Dec. 5, 1944. E. DAVIS 2,364,196

WORK CLAMP MECHANISM

Filed March 24, 1941 3 Sheets-Sheet 1

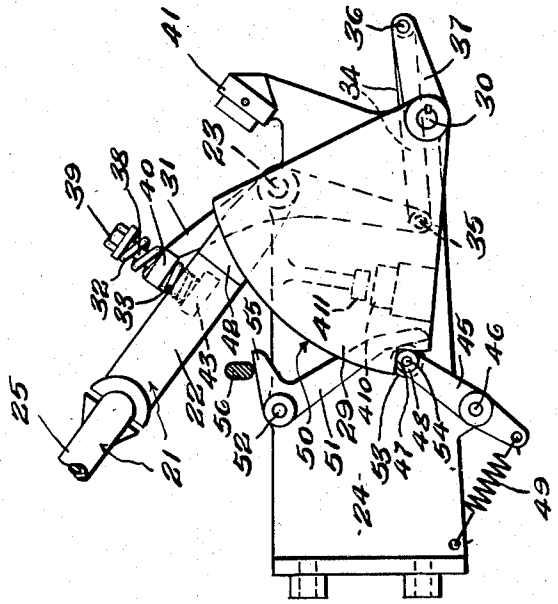

Fig. 2.

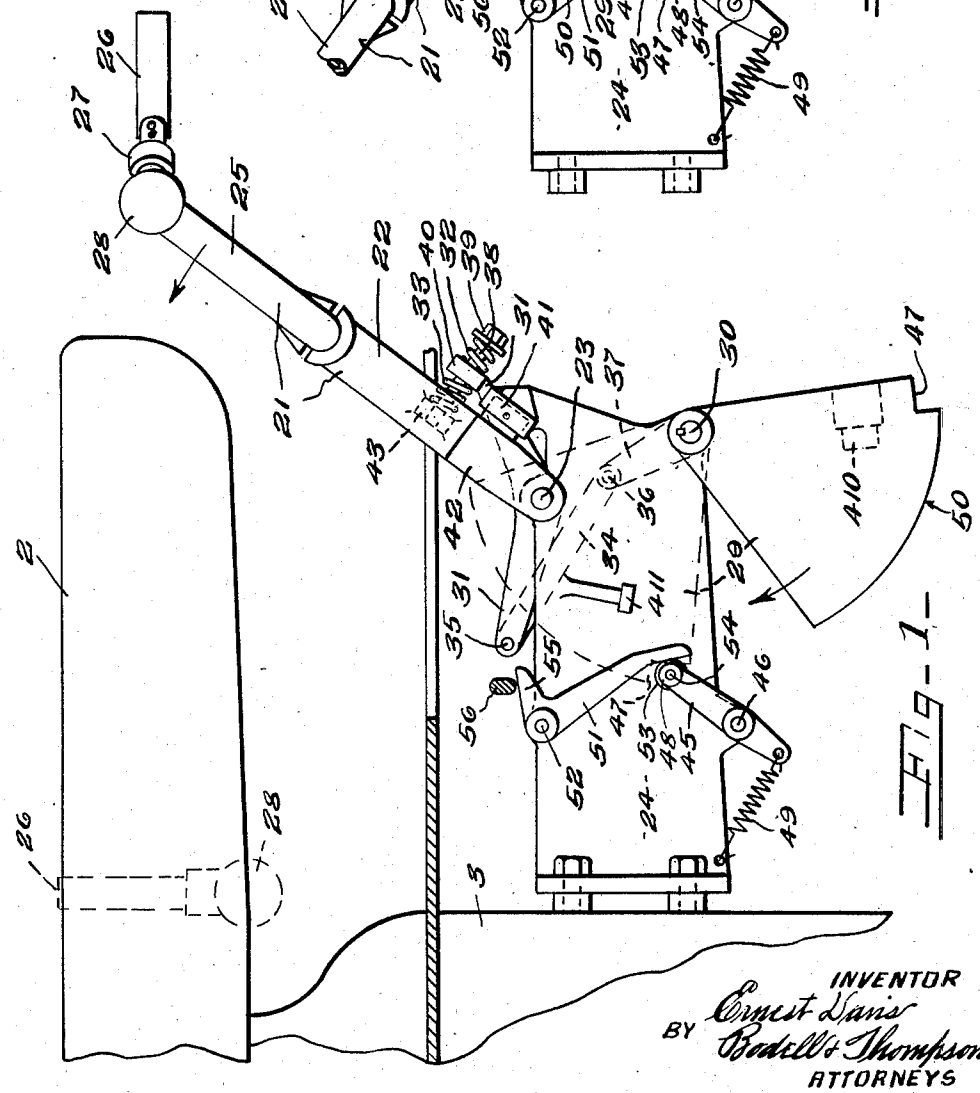

Fig. 1.

INVENTOR
Ernest Davis
BY Bodell & Thompson.
ATTORNEYS

Dec. 5, 1944. E. DAVIS 2,364,196

WORK CLAMP MECHANISM

Filed March 24, 1941 3 Sheets-Sheet 2

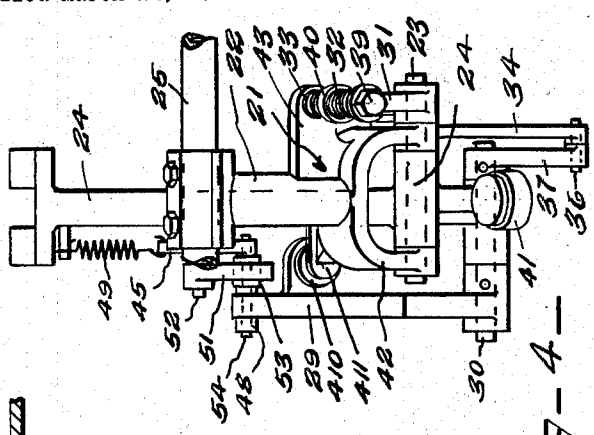

Fig. 4

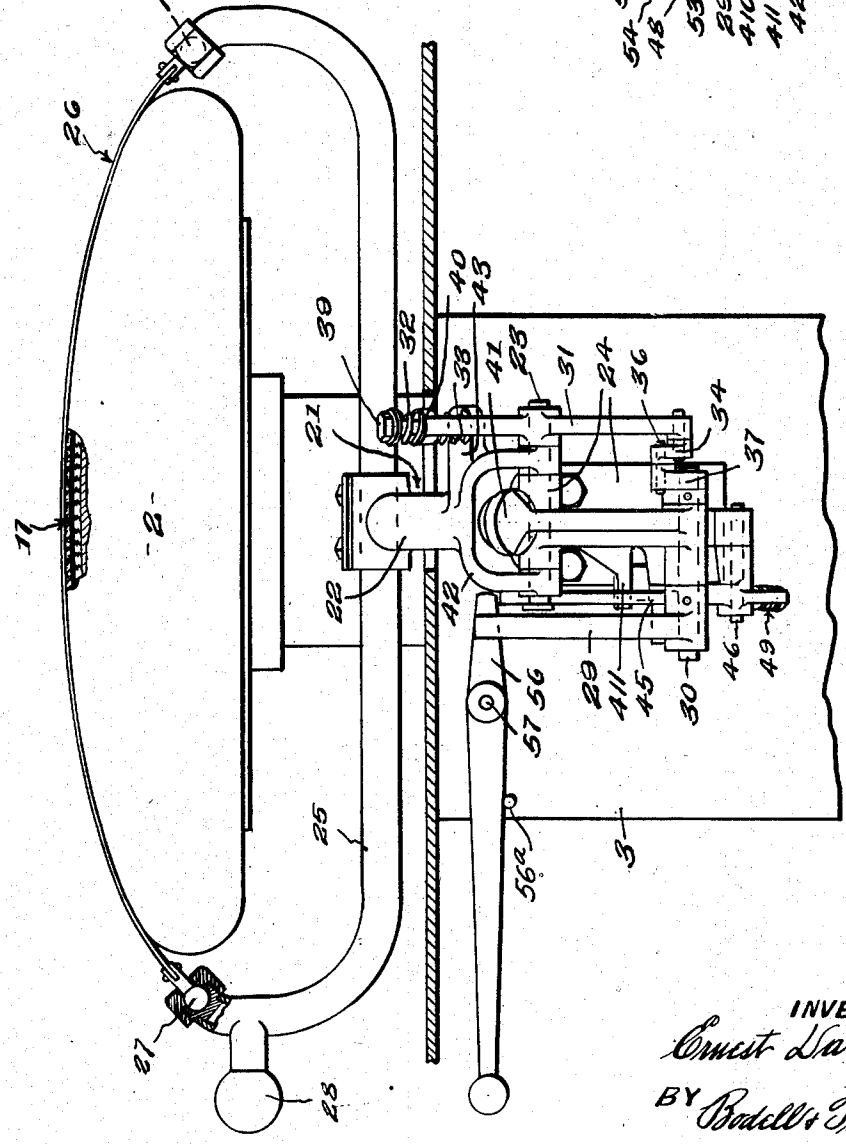

Fig. 5

INVENTOR
Ernest Davis
BY Bodell & Thompson.
ATTORNEYS.

Dec. 5, 1944. E. DAVIS 2,364,196

WORK CLAMP MECHANISM

Filed March 24, 1941 3 Sheets-Sheet 3

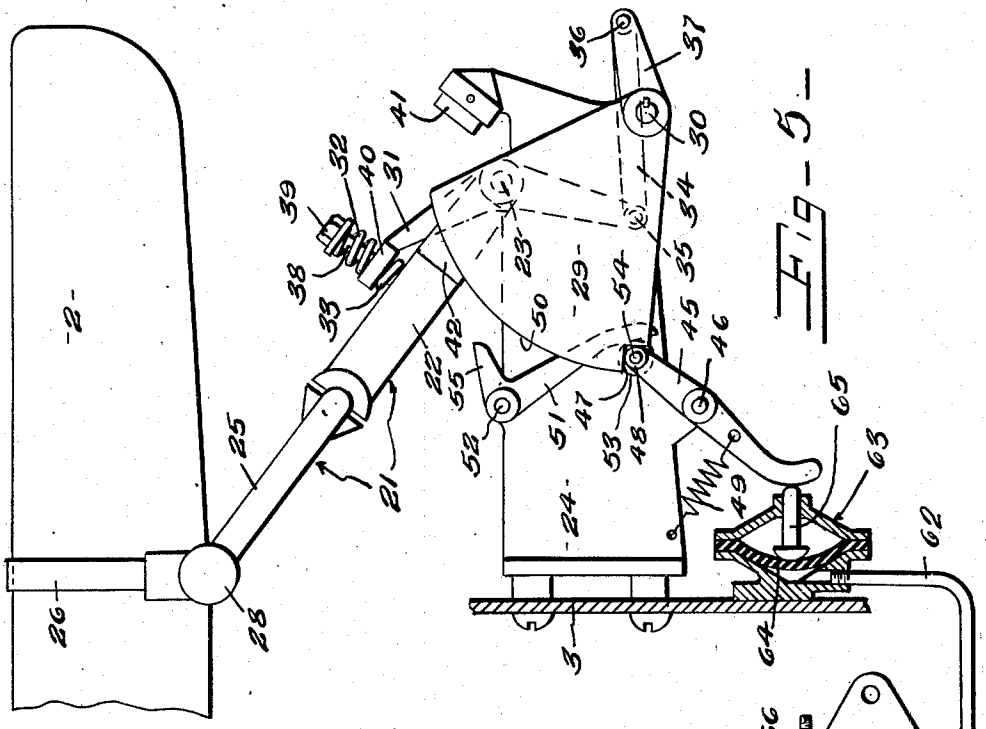

Fig. 5.

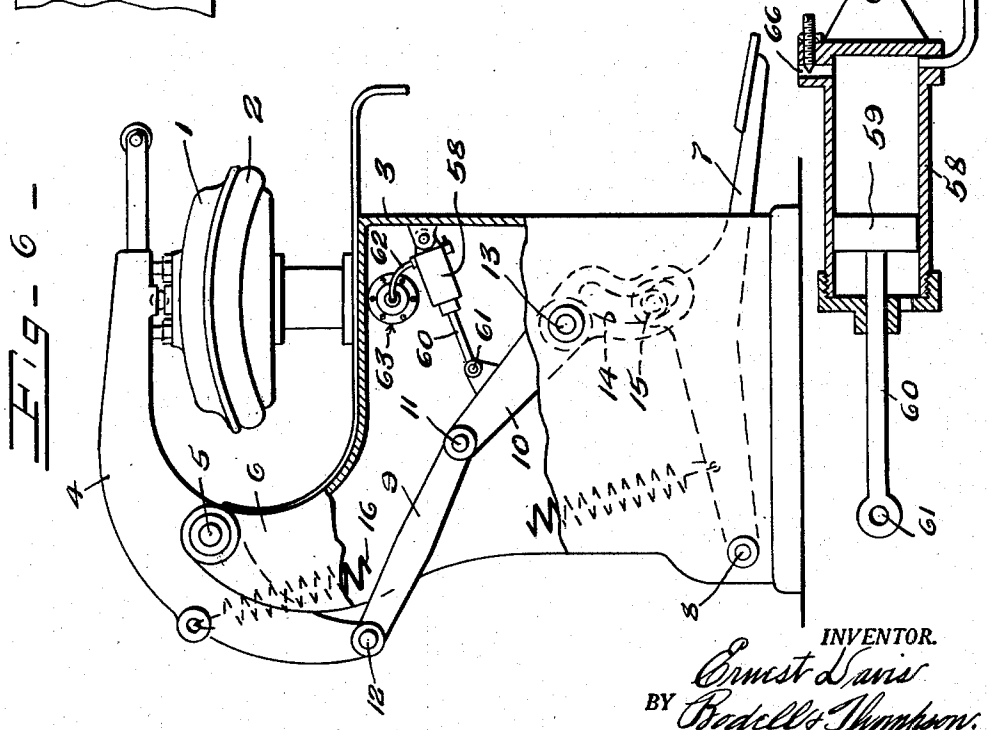

Fig. 6.

INVENTOR.
Ernest Davis
BY Bodell & Thompson.
ATTORNEYS.

Patented Dec. 5, 1944 2,364,196

UNITED STATES PATENT OFFICE

2,364,196

WORK CLAMP MECHANISM

Ernest Davis, Syracuse, N. Y., assignor to The Prosperity Company, Inc., Syracuse, N. Y., a corporation of New York

Application March 24, 1941, Serial No. 384,788

7 Claims. (Cl. 38—12)

This invention relates to work holders or work clamps for garment and laundry pressing machines, and has for its object a readily operable work clamp including an inert or momentum body or member set in motion by the initial closing movement of the work holder or clamp and operable to impart a delayed clamping effect to finally close the clamping member down on the work on the lower pressing element under the momentum of the inert member.

It further has for its object an arrangement of the inert body or member, whereby the inert member moves into a position by which it returns in a retrograde direction by gravity when released, and releasable means operable to hold the inert member in its operated position, and also a releasable means operable by the operation of the press, particularly the opening movement of the press.

This work holder is particularly designed for presses in which the force is applied by the operator in contradistinction to a power press, and one of the objects of the invention is a work holder mechanism involving an inert body or member that is operable with a minimum effort on the part of the operator, although the work holder is equally adaptable to power presses.

The invention consists in the novel features and in the combinations and constructions hereinafter set forth and claimed.

In describing this invention, reference is had to the accompanying drawings in which like characters designate corresponding parts in all the views.

Figure 1 is a fragmentary elevation of this work holder or clamping mechanism and contiguous parts of the pressing machine, showing the said mechanism in starting position.

Figure 2 is a view similar to Figure 1 showing the work clamping mechanism in finally clamped position.

Figure 3 is an elevation looking to the left in Figure 2, and also illustrating a manually operable release means.

Figure 4 is a fragmentary plan view of parts seen in Figure 2, contiguous portions of the pressing machine being omitted.

Figure 5 is a view similar to Figure 1 illustrating the means for automatically releasing the work clamping mechanism when the press opens.

Figure 6 is an elevation, partly in section, of one form of pressing machine embodying this invention and showing one means for releasing the work clamp mechanism by an operating movement of the press.

The invention comprises an inert body or member set in motion by an operating movement of a work holder or clamping member and free to lag behind and run ahead of the clamping member, and hence gain momentum when lagging behind to run ahead of the clamping member and impart under the momentum an additional operating impulse thereto.

The work clamp mechanism here illustrated comprises, generally, a manually operable clamping member movable from an inoperative position into and out of position to cooperate with the work on the lower pressing element of the machine, a movable inert body or member, means between the clamping member and the inert member to give a starting impulse to the inert member and set the same in motion, when the clamping member is moved by the operator from open toward closed position, this means being constructed to permit the inert member to gain momentum and move ahead of the clamping member and exert a delayed clamping effect on the clamping member due to the momentum of the inert member or the energy stored therein, when the clamping member approaches its final clamping position.

In Figure 6 is illustrated one form of pressing machine including coacting upper and lower pressing elements 1, 2, the lower pressing element being suitably mounted on a frame 3, and the upper pressing element being movable toward and from the lower pressing element 2 and carried by a lever 4 pivoted between its ends at 5 to an upright 6 rising from the frame.

The press here shown is pedal operated. 7 designates the foot pedal pivoted at 8 to the frame. The motion is transmitted from the foot pedal to the rear arm of the head carrying lever 4 through suitable means, as toggle links 9, 10 pivoted together at like ends at 11 and at their other ends at 12 and 13 to the rear arm of the head carrying lever 4 and to the frame respectively. The motion of the foot lever 7 is transferred to the link 10 of the toggle through suitable mechanism, as a cam slot 14, provided in an arm of the link 10, and a follower or roller 15 carried by the lever and movable along the slot. In Figure 6, the press is shown as closed. When the press opens, the toggle links 9, 10 break or fold upwardly. The closing movement of the press is against suitable returning means, as a counter spring 16. The lower pressing element 2 is usually covered with a resilient or spring padding 17.

The work holder or clamping member usually

moves or swings from a position beyond one end of the lower pressing element 2 over the same and clamps substantially rectilinearly downwardly onto the work on the lower pressing element 2 or the padding thereof.

21 designates the clamping member, this including an arm 22 pivoted at 23 to a suitable support or bracket 24, attachable to the frame 3 of the pressing machine, a yoke 25 carried by said arm and a tape or bow 26 connected at its ends to the arms of the yoke. The arm 22 and the pivot 23 are arranged below one end of the pressing element 2 in such position that the clamping member normally stands in the position shown in Figure 1 beyond one end of the lower pressing element 2, and moves into a position in which the yoke is located under the pressing element 2 and the bow or tape extends transversely over the surface of the pressing element 2 in the position shown in Figure 2 or in dash lines (Figure 1). The ends of the bow or tape 26 are connected to the ends of the yoke by universal joints, as ball and socket joints 27. The yoke is also provided with a suitable handle 28.

29 designates the inert body or member, here shown as in the form of a quadrant or segment of a fly wheel. It is pivoted on a horizontal axis at 30 to the support or bracket 24 and is here shown as pivoted below the pivot 23 of the arm 22 and movable from a depending static position (Figure 1) upwardly into the position shown in Figures 2 and 5 under a starting impulse given to it by the clamping member 21.

The means between the clamping member and the inert member to set the latter in motion and permit it first to lag behind, second to gain momentum, and finally overtake the clamping member and exert the delayed clamping effect on the clamping member when the clamping member approaches clamping position is, in the illustrated embodiment of the invention, motion transmitting connections including a reducing leverage, when the motion is being transferred from the clamping member to the inert body or member and an increasing leverage when the motion of the inert body or member is being transferred to the clamping member to give the latter a final impulse. These connections comprise a lever 31 pivoted to the support or bracket 24 and here shown as pivoted coaxially with the arm 22 on the pivot 23, one arm of the lever 31 coacting with the clamping member or the arm 22 thereof through yielding means or springs 32, 33 and the other arm being connected to the inert member 29 eccentric to the axis 30 of the inert member, as through a link 34 pivoted at 35 to the other arm of the lever 31 and at 36 to a rock arm 37 mounted on the pivot or shaft 30 of the inert member 29. One arm, as the arm below the pivot 23 of the lever 31, and the link 34 are in an acute angle folded position (Figure 1) when the clamping member 26 is in its open position and move to a more open or obtuse angle relation, as the clamping member 26 closes and the inert member or weight 29 has moved into its operated position (Figure 2). The spring 32 is located on a stud 38 projecting from the arm 22 between the head 39 of the stud and a head 40 on the lever 31, and the spring 33 is interposed between the head 40 and the arm 22. A suitable stop 41 on the bracket 24 limits the opening movement of the clamping member 21. A stop 410 on the inert member coacts with a stop 411 on the bracket 24 to limit the overthrow of the inert member under its momentum.

In operation, the operator by means of the handle 28 swings the clamping member 21 from the position shown in Figure 1 toward that shown in Figure 2. This through the spring 32 imparts a starting impulse to the inert member 29 through reducing leverage including the lever 31, link 34, and rock arm 37, starting the same in motion from the position shown in Figure 1. The inert member first, because of the spring 32, lags behind, then gains momentum and runs ahead of the arm 21, and in so doing, through the rock arm 37, link 34, lever 31, which now acts in the reverse direction, as an increasing leverage, compresses the spring 33 and applies final pressure to the arm 22 and the bow 26 causing the bow to move substantially rectilinearly onto the work on the lower pressing element 2. The action of the inert member under the energy stored therein is a delayed action between the starting of the inert member in motion and the time the momentum overtakes the clamping member 21, this being when the bow 26 is opposed to or down on the work on the lower pressing element 2. The delayed clamping action causes the bow to tightly clamp on the work.

The lever 31, link 34 and rock arm 37 are so relatively arranged that during the final or delayed action of the inert member 29 an increasing leverage is provided to transmit the momentum of the inert member 29 to the clamping member 26 through the rock arm 37, link 34, lever 31 and the clamping member 21. During the movement of the clamping member from open position (Figure 1) to closed position (Figure 5), the link 34 moves into position where it approaches the radius of the arm 37. During the movement from the position shown in Figure 1 to that shown in Figure 5, the pivot 36 connecting the link 34 and the rock arm 37 moves through a small arc relative to the arc of movement of the periphery of the member 29. However, as the link 34 approaches the radius of the arm 37, the arc of movement of the pivot 36 becomes large relative to the arc of movement of the pivot 35 between one arm of the lever 31 and the link 34 and thereby provides an increasing leverage to transmit the momentum of the inert member 29 to the clamping member.

For the sake of compactness, or in order to locate the bracket 24, and the work clamping mechanism within the vertical plane of the end edge of the overhanging end of the lower pressing element 2, the inert member 29 extends inwardly or in the same general radial direction as the clamping member 21, when the clamping member is in closed or operative position. As seen in Figures 3 and 4, the arm 22 is formed with a yoke 42, the arms of which are mounted on the pivot 23. The stud 38 is secured to a laterally extending lug 43 outside of the yoke 42 and the pivot 30 of the inert member 29 is a rock shaft on one end of which the inert member 29 is mounted, and on the other end of which the rock arm 37 is mounted. The stop 41 is located in the path of movement of the member 29 and is supported by the bracket 24 between the arms of the yoke 42 and also between the inert member 29 and the link 34.

Means is provided for latching the inert member in its operated position. This means is shown in Figures 1 and 2 as a latch 45 pivoted between its ends at 46 to the bracket 24 and co-

acting at one end with the notch 47 in the inert member 29, the latch being urged toward its latching position by a spring 49. When the inert member is moving upwardly from its position shown in Figure 1 to that shown in Figure 2, the peripheral surface 50 of the inert member 29, this being a cam surface engages a roller 48 on the latch 45 and presses the latch to the left (Figure 2) against the action of its spring 49. When the inert member 27 swings under its momentum into the position shown in dotted lines (Figure 1), the roller 48 enters the notch 47 and holds the inert member in its operated position and from rebounding. A suitable guide 51 is provided for coacting with the latch 45 to prevent it from displacement under the action of its returning spring 49 when the inert body or member 29 is in starting position and before it engages the roller 48 on the latch 45. This guide forms part of the release mechanism in the form shown in Figures 1, 2, 3 and 4. The guide 51 is here shown as an angle lever pivoted at 52 to the bracket 24 and having an arm coacting with a roller 53 on the pin or stud on which the roller 48 is also mounted, the lever 51 also having an angle arm 55 coacting with a release lever 56 and located to limit the pivotal movement of the lever 51 in such position that the latch 45 can not pass out of juxtaposition to the periphery of the inert body or member 29. The release lever 56 is located in its starting position by a stop 56^a.

In Figure 3, the manually operated latch lever 56 is pivoted at 57 and shown as extending forward with its outer or handle end within reach of the operator. However, the latch 45 may be released automatically by the operation of the press, as the opening movement of the press.

Referring to Figures 5 and 6, the means shown for releasing the latch 45 is operated by the actuating mechanism of the press and comprises a cylinder 58 suitably carried by the frame 3 of the machine, a piston 59 workable therein and having its rod 60 pivoted at 61 to one of the links of the toggle, here shown as pivoted to the link 10. The cylinder is connected through a pipe 62 to a diaphragm chamber 63 supported on the frame 3 and having a diaphragm 64 therein thrusting against a plunger 65 which in turn thrusts against the tail of the latch 45. The cylinder is provided with a restricted inlet port 66 which also constitutes the outlet port. It is restricted to obstruct too rapid exhaust during the power stroke of the piston 59. When the press is being closed, the toggle links 8 and 9 straighten and retract the piston 59, drawing air into the cylinder 58 through the port 66. When the press opens, the toggle link 10 moves upwardly and moves the piston to the right (Figures 2 and 6) and owing to the restricted outlet 66, forces air through the pipe 62 to the diaphragm chamber, actuating the diaphragm 64 therein and through the plunger 65 moves the latch out of its latching position. When the press is open and the latch released, the inert member 29 falls by gravity, and thus moves the clamping member 21 toward open position, this being also facilitated to some extent by the reaction of the spring padding.

In the general operation, after the work is laid on the lower pressing element 2, the work clamp is swung by hand from the position shown in Figure 1 to that shown in Figure 2, this operation setting in motion the inert member 29 which first lags and then gains momentum and finally re-acts with delaying clamping effect to tightly clamp the tape or bow 26 on the work on the pressing element 2. During the movement of the inert member into the position shown in broken lines (Figure 1), the latch 45 moves into latching position to hold the inert member in its operated position. When the press is opened, the latch 45 is released, and the inert member drops by gravity toward starting position and imparts an opening impulse to the rock arm 37, link 34, lever 31 and spring 32 to the clamping member 21, this being also facilitated by the spring 33.

What I claim is:

1. A work clamping mechanism for pressing machines which includes an element on which the work is laid, said mechanism including a support, a manually shiftable work clamping member shiftably carried by the support, a normally inert member shiftably carried by the support, motion transmitting connections between the clamping member and the inert member to set the inert member in motion upon the operating movement of the clamping member, said motion transmitting connections including a lost motion means permitting the inert member to initially lag behind the clamping member and build up momentum and finally overtake the clamping member and impart under its momentum an additional operating impulse to the clamping member.

2. A work clamping mechanism for pressing machines which includes an element on which the work is laid, said mechanism including a support, a manually shiftable work clamping member shiftably carried by the support, a normally inert member shiftably carried by the support, motion transmitting connections between the clamping member and the inert member to set the inert member in motion upon the operating movement of the clamping member, said motion transmitting connections including a lost motion means permitting the inert member to initially lag behind the clamping member and build up momentum and finally overtake the clamping member and impact under its momentum an additional operating impulse to the clamping member, said lost motion connection including yielding resilient means for transmitting the initial starting movement to the inert member and for translating the additional impulse from the inert member to the clamping member.

3. A work clamping mechanism for pressing machines which includes an element on which the work is laid, said mechanism including a support, a manually operable work clamping member shiftably carried by the support and movable into and out of coaction with said element, a normally inert member shiftably carried by the support, motion transmitting connections between the clamping member and the inert member to set the inert member in motion when the clamping member is initially operated, said connections including means to permit the inert member to initially lag behind the clamping member in its closing movement, then gain momentum and finally overtake the clamping member and impart under its momentum an additional delayed operating impulse to the clamping member when the clamping member approaches final clamping position, the inert member being movable under its momentum into a position in which it tends to return by gravity to starting position, and releasable means for holding the inert member in the position to which it has been moved by its momentum.

4. A work clamping mechanism for pressing

machines which includes an element on which the work is laid, said mechanism including a support, a manually operable work clamping member shiftably carried by the support and movable into and out of coaction with said element, and an inert weight member pivoted to the support and normally hanging downward from its pivot, motion transmitting connections between the clamping member and the inert member to set the inert member in motion about its pivot in an upward arc, when the clamping member is initially operated, said connections including means to permit the inert member to initially lag behind the clamping member in its closing movement and then gain momentum and finally overtake the clamping member and impart under its momentum an additional delayed operating impulse to the clamping member when the clamping member approaches final clamping position, the inert member being movable under its momentum into a position in which it tends to return by gravity to starting position.

5. A work clamp mechanism for pressing machines comprising a suitable support, a manually operable clamping member including an arm pivoted to the support, an inert member pivoted to the support, a lever pivoted between its ends to the support, a link connecting one arm of the lever and the inert member, eccentric to the axis of the inert member, and yielding means between the other arm of the lever and said arm, all so arranged that the clamping member when actuated sets the inert member in motion and permits the same to gain momentum and exert additional delayed clamping effect on the clamping member when the clamping member approaches final clamping position.

6. A work clamp mechanism for pressing machines comprising a suitable support, a manually operable clamping member including an arm pivoted to the support, an inert member pivoted to the support, a lever pivoted between its ends to the support, a link pivoted to one arm of the lever and to the inert member eccentric to the axis of the inert member, and yielding means between the other arm of the lever and said arm, all so arranged that the clamping member when actuated sets the inert member in motion and permits the same to gain momentum and exert additional delayed clamping effect on the clamping member when the clamping member approaches final clamping position, the pivotal connection between the link and the inert member being so located that said pivotal connection has a small arc of movement relative to the periphery of the inert member during the closing movement of the clamping member, and the link approaches the radius of said pivotal connection as the clamping member closes, whereby the pivotal connection between the inert member and the link then moves in a comparatively great arc relative to the arc of movement of the pivotal connection between the link and said one arm of the lever, thereby providing an increasing leverage to transmit the momentum of the inert member to the clamping member.

7. A work clamp mechanism for pressing machines comprising a suitable spport, a manually operable clamping member including an arm pivoted to the support, an inert member pivoted to the support, a lever pivoted between its ends to the support, a link pivoted to one arm of the lever and to the inert member eccentric to the axis of the inert member, and yielding means between the other arm of the lever and said arm, all so arranged that the clamping member when actuated sets the inert member in motion and permits the same to gain momentum and exert additional delayed clamping effect on the clamping member when the clamping member approaches final clamping position, the pivotal connection between the link and the inert member being so located that said pivotal connection has a small arc of movement relative to the periphery of the inert member during the closing movement of the clamping member, and the link approaches the radius of said pivotal connection as the clamping member closes, whereby the pivotal connection between the inert member and the link then moves in a comparatively great arc relative to the arc of movement of the pivotal connection between the link and said one arm of the lever, thereby providing an increasing leverage to transmit the momentum of the inert member to the clamping member, the inert member being arranged to move under its momentum into a position by which it returns by gravity in a retrograde direction, and releasable means for holding the inert member in its operated position.

ERNEST DAVIS.