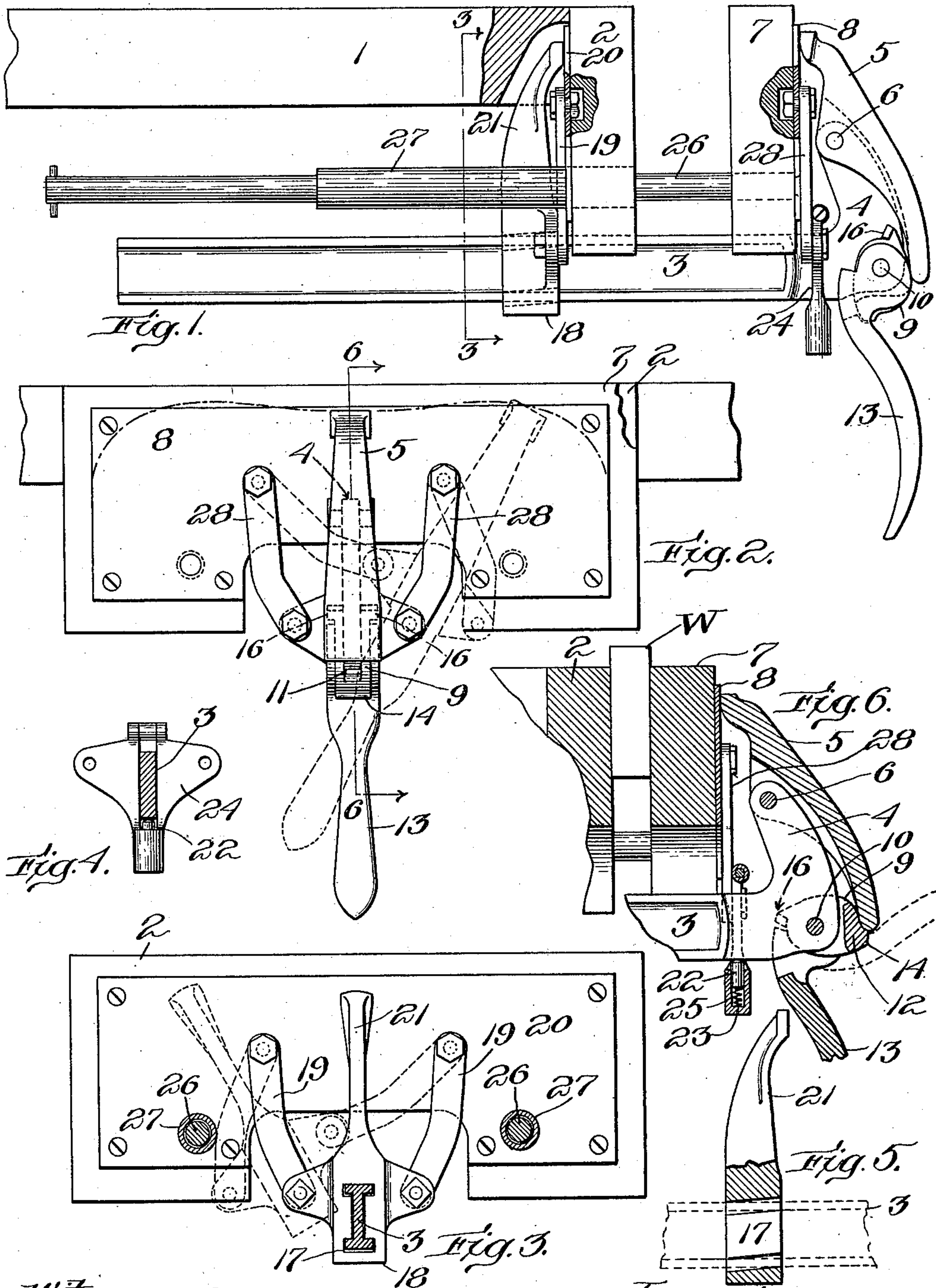


A. W. RICHARDS.
CLAMPING DEVICE.
APPLICATION FILED MAY 5, 1909.

996,884.

Patented July 4, 1911.



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UNITED STATES PATENT OFFICE.

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CLAMPING DEVICE.

996,884.

Specification of Letters Patent.

Patented July 4, 1911.

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To all whom it may concern:

Be it known that I, ARTHUR W. RICHARDS, a citizen of the United States, and a resident of Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Clamping Devices, of which the following is a specification.

My invention relates to clamping devices such as vises and like work holders, and is particularly intended to provide an improved vise of the type shown and described in an application for U. S. Letters Patent filed by me September 13, 1907, Serial No. 392,683. The vise herein described, like the device described in the application above noted, comprises a fixed jaw and a clamp for applying pressure to the work to hold it against the fixed jaw, the pressure-applying member being supported opposite the fixed jaw and having provisions for adjustment laterally, or in parallelism with the face of said jaw, and also toward and from the latter, according to the size of the work and the position of the point at which it is desired to apply the pressure of the clamping member; it also comprises, in addition to the characteristics just referred to, a novel arrangement of laterally-swinging links or hangers whereby the clamp is supported and guided in its lateral movements, an improved device for applying and releasing the clamping pressure, and also certain other features and details hereinafter described.

In the accompanying drawings: Figure 1 is a side view partly broken away, showing the preferred construction of my improved vise; Fig. 2 is a front view of the vise shown in Fig. 1; Fig. 3 is a section on the line 3—3 of Fig. 1; Figs. 4 and 5 are details hereinafter described; and Fig. 6 is a section on the line 6—6 of Fig. 2, showing a piece of work clamped in the vise.

In the particular arrangement illustrated in the drawings, 1 represents a work bench to one side or end of which is immovably secured the fixed jaw 2 of the vise, with the working face of said jaw extending vertically. Beneath the jaw 2 is located a clamping-carrying beam 3 provided at its outer end with an upwardly-extending portion 4, to which a clamping lever 5 is pivoted as at 6. The upper end of the lever 5 preferably operates upon a supplemental movable jaw

7 to the outer side of which is fastened a metal face plate 8 against which the lever 5 bears, although said lever 5 may be arranged to bear directly upon the work, if preferred. The lower arm of the lever 5 coöperates with a cam 9 adapted to turn loosely on a pin 10 extending through the outer end of the beam 3, said cam 9 being slotted as at 11, Fig. 2, to straddle the beam 3. The connecting web 12 uniting the two parts of the cam 9 serves as a weight which tends to hold said cam in the position shown in Fig. 1, and to return the cam to that position as hereinafter described. Also loosely pivoted on the pin 10 is a cam-operating member or handle 13 adapted when swung outwardly to engage a nose or stop 14 on the cam 9 and turn said cam with it, and also adapted under certain circumstances hereinafter described to engage stops 16 on the cam 9 and return said cam to its normal position when the handle 13 is swung inwardly.

The beam 3 is I-shaped in cross section for the greater part of its length, and just behind the jaw 2 it extends loosely through a correspondingly-shaped slot 17 in a bracket 18. The bracket 18 has a lug projecting from each side of it, and each lug is pivotally fastened to the lower end of a link or swinging hanger 19 pivoted at its upper end to a metal face plate 20 secured to the rear side of the jaw 2. For reasons hereinafter described the bracket 18 is preferably provided with an upwardly-extending arm 21 adapted to bear at its free end against plate 20, substantially opposite the upper end of the lever 5.

The outer end of the beam 3 rests upon a plunger 22 mounted to slide vertically in a pocket 23 provided in a bracket 24, said plunger being supported by a spring 25 locked within the pocket, and the bracket 24 is pivotally fastened to the lower ends of a pair of links or swinging hangers 28, which correspond in construction and arrangement to the hangers 19 and are pivoted at their upper ends to the face plate 8 of the jaw 7. The beam 3 passes through a slot in the bracket 24 and is of less thickness at this point than behind said slot, so that said beam 3 if moved forward or outward will carry the bracket 24, hangers 28 and jaw 7 with it, and said jaw 7 is guided during such movements and also restrained against

movements in the plane of its working face by means of a pair of inwardly-extending guide rods 26 secured at their outer ends to the jaw 7 and passing through suitable bearings such as tubes 27 carried by the fixed jaw 2 and extending rearward therefrom.

Normally the front end of the beam 3 is supported by the plunger 22 and spring 25 in such position that said beam is free to be slid inward or outward through the slot 17 in the bracket 18, but when a piece of work, as W, is placed between the jaws 2 and 7 and the jaw 7 is forced against the work by the lever 5, the reaction of said jaw 7 upon said lever 5 forces the outer end of the beam 3 downward until the flanges of said beam are caused to bind in the slot 17. This binding action is due to the impinging of the walls of said slot upon the under side of said flanges at the front end of the slot and upon the upper side of said flanges at the rear end of the slot, as shown in dotted lines in Fig. 1; in other words, the beam 3 is thrown out of alinement with the slot through which it passes until it is tightly gripped by the bracket 18, and is thereby held against endwise movement. The clamping pressure is then applied to the desired extent by operating the handle 13, the gripping action of the bracket 18 upon the beam being correspondingly intensified. When the clamping pressure on the work is released the spring 25 lifts the front end of the beam 3 and leaves said beam in position to slide freely inward or outward as before.

When the handle 13 is operated to apply the clamping pressure it is swung outward from the normal position shown in Fig. 1 to the position indicated in dotted lines in Fig. 6, by which movement the handle is caused to engage the nose or stop 14 and turn the cam 9 into the position shown in Fig. 6, whereby the lower end of the lever 5 is thrown outward. The handle 13 is then released and is free to return by gravity to its normal position, leaving the cam 9 held in the position shown in Fig. 6 by its frictional engagement with the lever 5, the stops 14 and 16 being located at such a distance apart as to provide sufficient free movement between the handle 13 and cam 9 to permit said handle to return to its normal position without moving the cam. The position of the stops 16 is such, however, that when the cam 9 is in the work-clamping position shown in Fig. 6 the handle 13, if swung inward or toward the jaw 2, will engage said stops 16 and move said cam sufficiently to relieve the pressure of the same upon the lever 5, thereby relieving the jaw 7 from the clamping pressure exerted thereon. This arrangement of the cam 9 and handle 13 is advantageous for the reason that after a piece of work has been clamped against the jaw 2 said handle 13,

when released, will return to its lowermost position, where it is least likely to interfere with the manipulation of any tools which may be used in operating upon the work and where its weight will have no tendency to release the pressure exerted by said cam on the lever 5.

The lower portion of the lever 5 is preferably made wide enough to overlap the pivoted end of the operating handle 13 on both sides of the cam 9, in which case said end of the handle is so shaped, as shown in Fig. 1, that it provides a supporting surface coinciding in peripheral contour with that portion of the cam 9 which first engages said lever 5 when the handle 13 is swung outward, so that during the initial outward movement of said handle the lever 5 has a bearing not only on the cam but also on the handle itself, the wear on these parts being correspondingly distributed and diminished. During the last portion of the operative movement of the cam 9, however, the lever 5 is moved out of contact with the handle itself, leaving the latter free to drop downward as above explained.

The suspension of the beam 3 by means of the hangers 19 and 28 permits the upper or pressure-applying end of the lever 5 to be moved laterally in either direction from its normal or central position shown in Fig. 2, so that the point of application of the clamping pressure on the work may be correspondingly shifted, and the employment of said hangers for this purpose has the advantageous result that by properly arranging and proportioning the parts said upper end of the lever 5 may be caused to move along a path which follows closely the upper and end edges of the jaw 7, as indicated by the dotted line in Fig. 2, which path includes all the points at which it will usually be desirable to localize the clamping pressure. In the operation of the device the operator can hold and adjust the work with one hand and manipulate the handle 13 with the other hand, first to push the jaw 7 against the work, then to bring the upper end of the lever 5 into the desired position, and finally to apply the clamping pressure to the work.

Since the upper end of the arm 21 is located substantially opposite the upper end of the lever 5, said arm 21 effectively resists the thrust exerted by said lever 5 and, by re-acting on the bracket 18, tightens the grip of said bracket on the beam 3. The clamping pressure is therefore exerted in a line joining the upper ends of the arm 21 and the lever 5 and lateral strains on the clamping mechanism are thereby prevented, so that the jaw 7 has no tendency to bind and the guide rods 26 do not have to resist any lateral thrust, wherefore they need not be so strong or so accurately fitted to their bear-

ings as would be otherwise necessary or desirable. The upper end of the arm 21 of course moves laterally in unison with the upper end of the lever 5, so that said parts are kept opposite each other in all positions, the under side of the bench 1 being cut away as shown in Fig. 1 to permit the lateral movements of said arm 21. The jaw 7 and the plates 8 and 20 are also recessed on their lower edges as shown in Figs. 2 and 3, for a similar reason. The hangers 19 and 28 not only guide the upper ends of the parts 21 and 5 in the desired path but also positively connect the brackets 18 and 24 to a supporting fixture, while the beam 3, being supported by the plunger 22 and spring 25, is normally free to be adjusted longitudinally and is automatically locked when the clamping pressure is applied, as previously described. All of these advantages, together with the advantages due to the simplicity of the various parts and the relatively slight amount of machine work involved in constructing the same, will be sufficiently apparent without further description, and it will also be evident that the particular details of construction illustrated may be variously modified without departing from my invention.

I claim as my invention:

1. A clamping device comprising a beam and pressure-applying means carried thereby, a pair of brackets supporting the same, and pivoted hangers for said brackets, whereby the point of application of the clamping pressure may be shifted laterally with respect to the work.

2. A clamping device comprising a fixed jaw, a pair of hangers pivotally connected thereto at their upper ends, a supporting bracket pivoted to said hangers, a beam passing through said bracket and adjustable lengthwise with respect to the same, means for locking the beam and bracket in fixed relation to each other, and pressure-applying means carried by said beam and extending upward therefrom.

3. A clamping device comprising a beam provided with an upwardly-extending clamping lever, a bracket adjustable longitudinally on said beam and having means for locking it thereto, an arm extending upward from said bracket to a point substantially opposite the upper end of the clamping lever, pivotally-mounted hangers supporting said beam and bracket and arranged to swing laterally with respect to the length of the latter, relatively-movable jaws located between the upper ends of said arm and clamping lever, and means for operating the latter to apply pressure to the work.

4. A clamping device comprising a fixed jaw, a movable jaw mounted to approach and recede from the fixed jaw, hangers pivotally suspended on the outer faces of said

jaws, a beam pivotally supported by said hangers, and means carried by the beam for exerting a clamping pressure on said jaws.

5. A clamping device comprising a fixed jaw, a movable jaw mounted to slide toward and from the fixed jaw, two pairs of hangers pivoted to the outer faces of said jaws respectively, a pair of brackets pivoted to the lower ends of the respective pairs of hangers, a beam passing through said brackets, means for locking said beam to the bracket supported from the fixed jaw, a clamping lever pivoted to the outer end of said beam, and means for operating said clamping lever.

6. A clamping device comprising a fixed jaw, a movable jaw mounted to slide toward and from the fixed jaw, two pairs of hangers, pivoted to the outer faces of said jaws respectively, a pair of brackets pivoted to the lower ends of the respective pairs of hangers, a beam passing through said brackets, means for locking said beam to the bracket supported from the fixed jaw, a clamping lever pivoted to the outer end of said beam, means for operating said clamping lever, and an arm extending upward from the bracket supported from the fixed jaw and terminating substantially opposite the pressure-applying end of the clamping lever.

7. A clamping device comprising a fixed jaw, a clamping lever having its pressure-applying end located opposite said jaw, and means for operating said lever comprising a pivotally-mounted cam and a pivoted handle mounted to swing independently of said cam and provided with means for engaging and actuating the latter.

8. In a clamping device, the combination with a fixed jaw of a lever having its pressure-applying end located opposite said jaw, a pivoted cam arranged to operate said lever, and a cam-operating handle mounted to swing independently of the cam and provided with stops to engage and operate said cam in either direction, said stops being so located as to provide for a free movement of the handle with respect to the cam.

9. In a clamping device, the combination with a fixed jaw of a beam extending outward therefrom and provided at its outer end with an upwardly-extending clamping lever, a cam pivoted to said beam and arranged to operate said lever, and a cam-actuating handle pivotally supported on the same axis as the cam and provided with stops to engage and operate said cam at the end of a free movement of the handle in either direction.

10. In a clamping device, the combination with a fixed jaw of a clamping lever, a pivoted cam arranged to operate the same, and a cam-actuating handle pivoted on the same axis as the cam, independently of the latter, and providing a supporting surface coinciding in peripheral contour with that portion

of said cam which first engages and operates said lever, said lever being of such width as to bear simultaneously upon the coincident portions of the cam and handle.

5 11. In a clamping device, the combination with a fixed jaw of a supporting bracket carried thereby and provided with a slot having gripping edges, a beam mounted to slide longitudinally in said slot and adapted
10 to be engaged and gripped by said edges, pressure-applying means carried by the outer end of said beam and extending upward therefrom, and a spring-actuating support normally holding the outer end of the
15 beam in position to release it from engagement by said bracket.

12. A clamping device comprising two jaws arranged to move toward and from each other, supporting brackets each sus-

20 pended by means of a pair of pivoted hangers on the outer faces of said jaws, a beam extending through said brackets and provided at its outer end with an upwardly-extending clamping lever, an arm extending
25 upward from one of the brackets, opposite the clamping lever, a cam pivoted to said beam, a cam-actuating handle independently pivoted to said beam and normally depending therefrom, and means for preventing
30 outward movement of the beam when the clamping pressure is applied.

In testimony whereof, I have hereunto subscribed my name this 3rd day of May, 1909.

ARTHUR W. RICHARDS.

Witnesses:

LOUIS KRAUS,
EUGENE HAINERT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
