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RATCHET CLAMP VERNIER

3,427,016

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Sheet 1 of 2

Fig. 1.

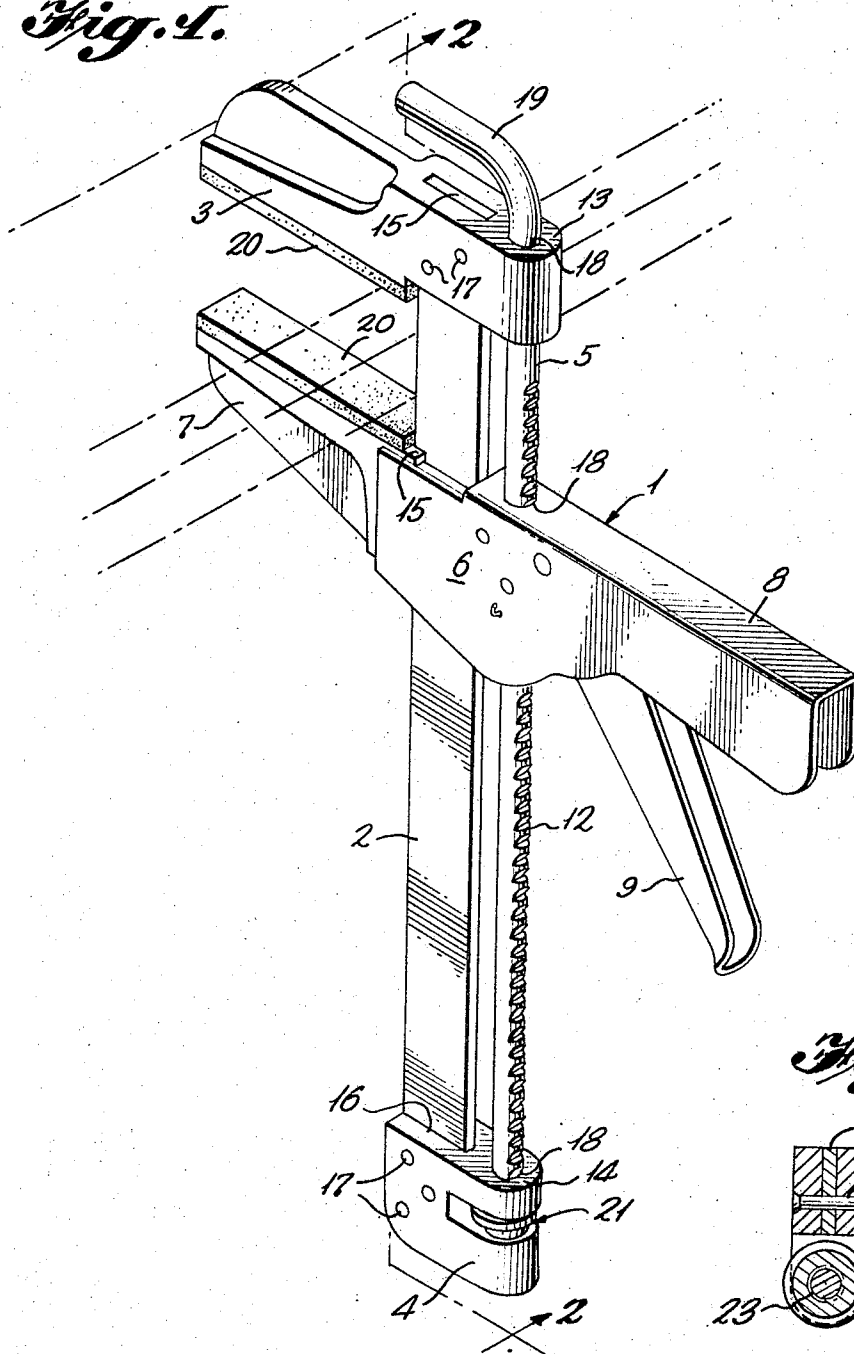
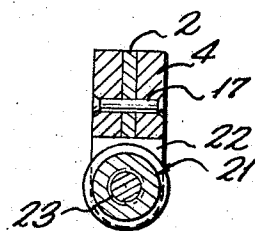


Fig. 3.



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Fig. 2.

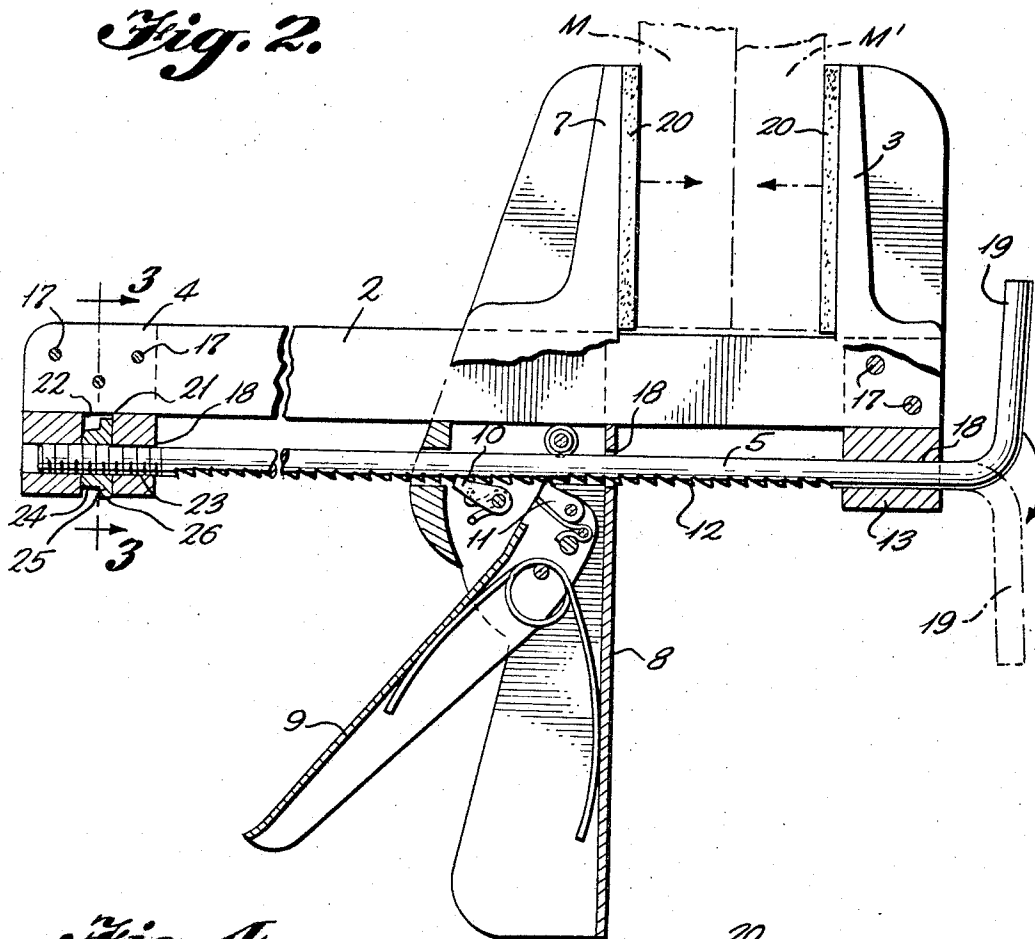
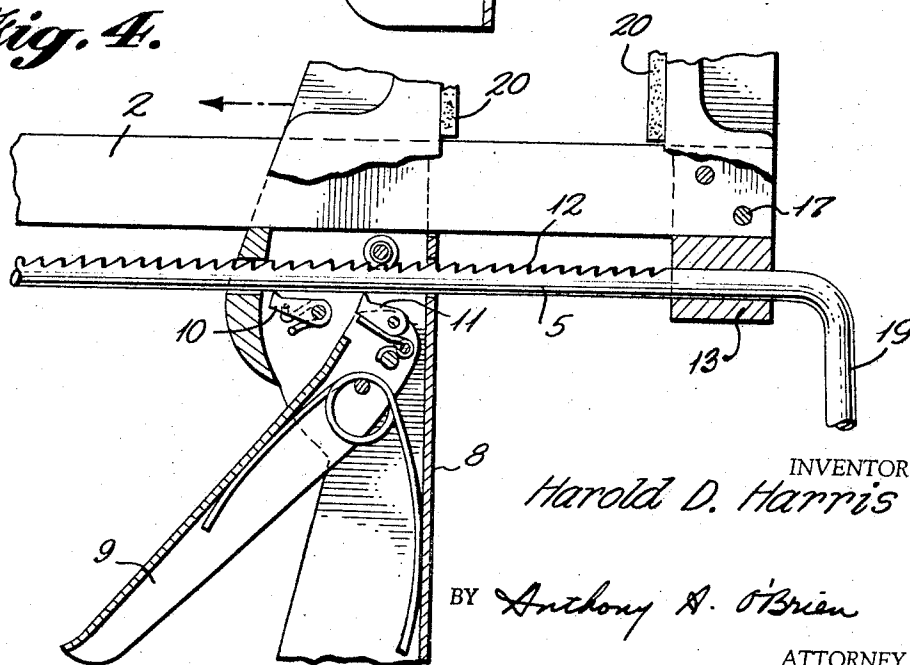


Fig. 4.



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RATCHET CLAMP VERNIER
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5 Claims

ABSTRACT OF THE DISCLOSURE

A device for adjusting the position of a movable jaw of a ratchet clamp relative to the fixed jaw thereof, wherein the ratch member is axially displaced, together with the movable jaw assembly, as a unit, while the jaw assembly is restrained against relative movement with respect to the ratch member.

Background of the invention

The ratchet clamp arrangement of the present invention is of the character generally employed for the purpose of immobilizing two or more articles or pieces of material in stacked relation by compressively gripping the upper and lower exposed surfaces of the stack between the jaws of the clamp, while performing a machining operation or the like, incident to the intended use of the material.

Conventional ratchet clamp devices are provided with a movable jaw adapted to be moved to clamping position relative to a fixed jaw by means of a pair of pawls carried by the movable jaw assembly, said pawls being designed for selective engagement with the teeth of a ratch member, whereby upon actuation of a trigger mechanism mounted on the movable jaw assembly, the jaw is moved longitudinally of the ratch into gripping contact with the material which is to be immobilized.

While the conventional, prior art clamp arrangements no doubt function for their intended purpose, they are open to objection for the reasons that the maximum gripping pressure which can be exerted on the material between the jaws, depends solely upon movement of the movable jaw assembly relative to the ratch tooth, by means of the trigger mechanism. In this regard, it will be appreciated that when the movable jaw is brought to maximum clamping position, that is to say, position of maximum compression obtainable by actuation of the trigger, the location of the check pawl, relative to the notches between successive teeth, is such that the pawl is unable to seat in normal holding position. Accordingly, when the trigger is released, there is a slight backing-off or retrograde movement of the jaw, in order to enable the check pawl to seat in holding position, which reverse movement of the jaw results in a diminution of the clamping pressure.

After considerable research and experimentation, I have found that above-noted deficiency of conventional ratchet clamps can be overcome by means of a vernier device constructed and arranged whereby, after the movable jaw assembly is brought to its maximum clamping position on the ratch rod by actuation of the trigger mechanism, the ratch rod may be axially displaced, thereby increasing the compressive action of the jaws on the material therebetween.

Summary of the invention

The improved ratchet clamp of the present invention comprises, essentially, a body member having a fixed jaw secured to one end thereof, a fitting secured to the opposite end of the body member, a vernier mechanism supported on said fitting, a ratch bar or rod having a threaded end portion in cooperative engagement with the vernier mechanism, a movable jaw assembly slidably adjustable

of body member intermediate of the fitting and the fixed jaw, said movable jaw assembly, including a handle member having a spring biased trigger pivotedly mounted thereon, a drive pawl and a check pawl carried by the trigger and the handle, respectively, adapted for selective engagement with the ratch teeth; the jaw assembly being constructed and arranged for movement to its maximum clamping position by manipulation of the trigger, and thereafter while the jaw assembly is in said maximum clamping position, the ratch bar is axially displaced by actuation of the vernier mechanism, thereby increasing the compressive action of the jaws on the material positioned therebetween.

Brief description of the drawings

FIG. 1 is a perspective view of a ratchet clamp incorporating a vernier device of the present invention;

FIG. 2 is a sectional view along line 2—2 of FIG. 1;

FIG. 3 is a sectional view taken along line 3—3 of FIG. 2; and

FIG. 4 is a detail sectional view showing the ratch rod angularly displaced to bring the teeth thereof in non-engageable position relative to the spring-pressed pawls carried by the movable jaw assembly.

Description of the preferred embodiment

Referring to the drawings, and more particularly to FIG. 1, there is shown a ratchet clamp, designated generally by numeral 1, comprising a body member 2, a jaw 3 fixed securely to the upper end portion of the body member, a fitting 4 secured to the lower end portion thereof, a ratch bar on rod 5 rotatably supported on said fitting in spaced parallel relation with respect to the body member, a movable jaw assembly 6, including a jaw 7 slidably mounted on the body member and the ratch rod, a handle member carried by the jaw 7, said handle member incorporating a manually operable spring biased trigger 9 and a pair of pawls 10 and 11, FIG. 2, designed for selective, cooperative engagement with the ratch teeth 12, whereby upon actuation of the trigger, the jaw assembly 6 is propelled to clamping position relative to the fixed jaw 3, as will be described more fully hereinafter.

It will be observed that the body member 2 of the clamp is of rectangular cross-section, and that the inner end portions 13 and 14 of the fixed jaw 3 and the fitting 4, respectively, are formed with complementary shaped slots 15 and 16 in which the end portions of the body member are seated, said inner end portions of the jaw and the fitting being secured to the body member by means of rivets 17, or the like. This construction provides a strong and sturdy support for the various elements of the clamp, particularly the jaws and their associated parts, which must be maintained in operative alignment when subjected to stresses developed during the clamping procedure. The fitting 4, handle member 8, and the jaw 3 are also provided with concentric openings 18 through which the ratch rod 5 is insertable and rotatably supported on the fitting 4, the upper end portion of the rod being formed with a handle 19, whereby the rod may be angularly displaced to bring the teeth 12 into engageable or non-engageable position, with respect to spring pressed pawls carried by the handle 8 of the movable jaw assembly, as will be described hereinafter. In order to prevent marring or scratching of the surfaces of the materials in contact with the jaw faces, a pad 20 formed from rubber, or other suitable material, is secured to the face of each jaw.

Referring to FIG. 2, the vernier mechanism adapted for axially displacing the ratch rod 5 and the movable jaw assembly, as a unit, comprises a threaded nut 21, seated in a slot 22 formed in the fitting 4, adapted for threadable engagement with machine threads 23 formed

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on the lower end portion of the rod, whereby upon rotation of the nut in a direction to move the end portion of the rod upwardly of the fitting, the rod is axially displaced, thus increasing the compressive action of the jaws 3 and 5 on the pieces of material M, M', therebetween. In order to facilitate rotation of the nut, for the purpose of increasing the compressive action of the jaws on the clamped material, the body portion thereof is formed with a hexagonal shaped peripheral flange 24, the opposite sides of the hexagon being adapted to seat between the jaws of an open-mouth wrench or other tool; the body portion of the nut is also formed with an enlarged flange 25, a portion of the periphery 26 of said flange projecting through the sides of the slot 22, whereby the threaded nut may be manually retracted to effect preliminary displacement of the ratchet rod, prior to movement of the jaws into clamping position.

In use of the improved ratchet clamp, assuming that the movable jaw assembly 6 is spaced from the upper jaw 3, a considerably greater distance than the thickness of the material to be immobilized, and that the jaws 10, 11 are in engagement with the teeth 12 of the ratchet rod 5, as shown in FIG. 1, the rod is angularly displaced substantially 180° by means of the handle 19, to bring the teeth to their non-engageable position relative to the pawls, FIG. 4, whereupon the movable jaw assembly may be manually, freely adjusted to approximate clamping position. The teeth are then brought to engageable position with the pawls by reverse movement of the handle, and the jaw assembly 6 is propelled to its maximum clamping position on the ratchet rod by actuation of the trigger mechanism; finally, while the jaw assembly is in the maximum clamping position, the threaded nut 21 of the vernier mechanism is rotated to displace the ratchet rod axially out of the opening 18 in the fitting 4, thus increasing the compressive action of the jaws on the material therebetween.

Inasmuch as the present invention is subject to many modifications, variations and changes in detail, it is intended that all matter contained in the foregoing description or shown on the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A ratchet clamp comprising
 - a body member having a jaw fixedly secured to one end thereof and a fitting secured to the opposite end thereof,
 - a ratchet rod rotatably supported in said fitting and having teeth on one surface,
 - a movable jaw assembly slidably mounted on the body member and the ratchet rod,

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a handle on the jaw assembly including trigger means and pawl means operatively connected to the ratchet rod, whereby upon actuation of the trigger the movable jaw assembly is propelled to clamping position with respect to the fixed jaw, and

release means disposed adjacent said fixed jaw for angularly displacing said ratchet bar relative to the fitting to bring the ratchet teeth to a non-engageable position relative to the pawl means whereby the movable jaw assembly may be manually adjusted longitudinally of the body member and the ratchet rod.

2. The invention as recited in claim 1 wherein means are provided to axially displace the ratchet rod with respect to the fitting.

3. The invention as recited in claim 2 wherein said means to axially displace the ratchet rod comprises a vernier mechanism embodying screw threads formed on the end portion of the ratchet rod seated in the fitting and a complementary threaded nut rotatably supported in said fitting in cooperative threaded engagement with the screw threads of the ratchet rod whereby rotation of the nut axially displaces the ratchet rod in the direction of the fixed jaw and the compressive action of the jaws on the material therebetween is appreciably increased.

4. The invention as recited in claim 3 wherein said fitting secured to the body member is formed with a slot, and the threaded nut is rotatably supported in said slot.

5. The invention as recited in claim 3 wherein said threaded nut is formed with a hexagonal shaped flange for rotative engagement with the jaws of a wrench and with an enlarged flange having a portion of its periphery projecting outwardly of the fitting whereby the threaded nut may be manually selectively rotated.

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