July 5, 1955 R. J. CHAMPAYNE 2,712,206

RUBBING SHOE

Filed June 16, 1952

Fig. 1

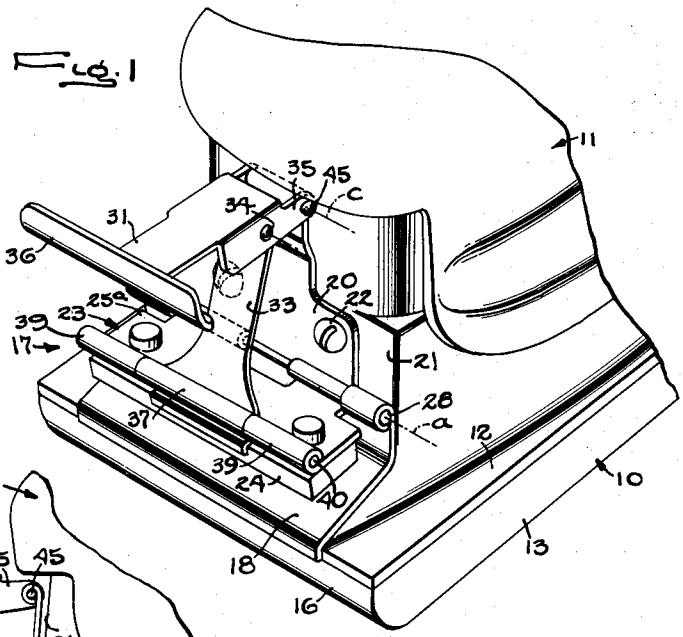



Fig. 3

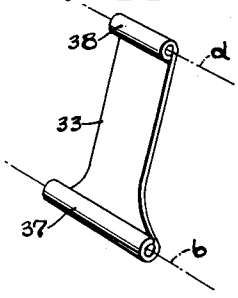



Fig. 2

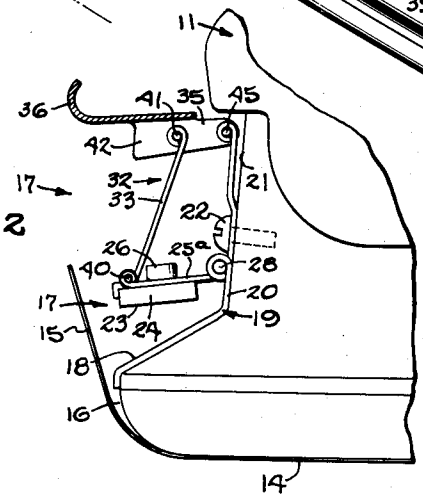



Fig. 4

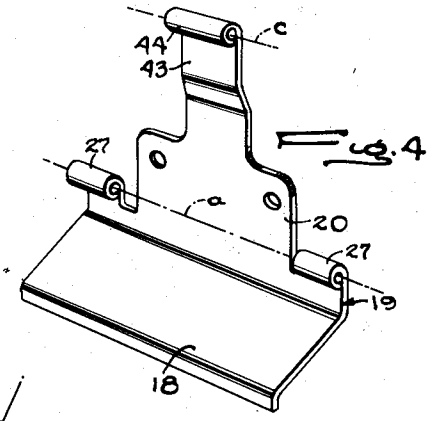



Fig. 5

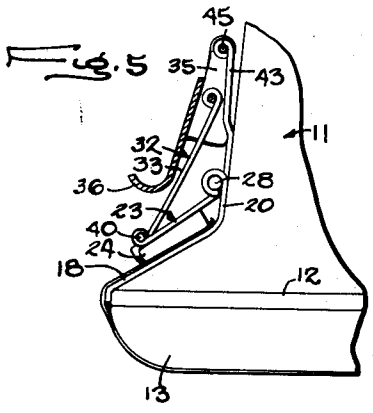



Fig. 6

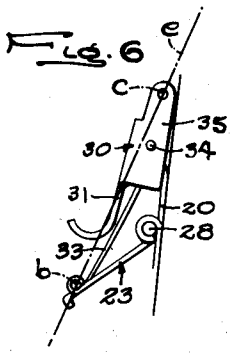
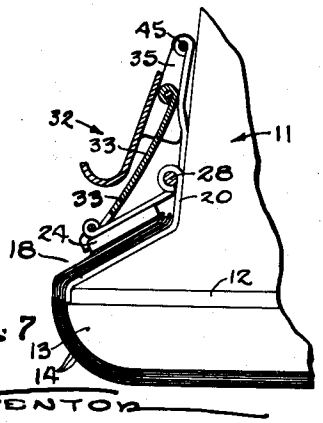



Fig. 7




INVENTOR
Roy J. Champayne
By Carlson, Pitzner, Hubbard & Wolfe
ATTORNEYS

United States Patent Office

2,712,206

Patented July 5, 1955



2,712,206

# RUBBING SHOE

Roy J. Champayne, Rockford, Ill.

Application June 16, 1952, Serial No. 293,799

12 Claims. (Cl. 51—187)

This invention relates to a rubbing shoe secured on its upper side to a support and providing on its underside a backing for one or more rubbing sheets bent upwardly and around the shoe ends and held by clamps on the upper side of the shoe.

The primary object of the invention is to provide a rubbing shoe of the above character having a new and improved clamp positively actuated by a toggle mechanism constructed and arranged in a novel manner to move over-center in closing the clamp in spite of wide variations in the thickness of the stack of rubbing sheets to be gripped between the jaws of the clamp.

A further object is to arrange the toggle for closing ing lever in a novel manner in relation to the rubbing shoe so as to dispose all of the parts compactly in an out of the way position when the clamp is closed.

A further object is to arranged the toggle for closing of the clamp by the application of hand pressure to the actuating lever downwardly and toward the top of the rubbing shoe.

The invention also resides in the yieldable construction of the clamp, the toggle, and the toggle mounting to permit different numbers of rubbing sheets to be held securely between the clamp jaws.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings, in which

Figure 1 is a fragmentary perspective view of a rubbing machine equipped with a clamp embodying the novel features of the present invention.

Fig. 2 is a fragmentary side view with parts broken away and showing the clamp in the open position.

Fig. 3 is a perspective view of one of the toggle links.

Fig. 4 is a perspective view of a portion of the clamp.

Fig. 5 is a view similar to Fig. 2 showing the clamp in the closed position.

Fig. 6 is a fragmentary view of the clamp illustrating the action of the toggle.

Fig. 7 is a view similar to Fig. 5 illustrating the manner in which the clamp grips a plurality of rubbing sheets.

In the drawings, the invention is shown associated with a rubbing shoe **10** adapted to be actuated either manually or by power and secured to a suitable support **11** upstanding from the upper side of the shoe. The body of the shoe comprises a generally rectangular and relatively rigid plate **12** having secured to the underside thereof a pad **13** of yieldable material providing a backing for one or more sheets **14** of abrasive paper or other rubbing material.

The abrasive sheets **14** are somewhat longer than the shoe **10** so that their end portions **15**, after being bent upwardly and around the end **16** of the shoe, project a short distance over the top of the shoe for entry between the jaws of a clamp **17** which is mounted on top of the shoe and opens generally outwardly toward the shoe end. The fixed jaw **18** of the clamp is rigid with the upper side of the shoe **10** and preferably is inclined upwardly away



from the shoe end **16**. Herein, this jaw is formed by one leg of an angle bracket **19** (Fig. 4) stamped from sheet metal and having an upright leg **20** lying alongside the vertical front wall **21** (Fig. 2) of the support **11** and secured to the latter by suitable screws **22**.

The movable jaw **23** (Fig. 2) of the clamp comprises a pad **24** of resiliently yieldable material such as relatively firm rubber disposed above the fixed jaw **18** parallel to the shoe end **16** and backed by a metal bar **25a** which is pivotally mounted on the support **11** to turn toward and away from the fixed jaw about a horizontal axis *a* paralleling the end **16** of the shoe **10**. Lugs **26** integral with the pad are pressed through holes in the plate to secure the pad thereto. To define the pivotal axis *a*, edge portions **27** at opposite sides of the bracket **19** extend upwardly along the wall **21** and are curled around a pintle **28** that spans the two curls in front of the bracket leg **20**.

The jaw **23** is thus swingable downwardly against the rubbing sheet **14** (Fig. 5) or a stack thereof (Fig. 7) bent upwardly and around the end of the shoe with the end or ends lying against the fixed jaw **18**. Comparing Figs. 5 and 7, it will be observed that the movable jaw **23** may, when the clamp is closed, occupy a number of different positions depending on the number and thickness of the rubbing sheets being clamped.

In accordance with the present invention, the substantial force required for clamping the rubbing sheets is derived by straightening of a toggle mechanism **32** to an over-center position which position is substantially the same for all of the different positions of the movable jaw **23** thus maintaining a uniform clamping force in spite of the relatively wide difference in the position of the jaw when clamping a single sheet as in Fig. 5 and a number of sheets as in Fig. 7. Thus the actuation of the clamp **17** is positive rather than being derived from the action of a spring. Herein the toggle **32** comprises a first link **33** pivoted at one end to the outer free end of the movable jaw arm **23** to turn relative to the latter about an axis *b* parallel to the axis *a* and a second link **35** pivotally mounted at one end on the support **11** to swing about another parallel axis *c*. At their outer free ends, the two links are pivoted together to form the toggle pivot **34**.

The toggle **32** has an over-center action, that is the toggle pivot **34** moves from one side of a line *e* (Fig. 6), which is defined by the axes *b* and *c*, to the other. When the toggle is flexed so that the links **33** and **35** are at an angle with respect to each other as shown in Fig. 2, the clamp **17** is open. As the toggle pivot is moved toward the support wall **21**, the toggle is straightened swinging the movable jaw **23** down toward the fixed jaw **18** and, when the toggle pivot lies along the line *e*, the clamp is closed. The toggle pivot then is moved slightly beyond the line *e* as shown in Fig. 6. With the toggle pivot moved over-center, the clamping pressure, which tends to swing the movable jaw **23** upwardly, cannot cause the toggle pivot to move back across the center line *e* and thus the clamp **17** is locked in the closed position.

When additional thicknesses of rubbing sheets **14** are held by the clamp **17**, the movable jaw **23** cannot swing down as far as it did when clamping a single sheet and stops short of its former position as seen in Fig. 7. To permit the over-center action of the toggle **32** in such a case, the toggle is yieldable. For this purpose, the link **33** is made of a resilient material such as spring steel and is supported between the link **35** and the arm **23** to bow inwardly toward the front wall **21** of the support **11**. In order to support the link **33** for such bowing, the ends of the link are bent outwardly to form curls **37** and **38**. On either side of the curl **37**, the outer end of the plate **25a** is bent upwardly to form alined curls **39** and a pivot pin **40** extends through the curls **37** and **39** whereby the

arm 25 and the link 33 may pivot relative to each other about the axis *b*. Similarly, a pivot pin 41 (Fig. 2) projects through the curl 38 at the other end of the link 33 with its ends fixed to depending flanges 42 on the link 35 and permits the toggle links to turn relative to each other about the axis *d* defining the toggle pivot 34.

With the above construction, the link 33 is offset inwardly from its pivotal axes *b* and *d* and bows inwardly when endwise forces are applied at its axes. Thus, when a plurality of sheets are being clamped, the movable jaw 23 presses against the sheets before the toggle 32 is straightened and further movement of the toggle pivot 34 results in the application of such endwise forces to the link 33 which then bows. This bowing, in effect, shortens the length of the toggle between the axes *b* and *c* to permit the toggle pivot to move over center.

To permit even greater thicknesses of rubbing sheets 14 to be received between the jaws 18 and 23, the mounting of the toggle 32 also is yieldable. Herein, the yieldable mounting is obtained by pivoting the inner end of the link 35 to a yieldable strip 43 which is integral with the bracket leg 20 at the upper end thereof and is bent first outwardly away from the wall 21 and then upwardly generally parallel to the wall. A curl 44 formed on the upper end of the strip 43 projects between the flanges 42 on the link 35 and a pin 45 received in the curl is secured at its ends to the flanges and defines the axis *c*. With this mounting of the toggle 32, the axis *c* will shift away from the fixed jaw 18 as the clamp 17 is closed to permit the toggle pivot 34 to move across center.

In the present instance, advantage is taken of the mounting of the toggle 32 to close the clamp 17 by the application of hand pressure downwardly toward the top of the rubbing shoe 10 so that the sheets 14 may be clamped in place while the shoe is resting on a table or other firm support. For this purpose, the link 35 is extended outwardly beyond the toggle pivot 34 to form a handle 31 the outer free end of which is bent upwardly to form a thumb tab 36. Thus the handle 31 and the link 35 constitute a lever arm 30 which when depressed moves the toggle pivot in the clamp closing direction and which may be lifted to open the clamp 17. When the clamp is closed, the handle projects downwardly alongside the support wall 21 where it is out of the way during service use of the rubbing machine.

It will be observed that the above clamp is capable of holding securely either a single rubbing sheet 14 or a plurality of sheets. Such versatility is achieved by the combined effects of the bowing of the link 33 and the bending of the strip 43 so that both the toggle 32 and the mounting of the toggle yield. Due to the resilient nature of the pad 24, still further yielding is obtained. With this arrangement, it has been possible to clamp not only a single sheet but also a substantial number of sheets at one time. In addition, the over-center action of the toggle holds the clamp 17 open and permits the operator to use both hands to insert the ends of the sheets between the jaws 18 and 23. By virtue of the fact that the handle 31 is pressed downwardly to close the clamp, it is not necessary for the operator to hold the rubbing machine while clamping the sheets since the machine may rest on a table when the clamp is being closed. Although the handle 31 may be comparatively long to afford good leverage, it lies alongside the support wall 21 and is out of the way when the clamp is closed.

I claim as my invention:

1. In a rubbing machine, the combination of, a rubbing shoe providing a backing surface on the under side thereof, a support upstanding from the upper side of said shoe and spaced inwardly from one end of the shoe, means on said upper side providing a generally upwardly facing fixed jaw between said end and said support, an arm pivoted on said support to swing about an axis parallel to said end and projecting outwardly over said fixed jaw, a pad of yieldable material fast on the under side of said arm and opposing said fixed jaw to provide a movable jaw, a toggle comprising a first link pivoted on the outer free end of said arm and extending upwardly therefrom and a second link pivoted on said support above said arm and extending outwardly from the support, the pivotal axes of said links being parallel to said first axis and said links being pivoted together adjacent their outer free ends to form the toggle pivot, and a handle rigid with and extending outwardly from said second link to be pushed downwardly thereby to move said toggle pivot across the center of said toggle and to swing said movable jaw toward said fixed jaw.

2. The combination of, a shoe for backing a rubbing sheet, a jaw fixed to one end of said shoe, an arm pivotally mounted for movement toward and away from said fixed jaw, a pad of resilient material on said arm and opposing said fixed jaw to constitute a movable jaw, said jaws coacting to form an outwardly opening clamp, a toggle pivoted at one end to said arm, a resilient member joining the other end of said toggle to said shoe to permit bodily yielding of the toggle relative to the shoe, a handle movable relative to said shoe, and a connection between said handle and said toggle to move the latter from a flexed to a substantially straight over-center position to close said jaws together, said toggle including a link composed of resilient material and bowed in the movement of the toggle over center after clamping of a rubbing sheet between said jaws.

3. The combination of, a shoe for backing a rubber sheet, a jaw fixed to one end of said shoe, a second jaw mounted for movement toward and away from said fixed jaw and coacting therewith to form an outwardly opening clamp, a toggle pivoted at one end to said movable jaw, a resilient member joining the other end of said toggle to said shoe to permit bodily yielding of the toggle relative to the shoe, a handle movable relative to said shoe, and a connection between said handle and said toggle to move the latter from a flexed position to a substantially straight and over-center position to close said jaws together, said toggle including a link composed of resilient material and bowed in the movement of the toggle over center after clamping a rubbing sheet between said jaws.

4. In a rubbing machine, the combination of, a rubbing shoe providing on the under side, a backing surface for a rubbing sheet, a support upstanding from the upper side of said shoe and spaced inwardly from one end of the shoe, means on said upper side providing a fixed jaw adjacent said one end, an arm pivoted on said support to swing about an axis parallel to said end and extending outwardly over said fixed jaw to provide a movable jaw, a first link disposed above said arm and pivoted on said support to swing about an axis paralleling said first axis, a second link of yieldable material extending between the outer free end of said first link and the outer free end of said arm, means pivotally connecting one end of said second link to the adjacent end of said first link and the other end of the second link to the adjacent end of said arm and supporting said second link for bowing inwardly toward said support when endwise forces are applied to its ends by said first link and said arm, said links constituting a toggle, and a handle on one of said links to move said toggle to a substantially straight and over-center position thereby to swing said movable jaw toward said fixed jaw and clamp the ends of different numbers of rubbing sheets between the jaws, said second link bowing inwardly to accommodate different thicknesses of sheets.

5. The combination of, a shoe for backing a rubbing sheet, a jaw fixed to one end of said shoe, a second jaw mounted for movement toward and away from said fixed jaw and coacting therewith to form an outwardly opening clamp, a handle movable relative to said shoe, a toggle comprising two links pivoted together at adjacent ends, the opposite end of one link being pivoted to said movable jaw and the opposite end of the other link being

pivotally connected to said shoe, and a connection between said handle and said toggle to move the latter from a flexed to a substantially straight over-center position to close said jaws together, one of said links being of resilient material and laterally offset from its pivotal axes to bow in the movement of the toggle over center after clamping a rubbing sheet between said jaws.

6. In a rubbing machine, the combination of, a shoe for backing a rubbing sheet, a jaw fixed to one end of said shoe, a second jaw mounted for movement toward and away from said fixed jaw and coacting therewith to form an outwardly opening clamp, a handle movable relative to said shoe, a toggle connected to said movable jaw, and a connection between said handle and said toggle to move the latter from a flexed to a substantially straight over-center position to close said jaws together, said toggle including a link composed of resilient material and bowed in the movement of the toggle over center after clamping a rubbing sheet between said jaws.

7. The combination of, a rubbing shoe providing a backing surface for a rubbing sheet on the under side thereof, a support upstanding from the upper side of said shoe and having a wall spaced from and facing outwardly toward one end of the shoe, means on said upper side defining a fixed jaw ajacent said one end, an arm pivoted on said support to swing about an axis parallel to said end and extending outwardly over said fixed jaw to provide a movable jaw, a yieldable strip disposed above said arm and extending along but spaced from said wall with its lower end secured to the wall, a toggle comprising two links pivoted together at adjacent ends to form a toggle pivot, means pivotally mounting one of said links at the opposite end to the upper end of said strip, and means pivotally mounting the other link at its opposite end to the outer free end of said arm, the pivotal axes of said toggle being parallel to said first axis thereby to swing said movable jaw toward said fixed jaw when said toggle is moved to a substantial straight and over-center position while said yieldable strip bends toward said wall to permit different numbers of rubbing sheets to be clamped between the jaws.

8. The combination of, a shoe for backing a rubbing sheet, a jaw fixed to one end of said shoe, a second jaw mounted for movement toward and away from said fixed jaw and coacting therewith to form an outwardly opening clamp, a toggle pivoted at one end to said movable jaw, a resilient member joining the other end of said toggle to said shoe to permit bodily yielding of the toggle relative to the shoe, a handle movable relative to said shoe, and a connection between said handle and said toggle to move the latter from a flexed position to a substantially straight and over-center position to close said jaws together.

9. In a rubbing machine, the combination of, a shoe for backing a rubbing sheet, a jaw fixed to one end of said shoe, a second jaw individually mounted on said shoe for movement toward and away from said fixed jaw and coacting therewith to form an outwardly opening clamp, a handle movable relative to said shoe, and means separately mounting said handle on said shoe and connecting



the handle to said second jaw, said means comprising a toggle connected to said movable jaw and a connection between said handle and said toggle to move the latter from a flexed to a substantially straight over-center position to close said jaws together.

10. The combination of, a rubbing shoe providing on the under side a backing for a rubbing sheet and on the upper side a fixed jaw extending inwardly from the end of the shoe, a support upstanding from said upper side and spaced inwardly of said shoe end, an arm pivoted on said support to swing about a horizontal axis parallel to said shoe end and extending outwardly from said axis over said fixed jaw to provide a movable jaw, a second arm disposed above said first arm and pivoted to swing about a second axis paralleling said first axis, said second arm constituting a handle and being movable from a generally horizontal position downwardly to a second position alongside said support, and means connecting said arms to move said movable jaw toward said fixed jaw as said second arm is swung downwardly thereby to clamp between the jaws the end of a rubbing sheet bent upwardly around the end of said shoe.

11. The combination of, a rubbing shoe providing on the underside a backing for a rubbing sheet, a clamp opening toward one end of the shoe and comprising fixed and movable jaws mounted on the upper side of said shoe, a support upstanding from said upper side, an over-center toggle pivotally connected at one end to said movable jaw and at the other end to said support and operable to close said clamp when straightened, and a handle connected to said toggle and mounted to swing from a generally horizontal and inactive position to an active position down alongside said support to straighten said toggle and clamp the end of a rubbing sheet between said jaws.

12. The combination of, a rubbing shoe having an upwardly facing clamping surface on the upper side and adjacent one end of the shoe, a support upstanding from said shoe side and spaced inwardly from said end thereof, a lower arm pivoted on said support to swing about a first generally horizontal axis and toward and away from said surface, said arm projecting outwardly over said surface and cooperating therewith to define an outwardly opening clamp, an upper arm projecting outwardly from said support above said lower arm and pivotally mounted to swing about a second axis parallel to said first axis and into and out of a lower position alongside said support, and a link pivotally connected at opposite ends to said arms for movement of said lower arm toward said surface to close said clamp in the downward movement of said upper arm and cooperating with the latter to define a toggle movable over center to maintain the closed condition of the clamp as the upper arm swings into said lower position.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 2,521,689 | Champayne | Sept. 12, 1950 |
| 2,530,301 | Hoy | Nov. 14, 1950 |