

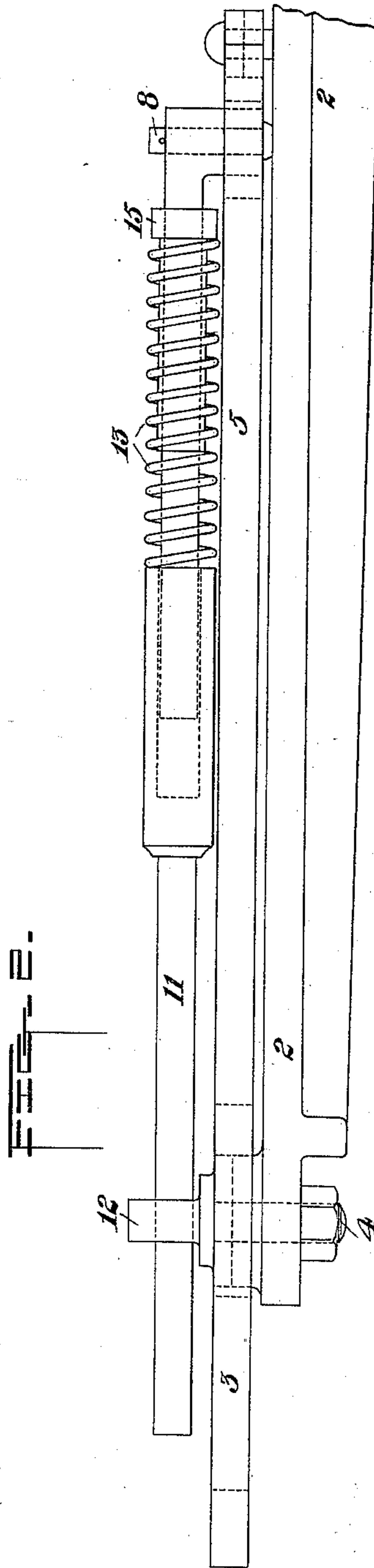
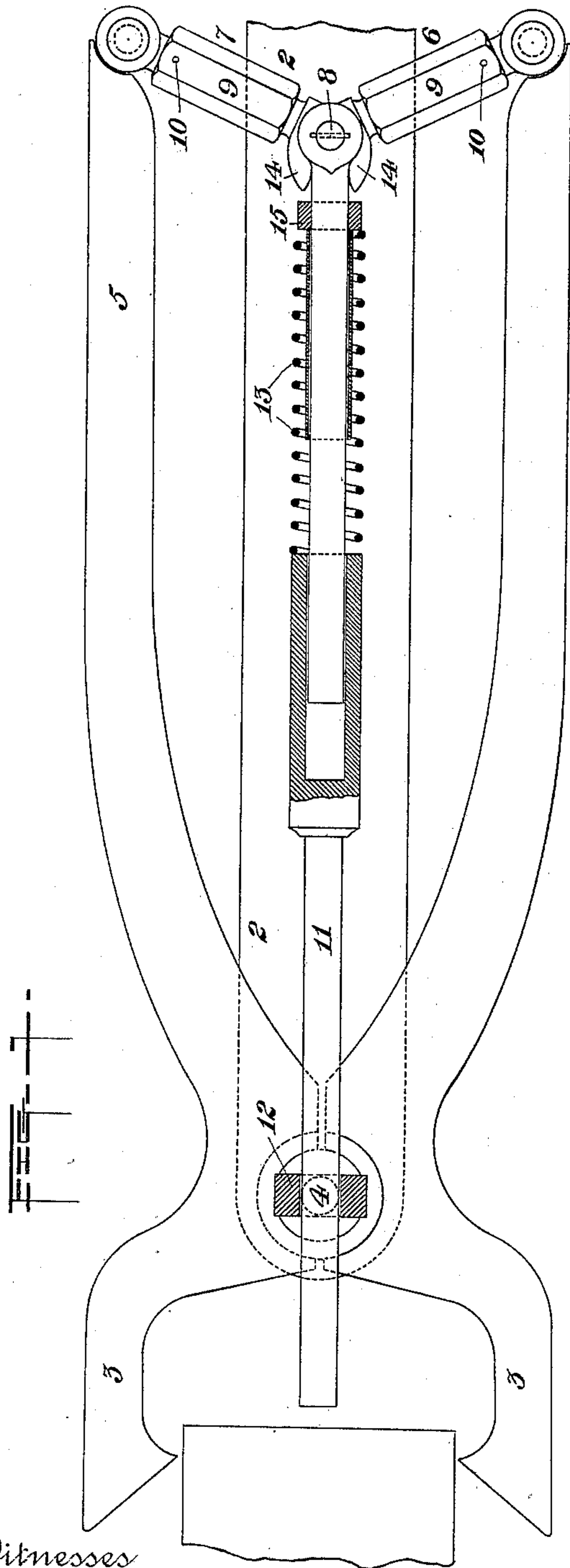
(No Model.)

3 Sheets—Sheet 1.

T. JAMES.  
FURNACE TONGS.

No. 409,843.

Patented Aug. 27, 1889.



Witnesses  
*A. B. Gill*  
*N. D. Corwin*

Inventor  
*Thomas James*  
by *W. Baxwell & Son*  
his Attorneys

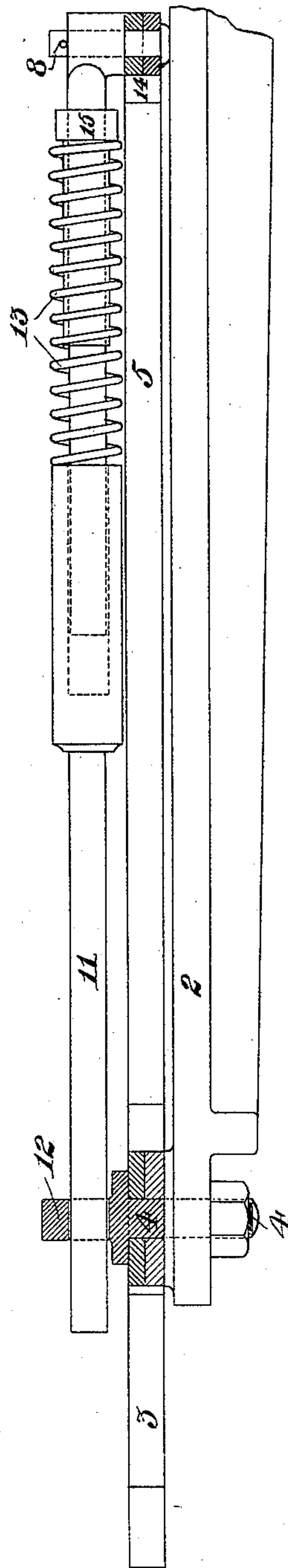
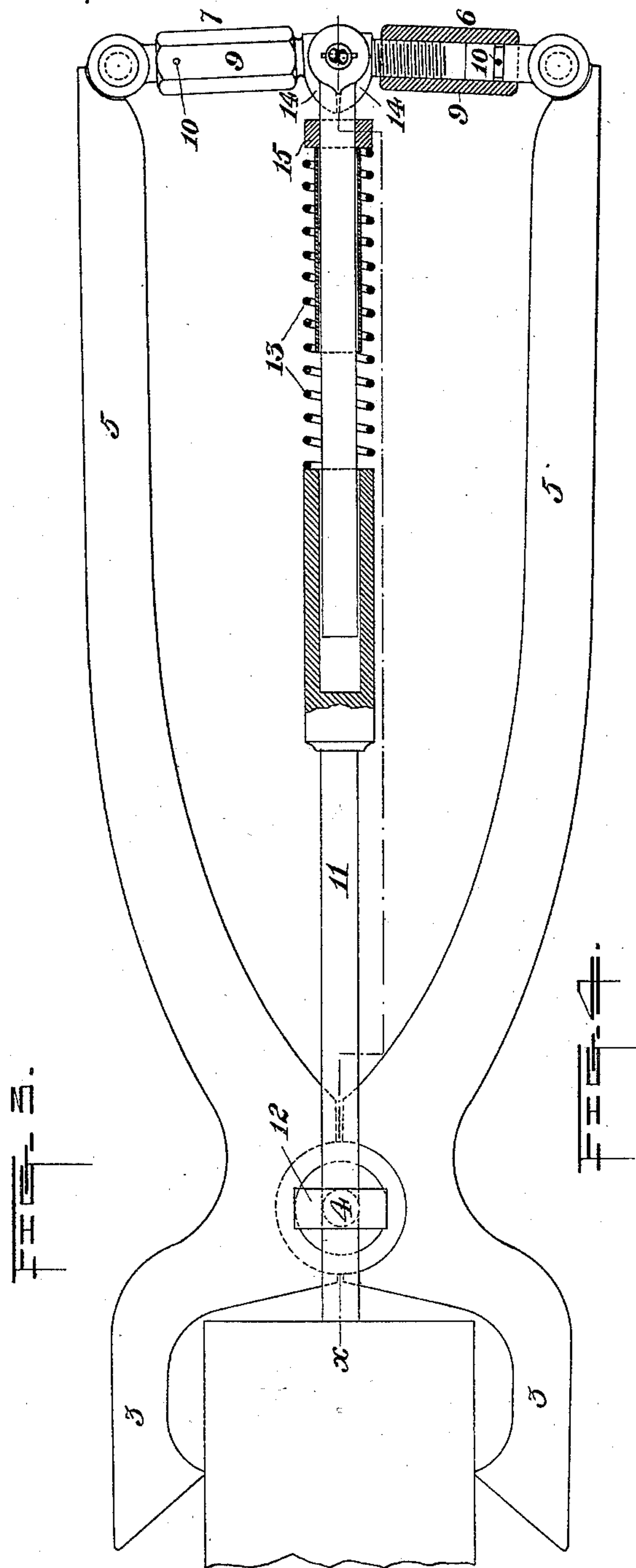
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3 Sheets—Sheet 2.

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*H. L. Gill*  
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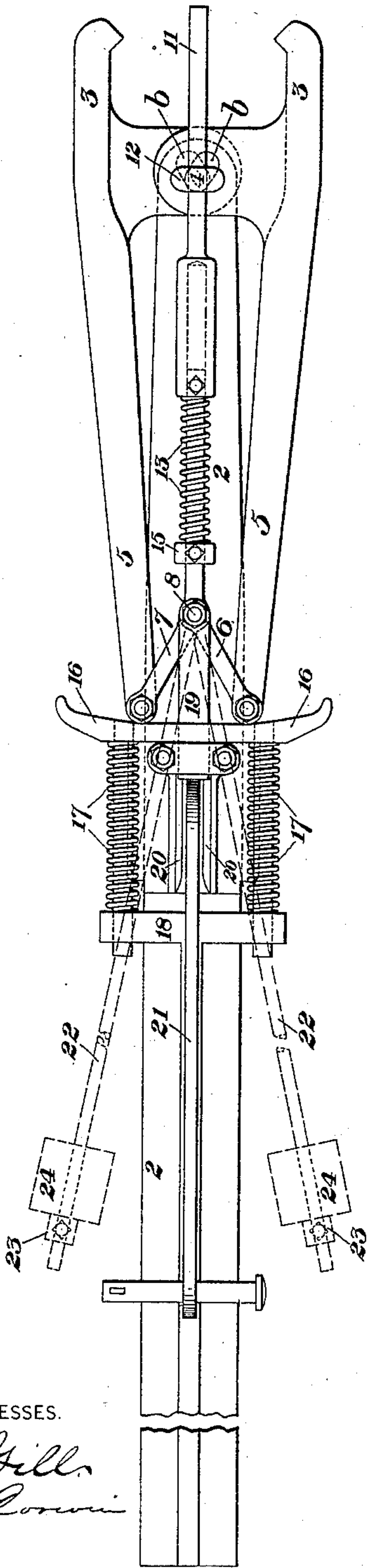
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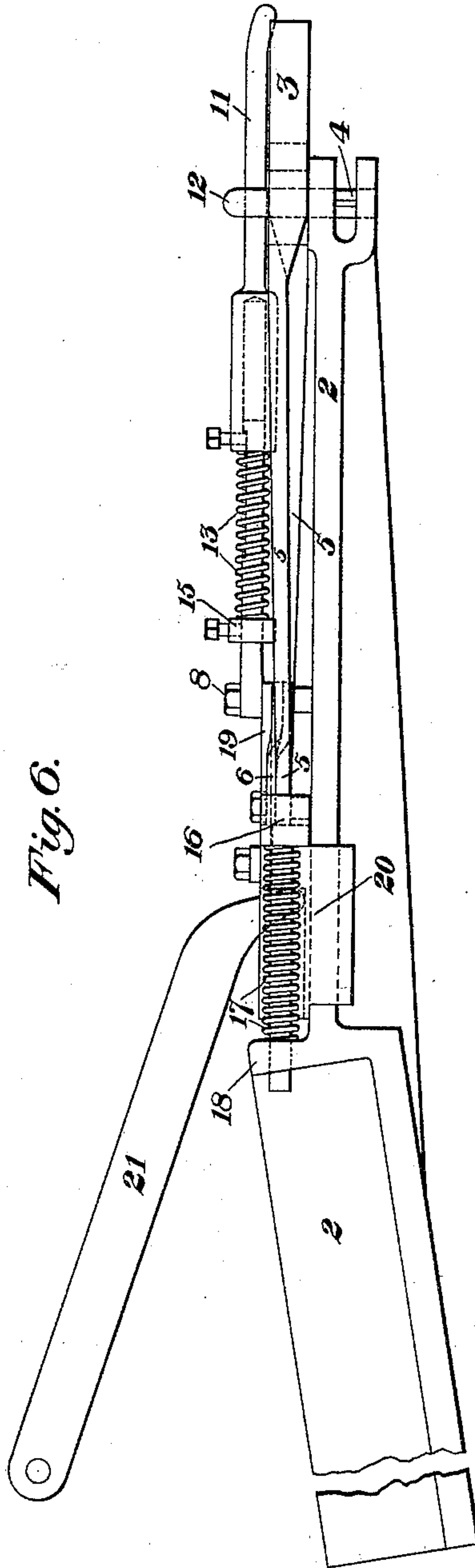
Fig. 5.



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Fig. 6.



INVENTOR.

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# UNITED STATES PATENT OFFICE.

THOMAS JAMES, OF BRADDOCK, PENNSYLVANIA.

## FURNACE-TONGS.

SPECIFICATION forming part of Letters Patent No. 409,843, dated August 27, 1889.

Application filed April 15, 1889. Serial No. 307,248. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS JAMES, of Braddock, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Furnace-Tongs, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a sectional plan view of my improved tongs, showing them in connection with an ingot or bloom, but before the tongs have seized the same. Fig. 2 is a side view of the tongs. Fig. 3 is a sectional plan view of the tongs when closed upon an ingot or bloom. Fig. 4 is a vertical longitudinal section on the line  $x x$  of Fig. 3. Fig. 5 is a plan view showing a modified form of the tongs. Fig. 6 is a side elevation thereof.

Like symbols of reference indicate like parts in each.

Heretofore where tongs have been employed for the purpose of withdrawing ingots or blooms from heating-furnaces they have consisted simply of pivoted jaws having rearwardly-projecting arms operated by the hands of the workman, thus necessitating his close approach to the intensely-heated furnace. This serious disadvantage I design to obviate by providing tongs which shall be automatic in their action both of gripping and releasing the ingot or bloom.

My invention consists in tongs composed of pivotally-connected jaws provided with arms which are connected by toggle-levers or the like, these toggle-levers being arranged so that when the tongs enter the furnace in proper relation to the ingot a stop (preferably the object to be grasped) shall engage the tongs and shall operate the toggle-levers, so as to close the jaws together on the ingot.

It also consists in certain details of construction of the apparatus.

Referring now to the drawings, 2 represents the frame of the carriage on which the tongs are mounted. This carriage is longitudinally movable up to and from the furnace-door, and by its backward movement the ingot or bloom is drawn out of the furnace after the tongs have grasped it.

3 3 are the jaws of the tongs, which are piv-

otally mounted near their front ends on the carriage-frame on a pin or post 4. The whole tongs can therefore be oscillated on this pivot. The jaws 3 have rearwardly-projecting arms 5, and, unlike the arms of the tongs now in common use, they preferably do not cross each other at the pivot. Hence, to produce an inward motion of the jaws the lever-arms 5 are moved outwardly, and to cause the separation of the jaws the arms are moved toward each other. The advantage of this arrangement is that it affords great facility in the introduction of the tongs into a furnace-door. The jaws of the tongs are open when they are introduced, and the arms 5, being then in the position most nearly approaching each other, occupy comparatively little space and are easy to handle.

To open and shut the jaws of the tongs, the arms 5 are connected at their extremities by toggle-levers 6 and 7, which are pivotally connected with the arms and are also connected with each other by a pin 8. In order to make these toggle-levers adjustable, I part them, as shown in Fig. 3, and connect the parted ends of each by a sleeve-nut 9, which screws on one of the parts of the arm and is connected with the other parts by a pin 10, which fits in a peripheral groove on the lever-arm. The nut can thus be turned in either direction to cause the shortening or lengthening of the lever, and the length of these levers determines the nearness of approach of the jaws, which are operated by movement of the levers, being opened when the levers are in the inclined position shown in Fig. 1 and closed when the levers are substantially in line with each other, as shown in Fig. 3.

In order to prevent the backward motion of the lever-arms 6 and 7 farther than the position in which they are shown in Fig. 3, I provide them at their inner ends with stops 14, which are so arranged that when the lever-arms come into this position the stops shall engage each other.

I will now describe the means which I employ for moving the toggle-levers and thus opening and closing the jaws of the tongs. A rod 11 is pivotally connected at its rear end to the toggle-levers by the pin 8, and thence extends forward through a guide-eye 12 on



the top of the pin 4, and projects beyond this eye between the jaws of the tongs.

Referring now to Fig. 1, the jaws of the tongs are shown open, and the carriage-frame 2 is in the act of moving forward into the furnace. This motion of the carriage is so directed and the tongs are so turned on the pivot 4 that the jaws of the tongs shall pass on both sides of the ingot, and when it has moved forward sufficiently to cause the end of the rod 11 to engage the end of the ingot the effect is to push the rod back, thus straightening the toggle-levers, spreading the arms 5, and causing the jaws 3 to bite upon the ingot, as shown in Fig. 3. The carriage may then be moved back, and the tongs having a firm grasp on the ingot will draw it out with the carriage.

In order to provide for the loosening of the tongs from the ingot, I part the rod 11 in the middle, making one part fit telescopically within the other, and between the one part and a collar 15 on the other part I interpose a spring 13. This spring is of sufficient rigidity that when the forward end of the rod 11 engages the ingot the resistance of the ingot shall be transmitted by the spring to the rear part of the rod 11, so as to spread the toggle-levers, and it is sufficiently yielding that when in the back motion of the carriage 2 the middle joint of the toggle-lever engages any suitable stop the toggle-joint shall yield and the rear part of the rod 11 shall move forward within the other part, thus spreading the jaws and bringing the parts of the tongs into the position shown in Fig. 1 and releasing the ingot.

In Figs. 5 and 6 I illustrate a modification of my improved apparatus. The gripping-jaws 3 and the arms 5 are arranged in substantially the same way as shown in Figs. 1 and 2, except that at their connection with the bolt 4 they are provided with obliquely-shaped slots *b*, through which said bolt passes, and at their rear ends the arms 5 bear against a cross-bar 16, which is backed by springs 17, interposed between the cross-bar 16 and a head 18 on the frame 2.

19 is a bar which projects rearwardly from the middle joint of the toggle-levers 6 and 7 and fits within a box 20 on the carriage-frame.

The operation of this form of my improvement is as follows: When in the position shown in Figs. 5 and 6, the tongs are open in position for grasping the bloom, and on introducing the tongs into the furnace the jaws are closed upon the bloom by engagement of the end of the rod 11 therewith, as before explained. If the bloom is too wide to fit between the jaws, the engagement of their ends therewith will force them back against the pressure of the springs 17, which yield, and, permitting the slotted portions *b* of the jaws to move back on the pin 4, cause the jaws to spread somewhat, so that they may engage the bloom. As the carriage-frame further advances into the furnace, the pressure of the

bloom upon the rod 11 will cause the engagement of the jaws by action on the toggle-levers 6 and 7, as before explained. When the bloom is withdrawn from the furnace by drawing back the carriage-frame 2, a lever-arm 21 drops into a slot in the box 20 and engages the end of the bar 19, thus acting as a stop and causing the further retraction of the tongs to bend the toggle-levers, as shown in Fig. 5, and thereby to open the jaws 3. As soon as these jaws are thus disengaged from the ingot the spring 13, which was previously compressed by engagement of the rod 11 with the bloom, reacts and pushes back the bloom (now resting on the rollers of the receiving- buggy or other support) clear of the grip of the jaws.

The advantage of the slotted connection between the jaws is that it enables them to be set quite closely together, so that they may be introduced into narrow furnace-doors, their divergence not taking place until they have been so introduced.

If desired, instead of operating the tongs by engagement of the rod 11 with the end of the object to be grasped, they may be operated by rods 22, extending from the joint of the toggle-levers 6 and 7 and provided with adjustable rollers 23, which are adapted to engage with fixed boxes or stops 24, as shown by dotted lines in Fig. 5.

In advancing the carriage-frame 2 into the furnace the engagement of the collars 23 with the stops 24 causes the rods 22 to draw on the toggle-levers and to close the jaws. In practice these collars are adjusted so that they shall act upon the jaws to close them when the jaws are in the position required to grasp the ingot.

The advantages of my improvement will be appreciated by those skilled in the art.

The tongs are simple in construction, strong, and durable, and their use results in a saving of labor to the workmen, making the work of discharging ingots from the furnace much easier and subject to much less discomfort than heretofore.

The tongs may be modified considerably in mechanical details, and I therefore do not limit myself to the precise form and arrangement of the parts which I have shown and described, although I deem these to be the best suited for the purpose. Nor do I desire to limit myself strictly to any specific use to which the tongs may be put. They are adapted not only to the removal of ingots or blooms from heating-furnaces, but also to the removal of crucibles and other objects from furnaces or other places difficult of access.

I claim—

1. Tongs having pivoted jaws and arms, in combination with a rod which projects between the jaws and toggle-levers connecting the rod with the arms, substantially as and for the purposes described.

2. Tongs having pivoted jaws and arms and a rod which projects between the jaws



and is connected with the arms to operate them, substantially as and for the purposes described.

5 3. Tongs having pivoted jaws and arms and a rod which projects between the jaws and is connected with the arms to operate them, said rods being made in movable parts and provided with a spring, substantially as and for the purposes described.

10 4. The combination of a longitudinally-movable carriage or frame, tongs carried thereby and provided with movable jaws and arms, and mechanism connected with said arms and adapted in the movement of  
15 the carriage to engage a stop to operate the jaws, substantially as and for the purposes described.

5. In furnace-tongs, the combination of

the pivoted gripping-jaws, provided with obliquely-slotted connections, and a spring 20 which permits motion of the jaws in said slotted connection to cause their approach, substantially as and for the purposes described.

6. In furnace-tongs, the combination of 25 the pivoted gripping-jaws provided with obliquely-slotted connections, which permit the approach of the jaws, substantially as and for the purposes described.

In testimony whereof I have hereunto set 30 my hand this 10th day of December, A. D. 1888.

THOMAS JAMES.

Witnesses:

W. B. CORWIN,  
JNO. K. SMITH.