoulder C^2 on the block C. The set-screw G^4 is provided with a lock-nut G^5 to enable it to be fixed in any position. If now the block C is moved in the manner described, the shoulder C^2 will come in contact with the end of the screw G^4, and further movement of the block C in a downward direction will bring about a downward movement of the lever formed of the plates G. The lever is caused to return to its normal position by a balance weight or spring.

In Fig. 3 a part of a burner is indicated by 5, the vapor-supply passage being indicated

by 6. A needle-valve 7 controls the flow of vapor from the supply-passage to the mixing-tube, and this valve is connected to one arm of a bell-crank lever 8, the other arm being connected by a rod or link 9 to the free end of the plates G. A spring 10 is connected to the bell-crank lever and to a fixed support and tends normally to hold the lever in such position that the valve 7 will be open. Said spring may also be utilized to hold the free ends of plates G in their normal position. It is obvious that as the free ends of the plates G are forced downwardly by the action of the regulator such movement will tend to close the valve 7 and reduce the supply of vapor to the mixing-tube. It is of course to be understood that the foregoing is only illustrative of one way in which my regulator may be utilized.

In the construction shown in Figs. 1 and 2 the block C always remains in contact with the screw G^4; but no movement of the lever will take place until the tubes B and D have expanded sufficiently to cause the nut E to butt up against the bar A, through which they pass loosely. In the modification shown in Fig. 3, however, in place of the tube D passing freely through a hole in the bar A the tube is secured there by the lock-nuts E^3. With this arrangement the block C is normally in such a position that the shoulder C^2 does not quite touch the end of the screw G^4, contact taking place when sufficient expansion has caused the tube B to bend the tube D downward.

The space between the bar A and the nut E in the construction shown in Figs. 1 and 2 or between the shoulder C^2 and the end of the screw G^4 in the construction shown in Fig. 3 constitutes a certain amount of slack, which has to be taken up before the lever formed by the tubes B and D operates to move the lever G. By adjusting this space, therefore, the temperature at which the apparatus is to come into operation is determined.

Without limiting myself to the precise details of construction shown, I claim—

1. In a regulator for steam-generators, the combination of two tubular metallic members having different coefficients of expansion and adapted to be connected to the generator to permit a heated fluid from the generator to flow through them, a rigid base supporting one end of each member and a movable connection for the other end of each member, a lever pivoted adjacent to the said members, a projection on the lever adapted to be engaged by said connection and adjustable in relation thereto, a device for controlling the feed of fuel to the generator, and connections between the lever and such device, substantially as and for the purpose specified.

2. In a regulator for steam-generators, the combination of two tubular metallic members having different coefficients of expansion and adapted to be connected to the generator to permit a heated fluid from the generator to flow through them, a rigid base to which one end of each member is attached, a movable connection for the other ends of the members, a lever pivoted adjacent to the said members, a projection on the lever adapted to be engaged by said connection and adjustable in relation thereto, a device to control the feed of fuel to the generator, and connections between the lever and such device, substantially as and for the purpose specified.

3. In a regulator for steam-generators, the combination of the fixed support, A, tubular metallic members B and D, secured at one end to the support A and having different coefficients of expansion and adapted to be connected to the generator to permit a heated fluid from the generator to flow through them, a movable connection C for the other ends of the tubular members, plates F secured to the support A and projecting therefrom, a lever G pivoted between the outer ends of said plates, a projection G^4 supported on the said lever to be engaged by the connection C, means to adjust said projection relatively to the connection C, a valve to control the feed of fuel to the generator, connections between the lever G and said valve, and means to move the valve and lever in a direction opposite to that in which they are moved by the connection C, substantially as and for the purpose set forth.

In testimony whereof I have hereunto set my hand in the presence of the two subscribing witnesses.

THOMAS CLARKSON.

Witnesses:
W. M. HARRIS,
FRED C. HARRIS.