

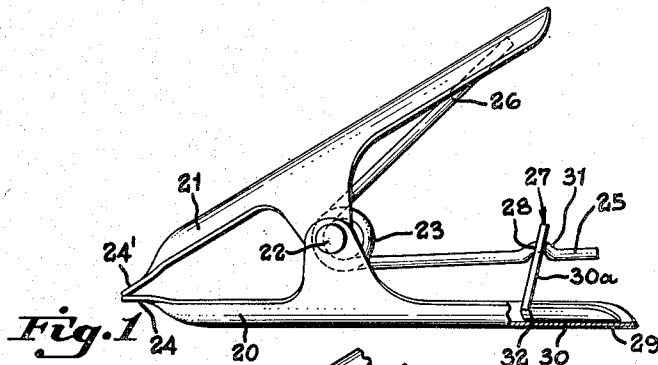
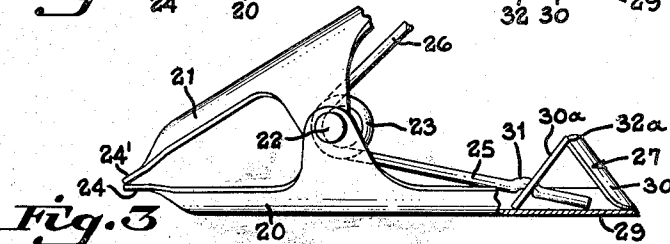
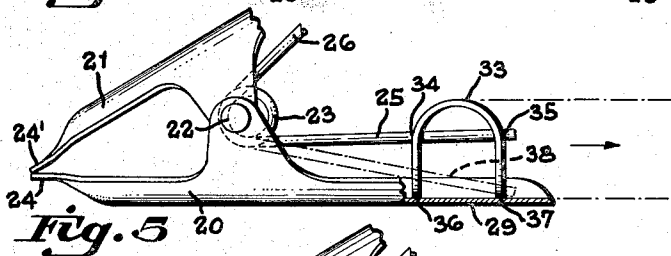
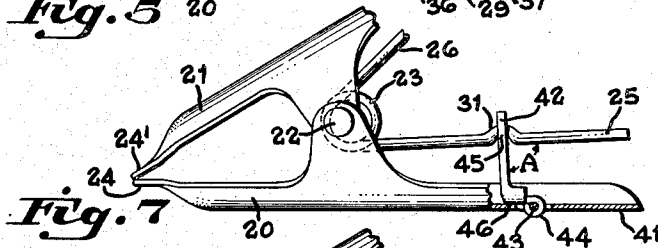
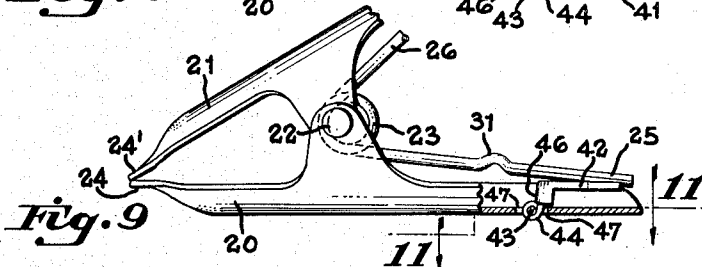
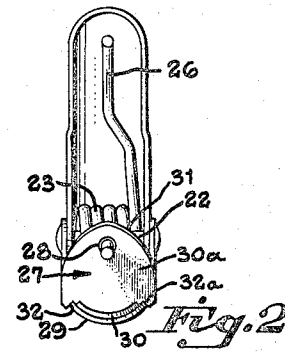
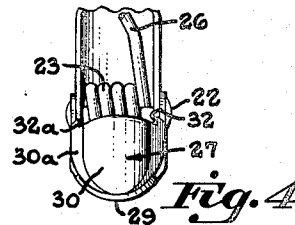
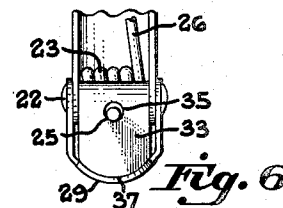
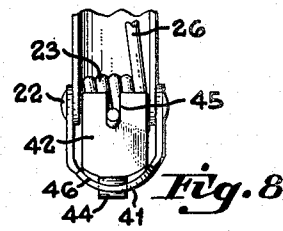
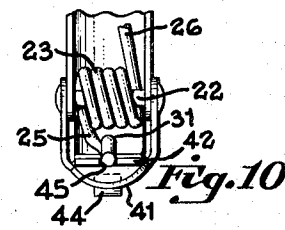
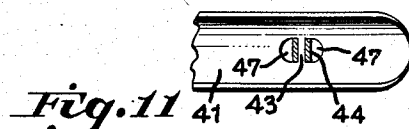
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2,519,652

CLAMPING DEVICE

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UNITED STATES PATENT OFFICE

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CLAMPING DEVICE

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10 Claims. (Cl. 24—253)

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This invention relates to an improvement in spring actuated clamping devices whereby the pressure exerted by the clamping jaws may be varied by the manipulation of a member which results in the displacement of one or both of the extensions of the spring.

Hand operated clamps of the nature to be described may be used wherever it is necessary to hold together sheet materials or the like for an indeterminate period of time. Particularly they have widespread application in the aircraft, textile and furniture industries. For example, sheet material can best be marked or cut into proper sizes while clamped to a pattern or template.

There are many instances in which there are determined advantages in having a clamp in which the degree of tension is adjustable to some extent at least. For example, for certain purposes a particularly strong tension is necessary and the conventional clamp will not have quite enough tension for the requirement. On the other hand there are many uses in which the degree of tension is comparatively unimportant but the conventional tension is too great for the requirements and places an increasing and unnecessary strain on the finger and the hand muscles of the manipulators. In the case of women workers particularly this condition results in complaints and a certain impairment of efficiency.

A particular object of the present invention is to provide a clamp in which the original tension may be substantially less than that conventionally provided heretofore but in which a single simple adjustment increases the tension to a point where it may be substantially more than the conventional.

Since the type of clamp to which the invention relates is very simple in construction and is sold in large quantities for a very low price, another object of the invention has been to provide an adjustment means which adds little to the cost of the clamp.

The accompanying drawings and following description relate to three modifications of structure by which this is accomplished, the preferred form being shown in Figures 1-4. These three variations have in common the fact that a manual adjustment of a wedge member, or spacer, results in displacement of one extension of the spring relative to the other extension whereby the pressure exerted at the jaws of the clamp is varied. In each case the spacer is either notched or apertured to act as a detent for the spring extremity. Preferably the spring extrem-

ity itself will be deformed at this point of contact to make the operative position of the spacer more stable. This may be accomplished by a crimp in the extremity, as shown by Figures 1-3 and 7-10, or by other means, e. g., flattening that portion of an otherwise round member.

In all the variations, pressure at the clamping jaws increases as the angle between the spring extensions decreases. In addition all three modifications shown are easily stamped out or machined and economical to produce.

Other advantages of the invention will be more fully apparent from the description of the drawings in which:

Figures 1 through 4 demonstrate the preferred embodiment of my invention. Figures 5 and 6 represent one variation and Figures 7 through 11 are directed to a third species. In Figures 1, 3, 5, 7 and 9 parts of the curved portions of handles 29 and 41 are broken away to show details of the respective means for varying the angle between the extremities of the spring.

Figure 1 is a side elevation showing the clamp at the greater of the two possible tensions.

Figure 2 is an end elevation of the clamp as shown in Figure 1.

Figure 3 is a fragmentary side elevation showing the clamp at the lesser of two possible tensions.

Figure 4 is an end elevation of the fragmentary clamp as shown in Figure 3.

Figure 5 is a fragmentary side elevation of a second species of clamp. Dot-dash lines at 38 indicate the effect of removal of member 33.

Figure 6 is an end elevation of the fragmentary clamp as shown in Figure 5.

Figure 7 is a fragmentary side elevation of a third species of clamp, showing the clamp at the greater of two possible tensions.

Figure 8 is an end elevation of the fragmentary clamp as shown by Figure 7.

Figure 9 is a fragmentary side elevation showing the clamp at the lesser of two possible tensions.

Figure 10 is an end elevation of the fragmentary clamp as shown by Figure 9.

Figure 11 is a fragmentary section of one handle of the clamp of Figure 9, taken along the line 11-11.

In Figures 1 through 4, the clamping device is comprised of two interacting arms 20 and 21 which are pivotally secured to each other for hinged movement. In the structure shown a pivot rod 22 joins the flanges of the respective arms. The position of rod 22 in the embodi-

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ment shown in Figures 1-4 is the same as that of rod 22 in Figures 5-10, and its exact location with respect to the flanges of the arms and coil spring 23 is most clearly shown in Figure 10. Rod 22 is movable with respect to arm 21 and fixed with respect to arm 20. Material to be engaged is contacted by clamping ends 24 and 24' of arms 20 and 21. Surrounding rod 22 is a coil spring 23, the extremities of which are extended in the same direction as adjacent handle ends of the arms 20 and 21. These spring extensions 25 and 26 are adapted to bear against the inner surfaces of arms 20 and 21 causing the arms' handle ends to diverge and the jaw ends to converge.

The pressure at the clamping ends is varied by the manipulation of a spacer 27, shown here substantially L-shaped in cross-section. Spacer 27 has sides 30 and 30a. Side 30a of spacer 27 has a detent aperture 28 disposed near the end of side 30a. This aperture 28 is slightly larger than a cross-section of extremity 25 and is adapted to receive extremity 25 at its crimped portion 31. Such a deformity in the spring extension helps prevent sliding or slipping of spacer 27.

The handle ends of the clamp, particularly handle 29, are trough-like to afford both a comfortable surface for squeezing the handles and a recess for spacer 27. As shown, side 30a of spacer 27 is planar, whereas side 30 of spacer 27 is arcuate so that it may be retained against the inner surface of handle 29 when spacer 27 is in operative position, as shown by Figures 1 and 2. Further means for securing spacer 27 alongside handle 29 are provided by incorporating into side 30a a pair of shoulders 32 and 32a which cooperate with the parallel edges of handle 29 to prevent movement of spacer 27 when it is in operative position. Thus, the configurations of the surfaces of spacer 27 and handle 29 are sufficient to hold the clamp at the increased tension without other means of attachment. Further stability is insured by the deformed portion 31 of the spring extremity cooperating with detent aperture 28. Shoulder 32 and 32a result in side 30a's being slightly wider than handle 29 (Figure 2), while side 30 may preferably be narrower than handle 29 (Figure 4).

The inoperative position of spacer 27 is shown in Figures 3 and 4. This results in the least possible pressure at the clamping jaws. Due to the size of aperture 28, spacer 27 is movable back and forth along extremity 25 and handle 29 but its preferable inoperative position is that of Figures 3 and 4 in which both ends of sides 30 and 30a of L-shaped spacer 27 are in contact with the inner surface of handle 29, and aperture 28 is adjacent crimped portion 31 of extremity 25. Thus spacer 27 is capable of stable positions when either operative or inoperative. As shown in Figures 3 and 4 spacer 27 presents a smooth exterior surface in its inoperative position.

To increase the clamping pressure, i. e., to go from spacer 27's inoperative position to its operative position it is only necessary to rotate spacer 27 about the axis of extremity 25 through an angle of approximately 180° so that side 30 is in the recess provided by the curved handle 29 and shoulders 32 and 32a impede further rotation.

The inoperative position of spacer 27 is preferably that shown by Figures 3 and 4, but al-

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ternatively, spacer 27 may be completely removed by sliding it off the end of extension 25. In either of these inoperative positions, spring extremity 25 will abut handle 29, or nearly so.

The construction shown in Figure 5 is similar to that of Figures 1 through 4 except that the counterpart of L-shaped spacer 27 is a substantially U-shaped spacer 33 with two detent apertures 34 and 35 through which spring extremity 25 is disposed for maximum clamping pressure. This arrangement is shown by Figures 5 and 6. U-shaped wedge 33 is disposed so that when it is moved there are two sliding areas of contact 36 and 37 with the inner surface of handle 29. To decrease the clamping pressure, wedge 33 is removed as shown by the arrow in Figure 5. Alternatively, the clamping pressure may be varied by the rotation of spacer 33 through an angle of approximately 180°. Removal of spacer 33 causes spring extension 25 to revert to the position shown by dot-dash lines 38 in Figure 5. Apertures 34 and 35 are larger than the cross-section of spring extremity 25 to facilitate introduction, removal and rotation of spacer 33. Like L-shaped spacer 27, spacer 33 may be of any suitable breadth and thickness. As shown by Figure 6 it is preferably slightly narrower than handle 29.

Figures 7 through 11 disclose another modification. Arms 20 and 21, connecting rod 22 and spring 23 are conventional elements. Means for displacing extension 25 is provided by a spacer 42 pivotally mounted in the handle at 43, best disclosed by Figure 11. This mounting may preferably be supplied by stamping two hemispheric holes in handle 41. These holes then accommodate ring 44, an integral part of spacer 42. In Figure 9 spacer 42 is disposed substantially parallel to handle 41 and the tension of the clamp is the lesser of the two values shown. Spacer 42 has a notched detent at 45 to receive, when pivoted, extension 25 of spring 23, at a crimped portion 31 of extension 25. When spacer 42 is pivoted through an angle of substantially 90° or slightly greater, the displacement of extension 25, as shown in Figures 7 and 8, results in a greater tension at the clamping jaws. Spacer 42 must be pivoted beyond a position at right angles to extension 25 whereby angle A is acute; otherwise, the thrust of extension 25 will cause spacer 42 to revert to the position shown in Figure 9. Spacer 42 has a shoulder 46, as disclosed in Figures 7-9. When shoulder 46 abuts the inner surface of handle 41, angle A is acute and the disposition of spring 23 and its extensions 25 and 26 is stable, as shown in Figures 7 and 8. Similar means for accomplishing this result will be apparent to those familiar with hand tools.

In Figures 1, 2, 5, 6, 7 and 8 spacers 27, 33 and 42 are shown in operative position, abutting both spring extension 25 and handle 29 or 41, as the case may be.

The foregoing discussion has been confined to a clamp capable of different clamping pressures in which only one of the spring arms is displaced. Obviously any of the means disclosed may be provided for displacing each spring arm of a given clamp, either independently or coincidentally, whereby any of several different clamping pressures becomes possible in one clamping device.

Having described my invention, I claim:

1. A clamping device adaptable to a plurality of clamping pressures, said device comprising two

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pivotally connected arms having handle ends and clamping ends, a spring having elongated extensions diverging the handle ends of said arms and converging the clamping ends of said arms, and a spacer, when in operative position, abutting both the handle end of one of said arms and one of said spring extensions, said spacer movable with respect to said abutting elements whereby manipulation of said spacer varies the displacement of said spring extension relative to said handle.

2. A clamping device adaptable to a plurality of clamping pressures, said device comprising two pivotally connected arms having handle ends and clamping ends, a spring having elongated extensions diverging the handle ends of said arms and converging the clamping ends of said arms, and a rotatable spacer, when in operative position, engaging one of said spring extensions whereby rotation of said spacer varies the displacement of said spring extension relative said handle ends.

3. A clamping device adaptable to a plurality of clamping pressures, said device comprising two pivotally connected arms having handle ends and clamping ends, a spring having elongated extensions diverging the handle ends of said arms and converging the clamping ends of said arms, and a spacer, when in operative position, abutting both the handle end of one of said arms and one of said spring extensions, said spacer rotatable about an axis substantially coincidental with said spring extension whereby rotation of said spacer varies the displacement of said spring extension relative said handle.

4. A clamping device adaptable to a plurality of clamping pressures, said device comprising two pivotally connected arms having handle ends and clamping ends, a spring having elongated extensions diverging the handle ends of said arms and converging the clamping ends of said arms, and a spacer pivotally mounted in the handle end of one of said arms, said spacer, when in operative position, rotatably engaging one of said spring extensions whereby rotation of said spacer varies the displacement of said spring extension relative said handle ends.

5. A clamping device adaptable to a plurality of clamping pressures, said device comprising two pivotally connected arms having handle ends and clamping ends, a spring having elongated extensions diverging the handle ends of said arms and converging the clamping ends of said arms, and an apertured, substantially U-shaped spacer having legs slidably contacting the inner surface of the handle end of one of said arms, one extension of said spring residing in the apertures of said spacer whereby said extension is displaced relative to the handle ends.

6. A clamp adaptable to different clamping

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pressures, said clamp comprising two pivotally connected arms having handle ends and clamping ends, a spring having elongated extremities bearing against adjacent inner surfaces of the handle ends of said arms, and a substantially L-shaped member apertured adjacent the end of one leg of the L, said member carried by an extremity of said spring whereby rotation of said L-shaped member varies the angle between the extremities of said spring.

7. A clamping device comprising two arms pivotally connected intermediate their ends to provide clamping ends and handle ends, a spring having elongated extensions engaging the inner surfaces of the handle ends and thereby converging the clamping ends, and a spacer inserted between one of said elongated extensions of the spring and the inner surface of one of the handle ends thereby to increase the tension of the spring.

8. A clamping device comprising two arms pivotally connected intermediate their ends to provide clamping ends and handle ends, a spring having elongated extensions engaging the inner surfaces of the handle ends and thereby converging the clamping ends, and a spacer having one surface thereof configured to engage the inner surface of one of the handle ends and an opposed surface configured to engage the extension of the spring disposed adjacent said handle end, said spacer being positioned between said spring extension and said handle end to increase the tension of the spring.

9. A clamping device comprising two arms pivotally connected intermediate their ends to provide clamping ends and handle ends, a spring having elongated extensions engaging the inner surfaces of the handle ends and thereby converging the clamping ends, and a spacer positioned between the extension of the spring and the inner surface of the handle member adjacent thereto for increasing tension of the spring, said spacer being removable from said device and having a surface complementary to the inner surface of the handle member whereby said spacer will be held positioned against said inner surface by the spring extension without other means of attachment.

10. A clamping device comprising two arms pivotally connected intermediate their ends to provide clamping ends and handle ends, a spring having elongated extensions diverging said handle ends, and a spacer positioned between a spring extension and the inner surface of a handle end adjacent thereto, said spring extension being deformed at the area of contact with said spacer to insure stability of said position.

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No references cited.