June 14, 1938. F. SUTHERLAND 2,120,686

CLAMPING DEVICE

Filed June 7, 1937 2 Sheets-Sheet 1

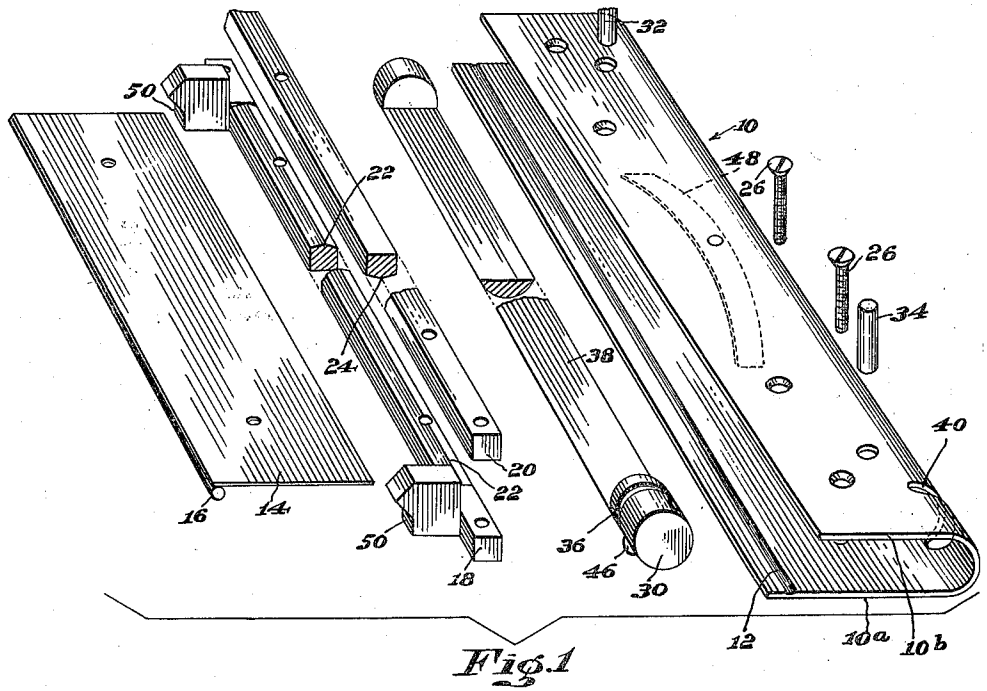


Fig. 1

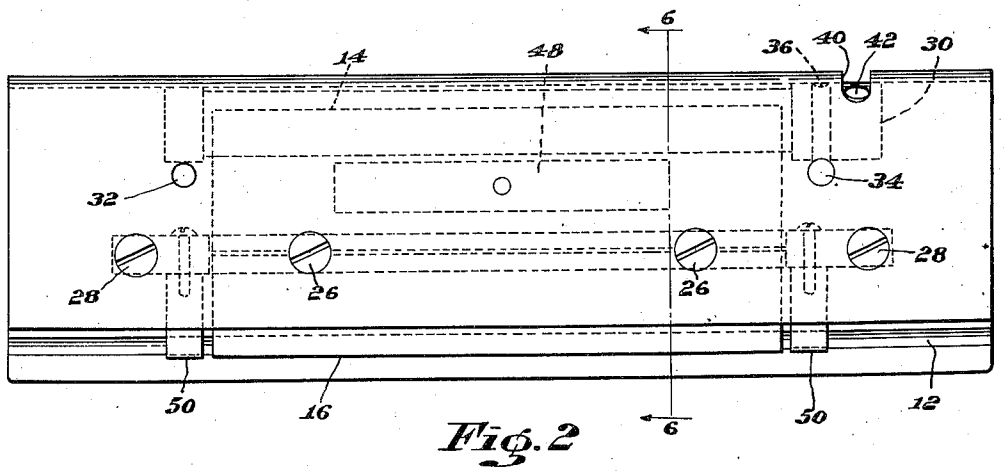


Fig. 2

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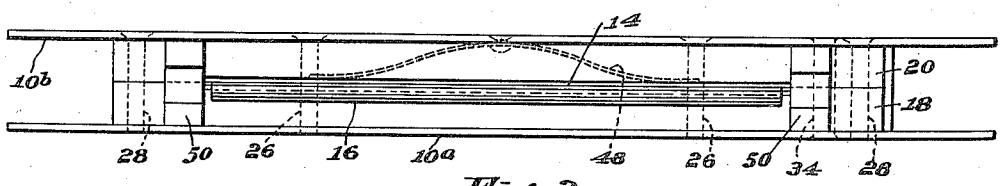


Fig. 3

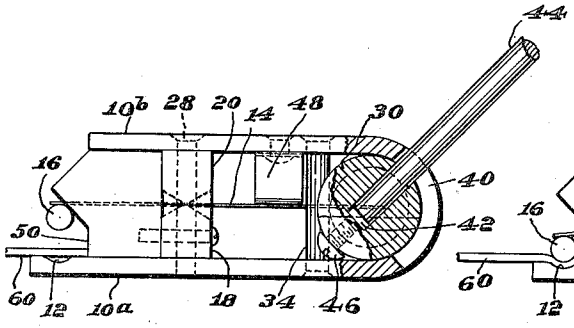


Fig. 4

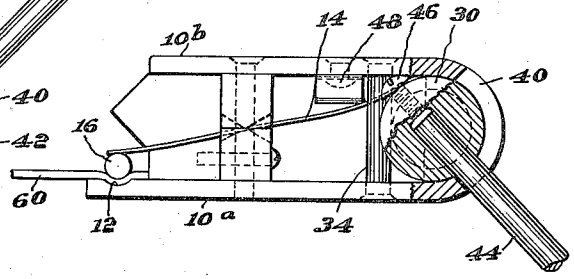


Fig. 5

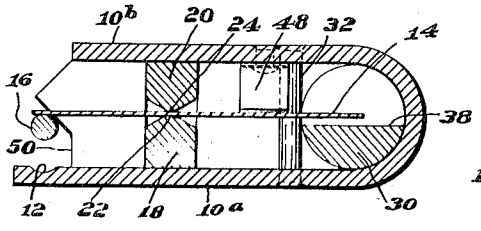


Fig. 6

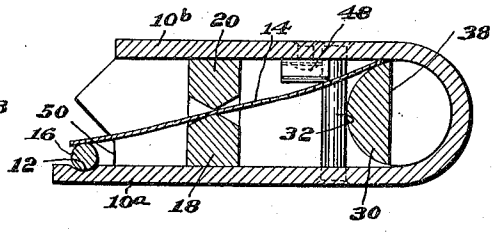


Fig. 7

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UNITED STATES PATENT OFFICE

2,120,686

CLAMPING DEVICE

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Application June 7, 1937, Serial No. 146,969

9 Claims. (Cl. 24—248)

This invention relates to a clamping device and more particularly to a clamp adapted to engage an edge of a material of the class exemplified by sheet material and floor coverings, to act as a gripping medium for handling such materials.

It is an object of this invention to provide a device which, while being narrow, flat and smooth-surfaced to allow movement of the clamp with an attached sheet material through restricted passages, has a novel and improved gripping action. Accordingly, the clamp includes as one gripping element, a resilient leaf, which may be conveniently made of tempered steel, and which preferably is so fulcrumed and so cammed as to assume a flexed position when the clamp is attached to the sheet material. Such flexure permits the use of the device with varying thicknesses of material, applying a substantially uniform gripping force to the material engaged, regardless of its thickness, without requiring adjustment of the clamp.

Further objects of the invention are the provision of a suitable lock for the clamp, to prevent inadvertent disengagement of the material, and of certain other features for facilitating operation by the user, which features will be more fully described in connection with the description of the drawings, in which,

Fig. 1 is a disassembled view of the clamp, showing the various parts;

Fig. 2 is a plan of the assembled clamp;

Fig. 3 is a front elevation;

Fig. 4 is an end elevation of the device in unclamped position, with a portion of the device broken away to show a cross section;

Fig. 5 is a view similar to Fig. 4, showing the device in clamping position;

Fig. 6 is a cross section along the lines 6—6 of Fig. 2; and

Fig. 7 is a view similar to Fig. 6, showing the device in clamping position.

As illustrated in the drawings, my device includes a casing 10, which may be conveniently formed of sheet material bent to the form illustrated. Such a casing provides a narrow, flat housing for the various parts about to be described, and permits their assembly without any resulting projections which might catch upon racks or other supports over which the sheet material is to be passed.

The lower plate of the casing 10*a* extends somewhat beyond the upper plate 10*b*, and is provided with a longitudinal groove 12. To cooperate with this groove to secure an efficient clamping action, I provide a leaf 14 having a bead 16 on its forward edge adapted to crimp an engaged material into the groove 12. The leaf 14 is fulcrumed between the two plates within the casing on two fulcrum members 18 and 20, the bottom fulcrum member 18 having upper beveled surfaces providing a central knife edge 22, and the upper fulcrum member 20 having similar bottom beveled surfaces providing a central knife edge 24. Leaf 14 is positioned within the casing by screws 26 countersunk in upper plate 10*b*, passing loosely through suitable holes provided in fulcrum 20, leaf 14, fulcrum 18, and threaded into the lower plate 10*a* of the casing. Additional fastening means, such as screws 28, 28 (Figs. 2 and 3), are provided to secure the fulcrum members with their respective central knife edges 22 and 24 so spaced that the leaf may be pivoted toward and from the bottom plate.

The pivoting means for forcing leaf 14 into clamping relation with the bottom plate comprises a roll or cam 30 adapted to be journaled within the casing 10. A convenient method of mounting this roll 30 is illustrated in the drawings, wherein the rounded back portion of the casing forms a journal for the roll, which is held against the casing by pins 32 and 34, fastened in the upper and lower plates. To prevent longitudinal removal or play of the roll 30, it is provided adjacent pin 34 with a peripheral groove 36 into which the pin projects.

The roll 30 has a cutaway portion forming a cam surface 38, shown in Fig. 1, which is adapted to act as a cam to move the leaf 14 into clamping position. The position of the cam surface relative to the rear end of the leaf 14 is well illustrated in the cross-sectional view of Fig. 6.

In order to rotate the roll 30 and cam surface 38 to operate the leaf 14, the casing 10 is provided with a slot 40, and the roll 30 has a drilled hole 42, into which a lever 44 may be detachably positioned for rotating the roll 30. As illustrated in Figs. 4 and 5, rotation of the lever 44 acts to elevate the rear edge of the leaf 14. Leaf 14 is preferably formed of a resilient material which will flex under this camming action due to the shape of the cam acting against the resistance of the plate 10*a* and interposed fulcrum member 20. Such resiliency of the leaf 14 not only acts to strengthen and equalize the clamping force on an inserted sheet material 60, but also prevents rotation of the roll 30 when the leaf is in the clamping position shown in Fig. 5, providing a frictional lock which is maintained even after removal of lever 44. The roll 30 is also provided with stop 46, which limits rotation of hole 42 to maintain it in alinement with the slot 40.

As best shown in Fig. 7, when the lever 44 has been rotated to move the cam into clamping position, the cam surface 38 has passed beyond a plane normal to that of the resilient leaf 14. Therefore, to unlock the clamp, it is necessary to move the lever 44 back again a short distance before the clamp will be free. In order to facilitate the unlocking action, I attach to the under surface of the upper plate of the casing 10 a spring 48, shown as a double leaf spring, which acts against the upper surface of leaf 14 to return it to normal position as soon as the frictional lock provided by flexure of the leaf 14 is relieved. As further shown, I provide with the clamping device, guide surfaces 58, which prevent insertion of a sheet material 60 into the clamp beyond a desired point. These surfaces are also conveniently formed with forwardly extending portions, which facilitate correct positioning of the sheet material 60 in the clamp, and may be rigidly fixed to the fulcrum 18 as shown in Fig. 1, by screws as illustrated in Fig. 2.

I claim:

1. A clamp comprising a casing having a pair of spaced plates, a resilient leaf intermediately fulcrumed within said casing, a roll journaled in said casing between said plates, said roll having a cam surface operating against a surface of said leaf to move said leaf into a flexed clamping position relative to one of said plates, with the flexure of said leaf maintaining a resilient clamping force against said plate and frictionally locking said roll against rotation, and means detachably associated with said roll to operate said cam.

2. A clamp comprising a casing having a pair of spaced plates, a resilient leaf intermediately fulcrumed within said casing, and cam means journaled in said casing between said plates and operating against a surface of said leaf to move said leaf into a flexed clamping position relative to one of said plates, with the flexure of said leaf maintaining a resilient clamping force against said plate, and frictionally locking said cam means against rotation.

3. A clamp comprising a casing having a pair of spaced plates, a resilient leaf intermediately fulcrumed between knife edges associated with said plates, means to retain said leaf between said knife edges, a roll journaled in said casing between said plates, said roll having a cam surface operating against a surface of said leaf to move said leaf into a flexed clamping position relative to one of said plates, with the flexure of said leaf maintaining a resilient clamping force against said plate and frictionally locking said roll against rotation, and means detachably associated with said roll to operate said cam surface.

4. A clamp comprising a casing having a pair of spaced plates, a resilient leaf intermediately fulcrumed between knife edges associated with said plates, means to retain said leaf between said knife edges, and cam means journaled in said casing between said plates and operating against a surface of said leaf to move said leaf into a flexed clamping position relative to one of said plates, with the flexure of said leaf maintaining a resilient clamping force against said plate, and frictionally locking said cam means against rotation.

5. A clamp comprising a casing having a pair of spaced plates, a resilient leaf intermediately fulcrumed within said casing to form a lever movable into and out of clamping position relative to one of said plates, a roll journaled in said casing between said plates, said roll having a cam surface operating against a surface of said leaf to move said leaf into clamping position and, additionally, to flex said leaf for maintaining a resilient clamping force against said plate and for frictionally locking said roll against rotation, means detachably associated with said roll to operate said cam surface, and a spring for returning said leaf to unclamped position upon release of the frictional lock.

6. A clamp comprising a casing, a resilient leaf intermediately fulcrumed within said casing for movement into and out of clamping position relative to said casing, and a rotatable cam member mounted within said casing and operating against a surface of said leaf to pivot said leaf into clamped relation with said casing.

7. A clamp comprising a casing, a resilient leaf intermediately fulcrumed within said casing, a rotatable cam member mounted within said casing and operating against a surface of said leaf to pivot said leaf into a flexed clamping position, the flexure of said leaf in clamping position frictionally locking said cam member against rotation, and means to rotate said cam member.

8. A clamping unit for holding sheet material comprising a base plate, fulcrum members mounted on said base plate, a resilient leaf intermediately held between said members, said resilient leaf forming a lever movable into and out of clamping position relative to said base plate, and a cam member mounted between said base plate and said resilient leaf, and movable into a position camming one end of said resilient leaf a distance above said base plate greater than that necessary to contact the clamping surface at the opposite end of said leaf with a sheet material held against the clamping surface of said base plate, whereby said cam member flexes said leaf on both sides of said fulcrum members to maintain a resilient clamping force against said sheet material.

9. A clamping unit for holding sheet material comprising a base plate, a resilient leaf mounted a predetermined distance above said base plate, and intermediately fulcrumed to form a lever movable into and out of clamping position relative to said base plate, and a roll journalled between said base plate and said resilient leaf, and having a cam surface movable into a position camming one end of said resilient leaf a distance above said base plate greater than that necessary to contact the clamping surface at the opposite end of said leaf with a sheet material held against the clamping surface of said base plate, whereby said cam member flexes said leaf to maintain a resilient clamping force against said sheet material.

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