Feb. 18, 1941. E. E. FOSTER 2,231,897

PRESSING AND IRONING MACHINE

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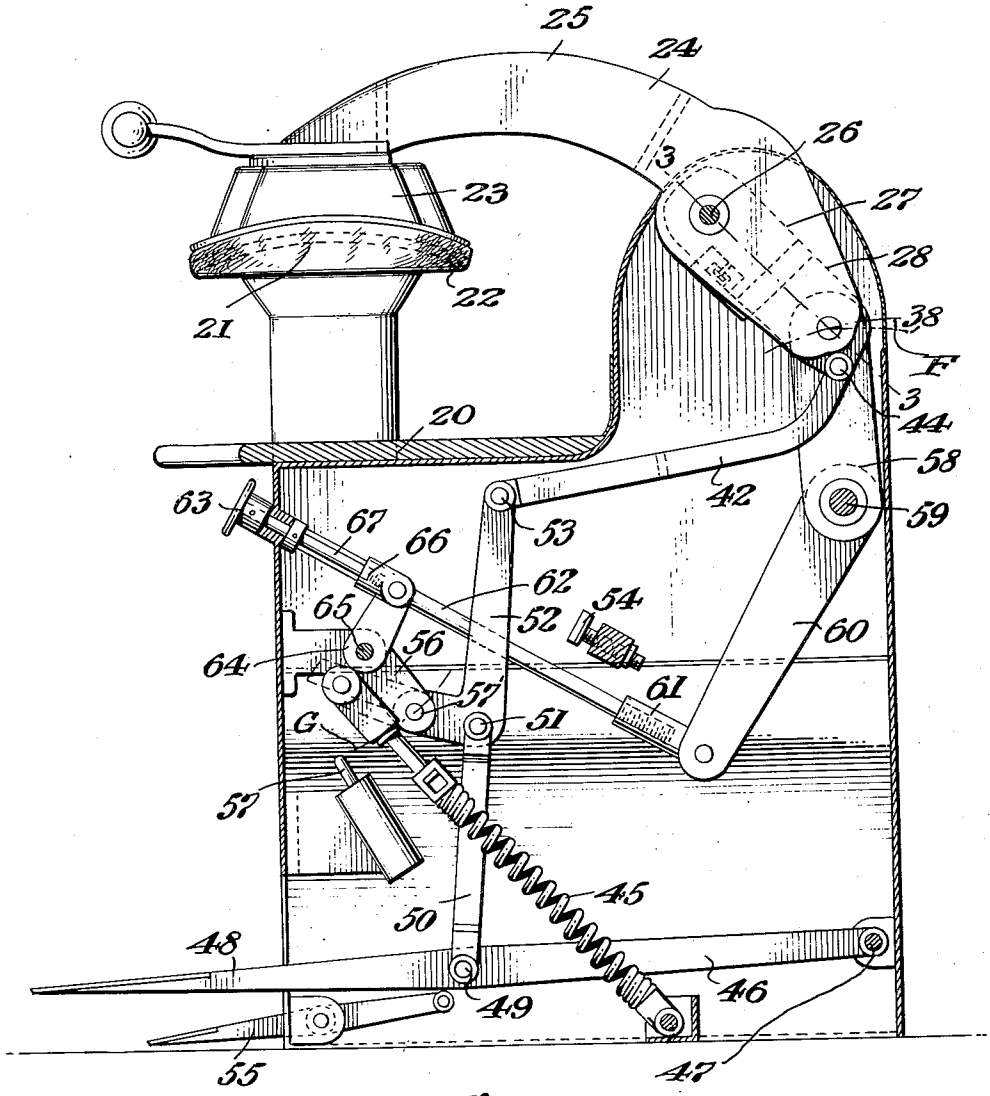


Fig. 1.

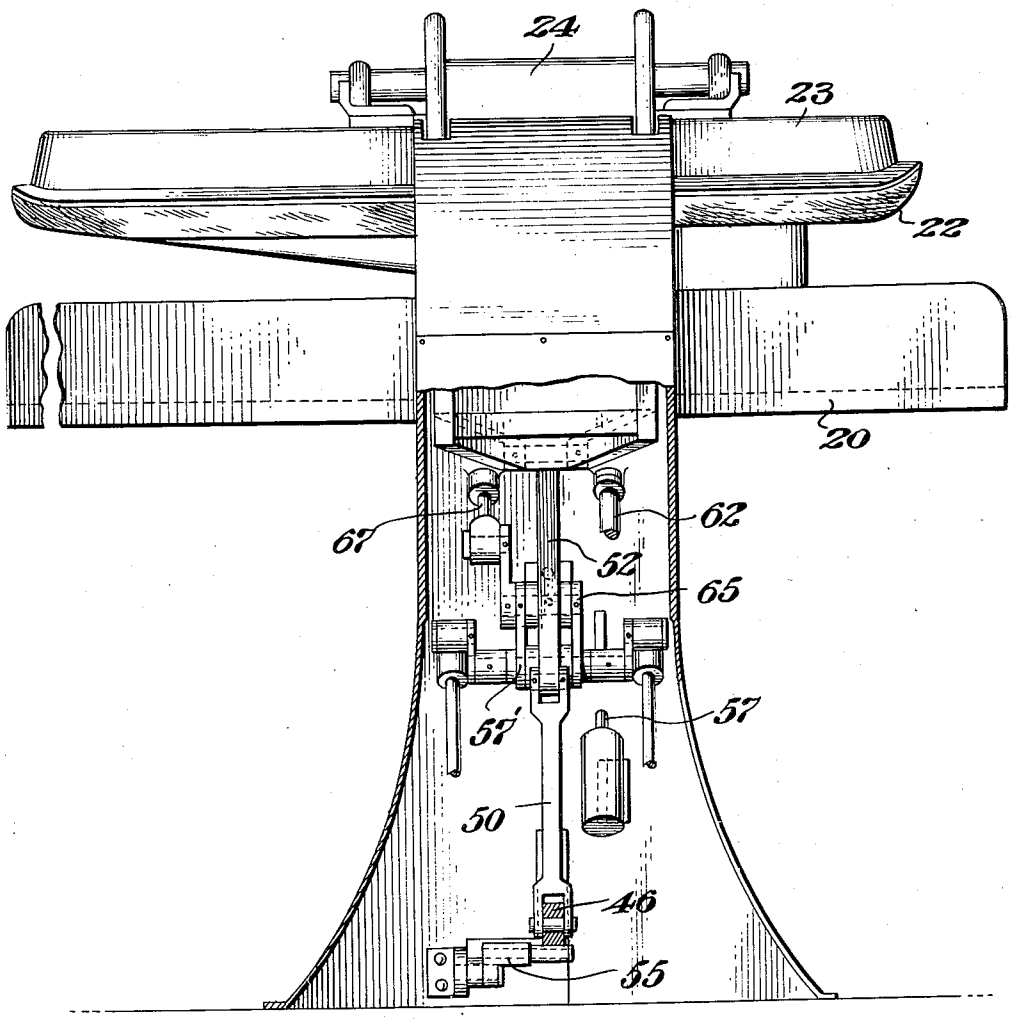
Inventor;
Edwin E. Foster,
By Young Emery & Thompson
Attys.

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PRESSING AND IRONING MACHINE

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Fig. 2.



Inventor;
Edwin E. Foster;
By Young, Emley & Thompson
Attys.

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PRESSING AND IRONING MACHINE

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Fig. 3.

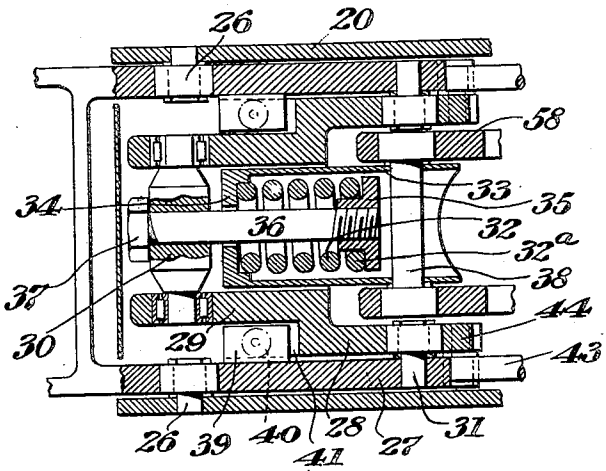


Fig. 10.

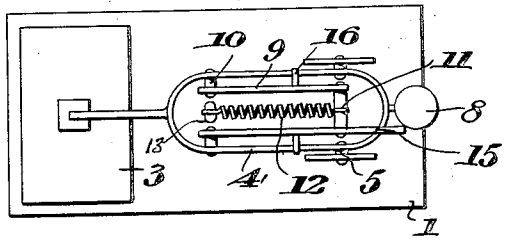


Fig. 8.

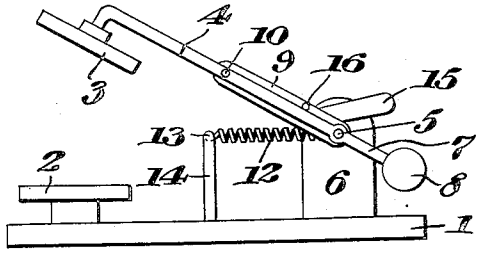
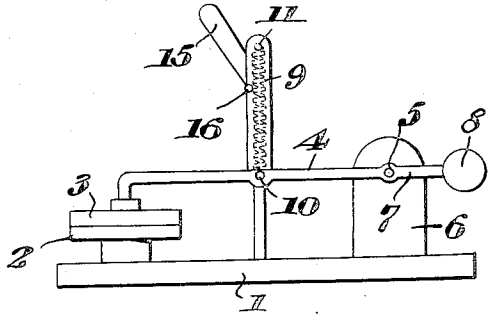


Fig. 9.



INVENTOR
Edwin E. Foster,
BY
Young, Emery & Thompson
ATTORNEYS

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Fig. 5.

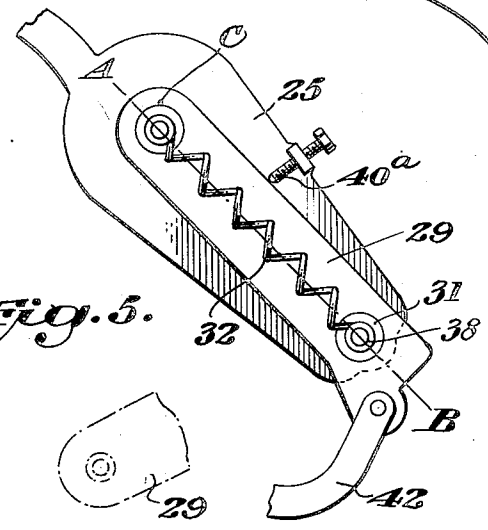


Fig. 6.

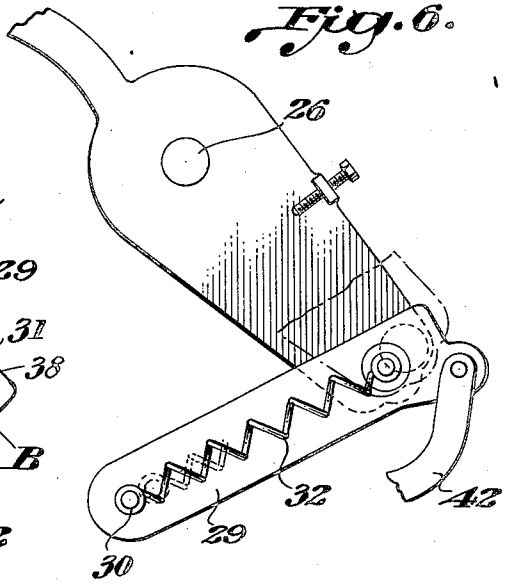


Fig. 7.

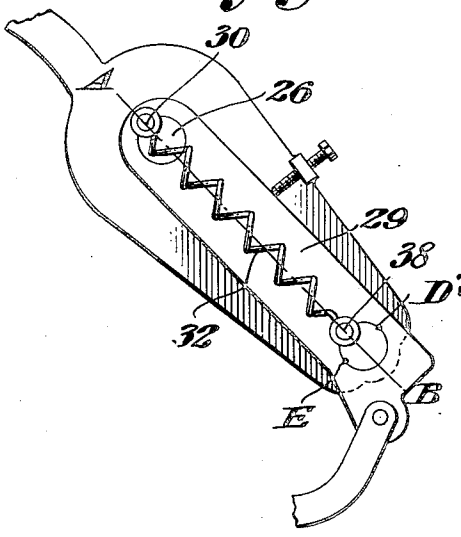
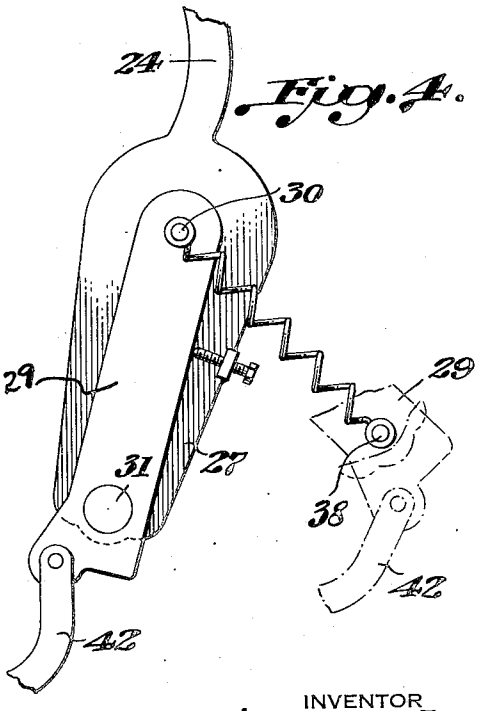


Fig. 4.



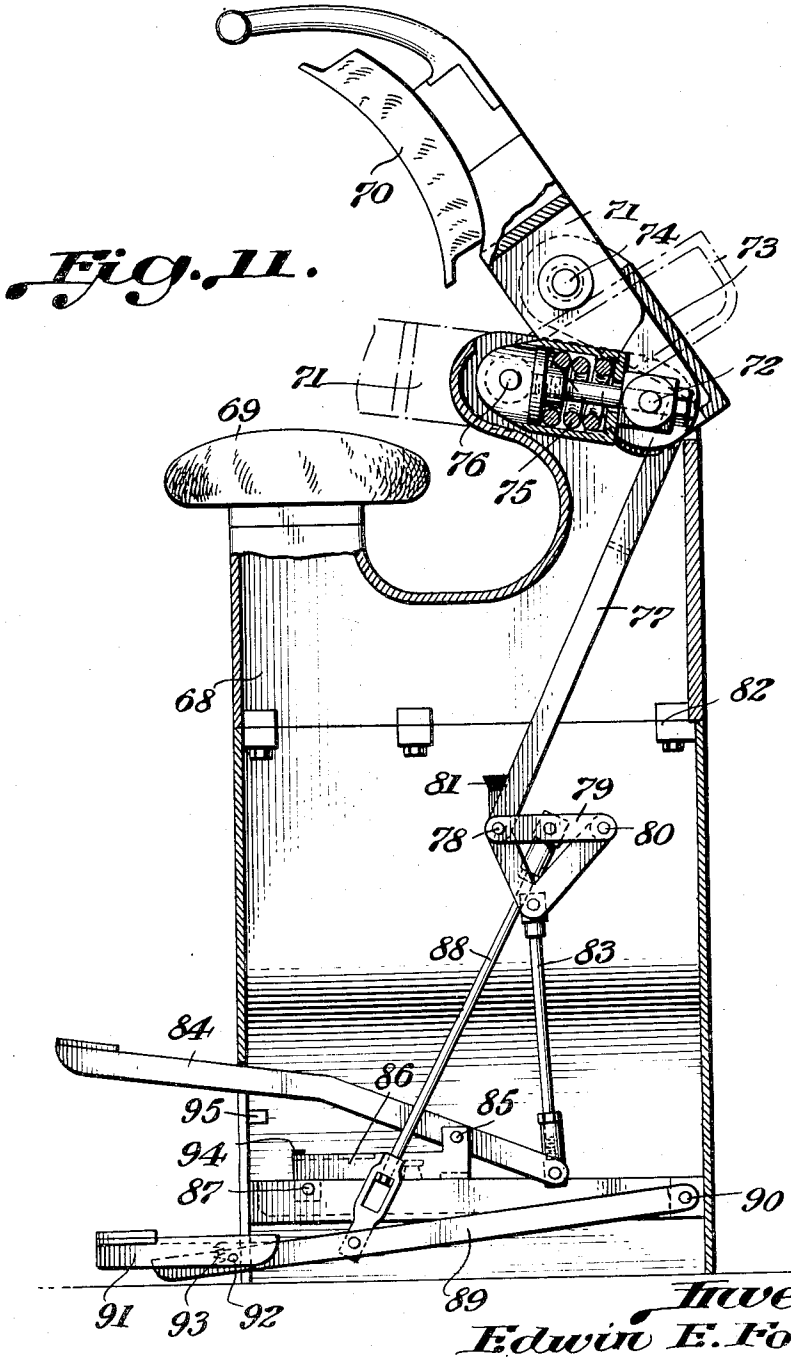
INVENTOR
Edwin E. Foster,
BY
Young, Emery & Thompson
ATTORNEYS

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PRESSING AND IRONING MACHINE

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Fig. 11.



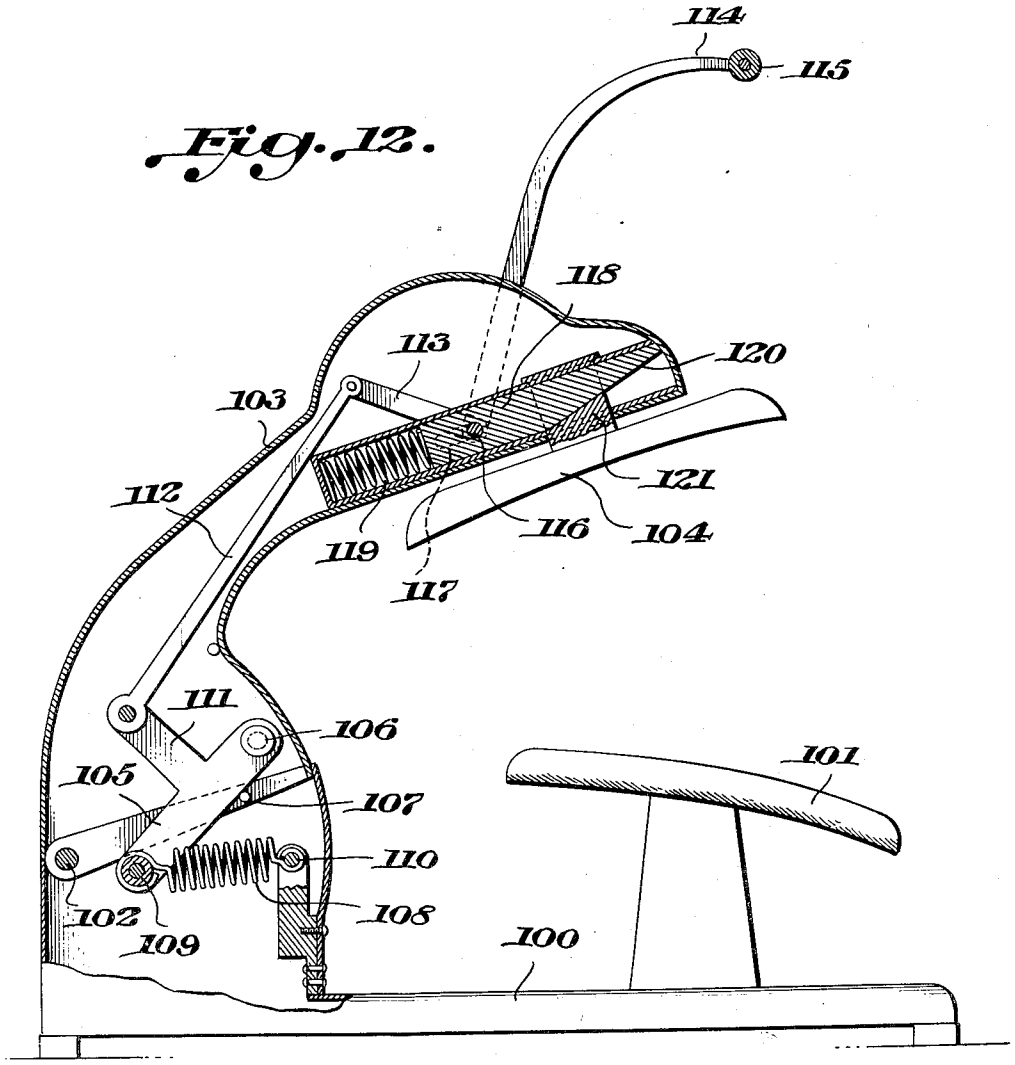
Inventor;
Edwin E. Foster;
By Young, Emery & Thompson
Attys.

Feb. 18, 1941. E. E. FOSTER 2,231,897

PRESSING AND IRONING MACHINE

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Fig. 12.



Inventor;
Edwin E. Foster;

By Young, Emery & Thompson
Attys.

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PRESSING AND IRONING MACHINE

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Fig. 13.

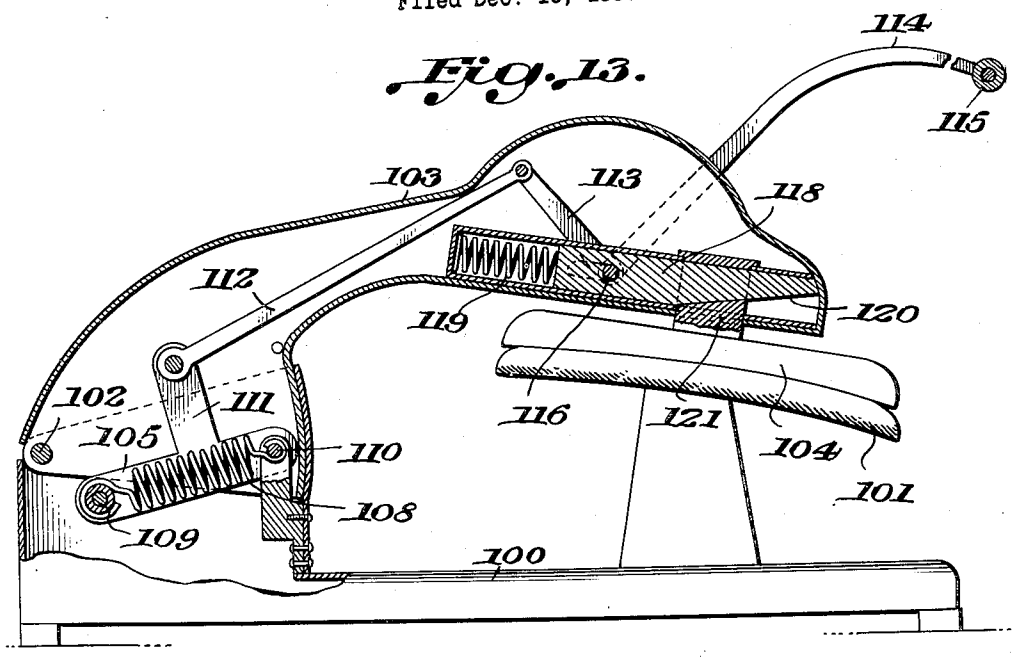
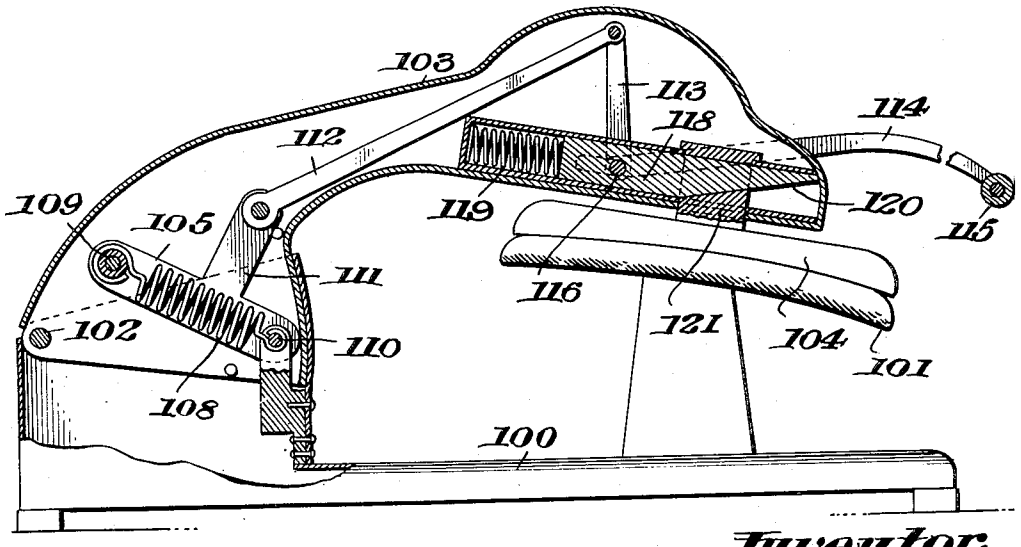


Fig. 14.



Inventor,
Edwin E. Foster,

By Young, Emery & Thompson
attys.

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Fig. 16.

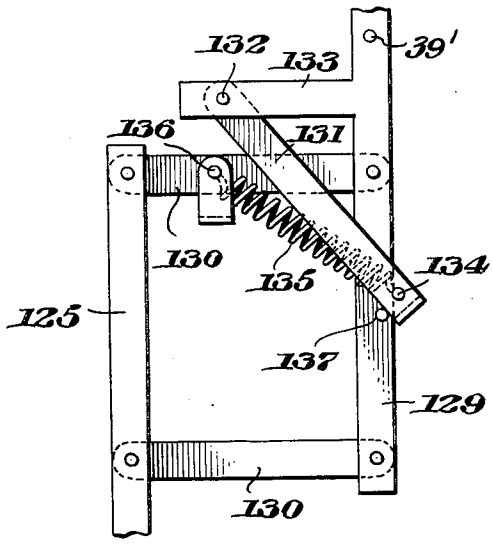


Fig. 15.

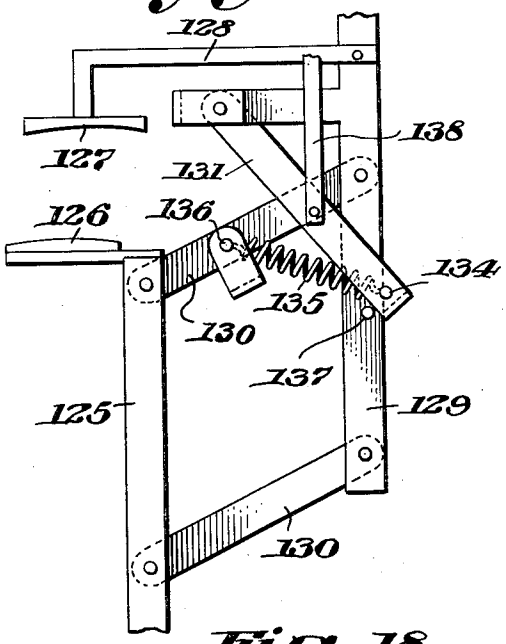


Fig. 17.

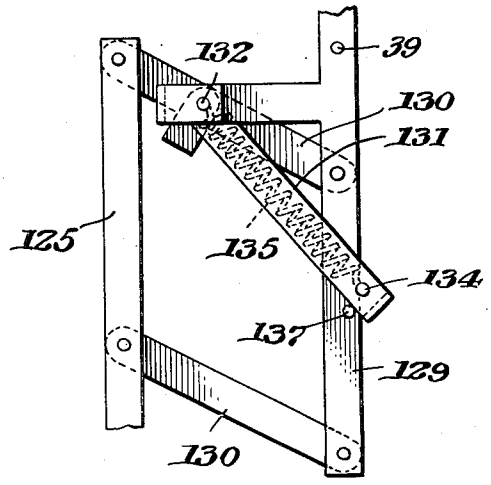
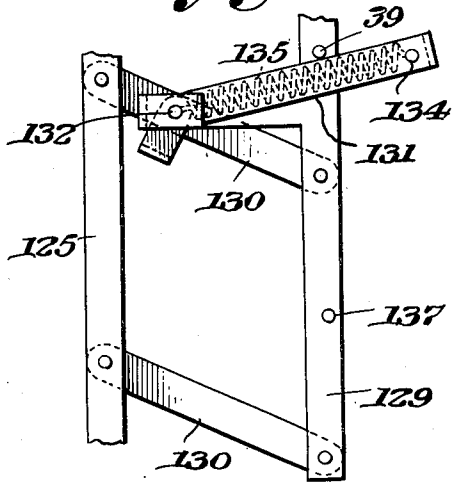


Fig. 18.



Inventor;
Edwin E. Foster;

By Young, Emery & Thompson
Attys.

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Fig. 20.

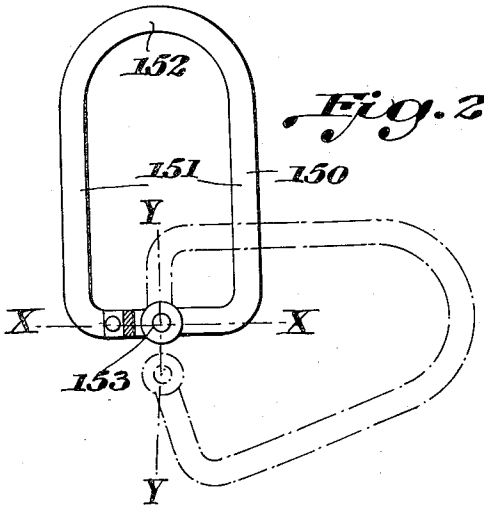


Fig. 21.

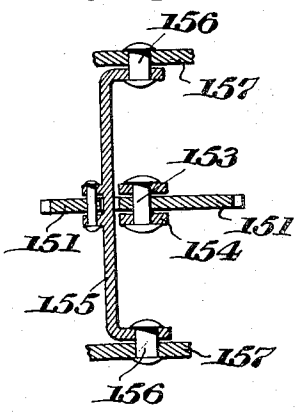
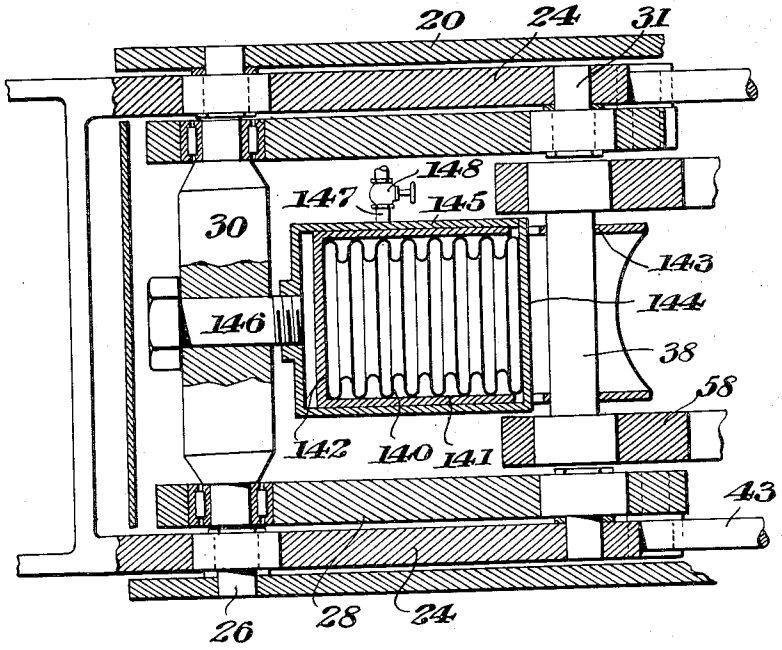


Fig. 19.



INVENTOR
Edwin E. Foster,
BY
Young, Emery & Thompson
ATTORNEYS

Patented Feb. 18, 1941 2,231,897

UNITED STATES PATENT OFFICE

2,231,897

PRESSING AND IRONING MACHINE

Edwin E. Foster, Austin, Tex., assignor to Majik-Ironers, Inc., Austin, Tex., a corporation of Texas

Application December 15, 1937, Serial No. 180,003

17 Claims. (Cl. 38—36)

The present application is a continuation-in-part of applicant's co-pending applications, Serial No. 747,241, filed October 6, 1934, and Serial No. 69,143, filed March 14, 1936.

This invention relates to pressing and ironing machines, such as are used for applying pressure to work between two cooperating pressing members. While useful in any kind of press, such as presses for pressing, cutting or forming plastic substances, leather, textile fabrics and other materials, the invention has more particular relation to machines for working on garments, such as are used by tailors or clothing manufacturers for pressing outer garments or in laundries for ironing or pressing shirts, underwear, children's rompers, or other articles of wearing apparel.

Satisfactory pressing of textile fabrics or articles made therefrom, such as wearing apparel, requires heat, pressure and the presence of moisture, to impart a permanent set and the desirable finish to the work. While some garment presses are actuated entirely by human effort, the total effective pressure thus possible is limited by the weight or strength of the operator and is not suitable for certain classes of work requiring heavy pressure. In the modern garment press, equipped with wide platen form pressing members having a total area of the order of 1000 square inches, it is sometimes desirable to produce a pressure of say 5 pounds per square inch or a total of 5000 pounds, or even more, distributed over the full pressing area. This requires the use of power means of one of the usual forms, such as mechanism operated by shafts and pulleys, or an electric motor, or electromagnetic means, or some fluid pressure motor, such as one or more fluid pressure cylinders, operated by compressed air, steam, hydraulic pressure or the like. Such presses are made capable of control by devices easily operatable by human effort, but at each pressing operation they require the expenditure of energy to produce the necessary pressure. For example, the electric motor expends electrical energy, while the fluid pressure motor requires the production and expenditure of fluid pressure energy. Both forms of energy are irretrievably lost and therefore play an important part in the expense of operation.

The present invention has for its object to provide an improved pressing machine which may be so constructed and arranged as to produce any desirable pressure, but without requiring expenditure of energy as heretofore or, at least, with no greater expenditure of energy than is capable of being returned or restored to the machine by effort within the range of strength or weight of the ordinary operator, thus reducing or doing away with the cost for power production.

A further object of the invention is to provide an improved pressing machine of this kind in which the control and operating devices are capable of being easily operated or manipulated by ordinary human effort and without the expenditure of expensive power especially produced for the purpose, but the machine nevertheless is capable of heavy duty, even beyond the limitations of human effort.

A further object is to provide an improved pressing machine which includes the usual relatively movable pressing members, and associated therewith a mechanical energy reservoir device capable of accepting and retaining a store of mechanical energy, said device being so arranged with reference to the pressing members as to be normally ineffective upon them, but which, when they are in pressing engagement with the work between them, may be so manipulated as to render the stored energy effective to produce pressure between the pressing members, but without material expenditure or loss of energy, so that upon conclusion of the required pressing period the device may be restored to its original ineffective position or condition and the work released from pressure, the same stored energy being subsequently used for another pressing operation, and so on.

A further object of the invention is to provide an improved machine of this kind which utilizes for the mechanical energy storing device a spring or spring unit, or its equivalent, pre-stressed or loaded with the required mechanical energy at the time the pressing machine is first assembled in operating condition, said unit being normally ineffective upon the pressing members, by virtue of the fact that normally, with the press either open or closed, its tendency to expend, release or use its stored energy is exerted in a direction in which it can produce little or no relative approach and pressure between the pressing members, and little if any movement between those parts which restrain the stressed unit, but which unit is capable of adjustment to a position altering the direction of application of its stored energy from an ineffective direction to one in which it becomes effective to produce relative approach and consequently to produce or increase pressure between the pressing members.

More specifically, an object of the present invention is to produce an improved pressing machine of this kind in which the energy storing

unit includes two elements which its stored mechanical energy tends to relatively move or separate, said two elements closely neighboring each other and being connected respectively to two other elements associated with other parts so that upon relative movement or separation of said elements the pressing members tend to approach each other for the production of pressure between them, the energy storing unit being capable of rotation about an axis through said several elements when the pressing members are in pressing engagement, to thereby change the direction of its applied force, whereby at the will of the operator said unit selectively may be made ineffective or effective, or its effectiveness may be either increased or diminished.

A further object is to provide a pressing machine of this kind, the energy storing unit of which is so constructed and is so associated with the pressing members that they may be readily moved relatively to each other to close and open the press, without either material expenditure of energy by the energy storing device or any necessity of supplying a material quantity of energy thereto by operator effort, but said unit, when the press is closed, nevertheless may be adjusted at will so that the direction of application of its force to the parts to which it is connected is changed, to thereby selectively compel said unit to become more or less effective or ineffective for the production or increase or reduction of pressure, as may be desired.

A further object of the invention is to provide an improved pressing machine of the character described in which the movable pressing member or members may be more or less counterbalanced or even biased to open or close, and thus more readily may be moved to open and close the press, the energy storing unit being so constructed and so associated with the pressing members or their operating parts as to utilize a portion of its stored energy for either producing all or a part of the counterbalancing or biasing effect, or to actually open or close the press or to assist in so doing, or even to actuate a part of the control or operating mechanism, the energy thus utilized during each pressing operation being relatively so small a part of the entire store as to be capable of being returned or restored to the unit by the operator because within the range of her weight or strength.

A further object of the invention is to provide an improved garment press of standard form embodying the usual relatively stationary bed and cooperating swinging head, together with an energy storing unit so constructed and arranged and so associated with the swinging head lever, or with its operating mechanism, as to enable the head lever to be readily moved back and forth by the operator with very little effort between press open and press closed positions, the energy storing unit being relatively ineffective upon the head or for more than very light duty during opening and closing movements, but in press closed position said unit, pre-stressed as described, being very easily adjustable by operator effort to change the direction of application of its force to the elements which it operates, thereby increasing its effectiveness and applying or increasing pressure between the pressing members in an amount beyond the ordinary effort of the operator.

Further objects of the invention are in part obvious and in part will appear more in detail hereinafter.

In the drawings, Fig. 1 is a side elevation of one form of machine embodying the invention, the frame being broken out and in section to expose interior parts, and the parts being shown in press closed position prior to the application of final pressure; Fig. 2 is a rear elevation, partly broken out and in section, of the machine shown in Fig. 1; Fig. 3 is a detail sectional plan view on the line 3—3, Fig. 1; Figs. 4, 5 and 6 are diagrammatic views illustrating several positions of the head lever and energy storing spring unit of the machine shown in Fig. 1, omitting any offset relation of pivots, and the parts being shown of conventional shape or form for simplicity of illustration, Fig. 4 showing the parts in press open position, Fig. 5 in press closed position prior to the application of final pressure, and Fig. 6 illustrating the full closed final pressure position; Fig. 7 is a view corresponding to Fig. 5 and illustrating offset relation of certain of the pivots; Fig. 8 is a side elevation conventionally illustrating another form of press embodying the invention, the parts being shown in press open position; Fig. 9 is a similar view, showing the parts in full closed final pressure position; Fig. 10 is a plan view of the machine shown in Fig. 8, the parts being shown in press closed position before the application of final pressure; Fig. 11 is a side elevation, partly broken out and in section corresponding to Fig. 1, and illustrating another machine embodying the invention; Fig. 12 is a side elevation, partly broken out and in section, showing still another embodiment of the invention, the machine being shown in press open position; Fig. 13 is a similar view showing the same press in press closed position before the application of final pressure; Fig. 14 is a similar view showing the parts in full closed final pressure position; Fig. 15 is a diagrammatic view conventionally illustrating the operating parts of another machine embodying the invention to a limited extent, the parts being shown in press open position; Fig. 16 is a similar view illustrating the press partly closed; Fig. 17 is a similar view illustrating the parts in press closed position before the application of final pressure; Fig. 18 is a similar view illustrating the full closed final pressure position; Fig. 19 is a detail sectional plan view corresponding to Fig. 3 and illustrating another form of energy storing unit; Fig. 20 is an elevation, illustrating still another form of energy storing unit; and Fig. 21 is a sectional plan view along the line X—X, Fig. 20.

While the present invention is capable of use in any kind of press and for the production of pressure upon any kind of work or for any purpose, for simplicity of illustration and in no sense of limitation the drawings illustrate the invention applied to several forms of garment press, such as the press used by tailors or clothing manufacturers for pressing outer garments or in laundries for the ironing of shirts or other articles of wearing apparel.

Whatever form the press may take, and whatever it may be used for, the energy storing unit may be of various forms, utilizing any suitable elastic or resilient body, such as a spring or an expansible container filled with trapped compressed fluid, or an equivalent, but always with said unit arranged so that the press may be readily opened and closed; and in closed position said unit is adjustable or may be manipulated to apply and remove or to increase or diminish its effect in any suitable manner such as by rotation around an axis, for which purpose it is connected to two relatively movable elements associated with the pressing members and arranged so that relative motion between them, or a tendency of

the unit to produce such relative motion, applies or releases, or increases or diminishes pressure between said pressing members.

Referring first to Figs. 8, 9 and 10, they illustrate, quite conventionally, a very simple form of press embodying a frame 1 supporting a stationary pressing member or bed 2 with which cooperates a movable pressing head 3 carried on one arm of a lever 4 pivoted at 5 on supports 6 attached to the frame, the other lever arm 7 carrying a counterweight 8.

The stored energy unit here shown comprises two members, to-wit, a rigid link 9 pivoted at 10 on the head lever or some other operating element attached thereto and having connected to its opposite end, at 11, an energy storing device in the form of a pre-stressed helical tension spring 12, the opposite end of which is fastened at 13 to some element associated with the bed, such as the stationary support 14. Link 9 may be operated in any suitable manner, such as by a handle 15, and said link and lever 4 are provided with interengaging stop means, such as the stop device 16 on link 9 adapted to abut an arm of lever 4 to properly register the centers 5 and 10, as will appear.

Fig. 8 shows the parts in press open position. The pivot points or centers 10 and 11 on link 9 are spaced apart by substantially, if not exactly, the same distance as centers 10 and 5 on the head lever, a distance which also is equal to the distance between the centers or points of attachment 13 and 11 at the opposite ends of the energy storing spring 12. This is not essential, as will later appear. Further, it is assumed that in the initial assembling and set-up of this press the spring 12 has been stressed, hereby extending it so that it is loaded with and stores energy in quantity, let us assume, sufficient to produce a pull of say 200 pounds at each end of the spring.

With the parts in press position shown in Fig. 8, spring 12 is anchored to the frame at 13, and at the point 11 is exerting a pull on link 9, thus holding the stop device 16 against lever arm 4. But the pull of the spring is exerted at the center 11 whose position now coincides with that of pivot 5 of lever 4, so that although the force of the spring unit is exerted upon two elements (the head lever and frame) which are relatively movable the spring cannot turn the head lever. As a result, said lever easily may be swung up and down between open and closed press positions without in any way affecting or being affected by spring 12, except as to friction between the moving parts, which may be assumed to be reduced to a negligible value by the use of ball or roller bearings, knife edge pivots, or the like.

During swinging of the head lever the link 9 and spring 12 open and close with reference to each other by hinging motion of link 9 around center 11, after the manner of operation of a jack knife. Assuming that the press is closed, by motion of the head to the position shown in Fig. 9, the centers 10 and 13 are brought into coincidence, but even yet the spring is ineffective upon the lever. Now, by using handle 15, link 9 and spring 12, now acting together or as a unit, may be swung about the centers 10 and 13 as an axis until the parts reach the position shown in Fig. 9.

In press closed position, the direction of application of the force of spring 12 to the head lever is through the axis of pivot 5, so that the spring energy is ineffective to and cannot move the lever. However, as the spring unit is swung more and more toward the full pressure position in Fig. 9 the direction of application of the spring force at the center 10 changes through an increasing angle, with a gradually increasing effect upon lever 4, until finally the direction of the force is normal to the lever and maximum effect is produced. In the final or in any intermediate position the spring 12 pulls down on link 9 and through it is effective upon the lever to produce pressure between the head 3 and bed 2. With a pull of 200 pounds and with a lever arm ratio of approximately 2 to 1, as shown, the net maximum effect is the production of 100 pounds pressure distributed over the total area of head 3 and bed 2.

Of course, if head 3 and bed 2 are solid metal members with no padding between them, and if the work is relatively thin, such as a handkerchief, the total pressure of the spring 12 is applied between the pressing members without actual relative motion between them. Therefore, no work is done and there is no loss or reduction in the amount of potential energy stored in the spring. However, if one or both of the pressing members is padded or yields, application of the force of the stored energy by shifting the spring unit to the position shown in Fig. 9 not only applies the force to produce pressure between the pressing members, but actual relative motion between said members is produced. Such motion may be accomplished only by the expenditure or loss of some of the stored spring energy, usually only a relatively small proportion of that energy, say ten per cent in the assumed example. This is accomplished by downward motion of center 10 to a position below center 13, so that they no longer coincide. Nevertheless, the two members of the stored energy unit, 9, 12, may be rotated back and forth by means of the handle 15, but obviously with the loss of some energy as pressure is applied to the work or is increased and the restoration of that energy by the operator as she moves the spring unit to or toward its ineffective position, Fig. 8.

The construction just described is but one typical instance of many ways in which the invention can be applied to garment or other presses. In each case, however, the press usually is so arranged as to enable the pressing members to be readily moved back and forth, by hinging, turret or sliding motion, between pressing position, where they are in engagement with the work between them, and an open position, where they are separated in one way or another to expose the lower pressing member for removing or arranging the work, all without material loss or expenditure of energy from the energy storing device. Nevertheless, when the pressing members are in pressing position, the energy storing device may be adjusted either to its ineffective or to its effective or to any intermediate position in a manner to change the direction of application of the force of its stored energy to the part or parts which it operates, thereby to release or produce or increase or diminish pressure between the pressing members, as desired.

Figs. 1 to 3 inclusive illustrate in some detail a preferred form of the invention differing mainly from the arrangement shown in Figs. 8, 9 and 10 in that the stored energy is applied to one arm of a two armed head lever while the head is carried by its other arm.

This press comprises a suitable frame 20 supporting a stationary lower pressing member or bed 21 provided with the usual padding 22. Co-

operating with the bed is a movable upper pressing member or head 23 having a plain metal pressing surface and being mounted upon the front arm 24 of a head lever 25 pivoted at the center or axis 26 in the frame and having a rear operating arm 27. Referring to Fig. 3 the energy storing device here shown is in the form of a spring unit consisting of two members, a rigid link member and a spring member. The rigid link member, marked generally 28, includes two side arms 29 connected by a cross bar 30, the side arms being pivoted at the center 31 to the rear arm 27 of the head lever. The spring member, marked generally 32, includes a helical, multiple coil spring 32a housed within a casing 33 between its end head 34 and a follower abutment 35 threaded for adjustment upon a strong rod 36 passing through an opening in the shaft or center member 30 and having a head 37 on its outer end. The casing 33 is pivoted at the center or axis 38 upon a relatively stationary member, such as a shaft supported by the frame in a manner presently to appear.

The spring 32a, at the time of its installation in the machine, is initially stressed or loaded by adjustment of follower 35 and, in the condition and position shown in Fig. 3, may be assumed to exert endwise a relatively heavy force, say of 10,000 pounds. It is intended that throughout the life and operation of this machine the spring 32a shall permanently retain the energy thus stored in it, subject only to more or less moderate fluctuations in the total value of the energy, as will later appear.

While spring 32a in the arrangement shown is actually a compression spring, nevertheless by reason of its housing within casing 33 and between its head and the abutment 35, it acts upon the members 30, 38 to which it is connected as a tension spring, always tending to move said members toward each other. Therefore, while the description hereinafter refers to endwise expansion of said spring as entailing loss of energy, it should be remembered that expansion of the spring is equivalent to contraction of the spring unit as a whole, including the spring 32a and the parts which connect it to shafts 30 and 38.

Head lever 25 and rigid link member 28 here also preferably are provided with interengaging abutment parts to limit their relative motion in one direction and thereby properly locate the centers 30, 26 with reference to each other. These interengaging parts, in the arrangement shown, consist of ears 39 on head lever 25 provided with cushioning abutment members, such as the rubber bumpers 40, adapted to engage flanges 41 on the arms of the rigid link member. In the diagrams, Figs. 4 to 7 inclusive, these cooperating abutment parts are conventionally shown as an adjustable screw 40a threaded into a flange of the head lever 25 and engaging an edge of the rigid link member 29.

Rigid link member 29 is connected to means for operating it, such as the link 42 having two yoke arms 43 respectively pivotally connected at 44 to the arms of link 29.

Figs. 4 to 7 inclusive, except as herein specially noted, are diagrams which, for simplicity of illustration and description conventionally show the same parts identified by the same reference numbers appearing in Fig. 1.

Fig. 4 illustrates the open press position where the head has been elevated to provide access to the bed for removing or arranging the work upon it. Pull on the link 42, produced in any manner, such as by operator effort, has turned the rigid link and head lever together about the centers 26, 30, which substantially coincide, to the position shown and the strong pull of the spring unit 32 now holds the rigid link 29 in engagement with the abutment 40a on the head lever. The spring member 32 is attached at one end to the stationary center 38 and at its opposite end to center 30, so that it does not move with the head lever, but the spring member 32 and rigid link 29 open and close like a jack knife.

A push on the link 42 by the operator moves the rigid link and head lever together about the centers 30, 26 as an axis until the parts reach the position shown in dotted lines, Fig. 4, and in full lines, Figs. 5 and 1, press closed position. Assuming that the centers 26 and 30 coincide, and that spring member 32 and link member 29 are of exactly the same length, as shown in Fig. 5, this motion is produced without expansion or contraction of the spring unit and the motion may be assumed to terminate with the centers 38 and 31 coinciding. The only effort the operator exerts, therefore, is that of turning the parts against friction or gravity effects.

The head and bed are now in contact, with the work between them. Continued pressure or push by the operator upon link 42 to some extent may compress the padding, but as soon as the resistance of the padding is sufficient, the spring unit, including the rigid link member 29 and spring member 32, begins to turn about the centers 38, 31 as an axis, moving from the position shown in full lines Fig. 4 to that shown in dotted lines Fig. 5 and in full lines Fig. 6. As before described in connection with Figs. 1 to 3, inclusive, in the press closed position Fig. 5, the force of the stored energy is exerted in a direction through the pivot of the head lever and exerts no tendency to turn it, although it is acting upon elements which are relatively movable. However, as the spring unit turns toward the position shown in Fig. 6, the direction of application of the spring force to the head lever changes by an increasing angle until finally it is substantially normal to the length of the rear lever arm 27 and is exerting maximum pressure upon it and upon the work lying upon the padding. Because the padding, and probably also the work, is possible of further compression, when the spring force is applied in the manner described, the head lever suffers additional motion producing further advance of the head toward the bed, and an increase of pressure, but obviously by the expenditure of energy from the spring. This effect increases progressively as the spring unit is swung from the position shown in full lines Fig. 5 to that shown in full lines Fig. 6, but the drawing illustrates it entirely by the dotted lines in Fig. 6 showing how the spring member contracts and the head lever is moved, the motion being exaggerated for purposes of illustration.

The dotted lines in Fig. 6 represent the final full pressure position of the parts with maximum pressure of the spring unit applied to the work.

To open the press the operator pulls on the link 42, producing reverse motion of all of the parts, first returning the spring unit from the position shown in Fig. 6 to that shown in Fig. 5 until the abutting parts on members 29 and 25 engage, and then swinging the head lever and rigid link member together to open press position, Fig. 4. During motion of the spring unit

from the position of Fig. 6 to that of Fig. 5, the pressure on the work is gradually reduced to zero, as will be readily understood.

The foregoing description of the press of Fig. 1 is based upon the assumption that in the position shown in Fig. 5 centers **31** and **38** coincide and centers **26** and **30** coincide. For many reasons and purposes true coincidence of these centers in the position referred to is undesirable and offsetting or lack of coincidence of centers may be beneficial, as will now appear.

In Fig. 7, the centers referred to are out of coincidence, or are offset from each other, in a manner to correspond with the arrangement shown in Fig. 3, the offsetting being exaggerated in Fig. 7 for simplicity of illustration.

As will appear, assuming the press in closed position before the application of final pressure, offsetting of the centers at one end of link **29** biases the head lever in one direction or the other, while offsetting of the centers at the other end of the link biases the link in one direction or the other, as will more fully appear.

Referring first to that end of the rigid link member **29** which is uppermost in Fig. 7, the center **30** of connection of the spring member **32** thereto is beyond the center **26** connecting the head lever and frame. In other words, it is on the head side of the head lever pivot and is in the dead center line A—B between pivots **31** and **30**. Therefore, as soon as the head lever begins to move from press closed to press open position the center **30** moves away from line A—B by a gradually increasing amount and the spring **32**, through a very short lever arm, exerts upon the head lever an increasing effect biasing it toward press open position. The spring member, therefore, has been arranged to utilize a part of its stored energy for the production of this biasing or counterbalancing effect. Obviously if the center **30** of connection between spring **32** and link **29** is initially placed in, or the parts are adjusted so that said center can reach, a position at one side of the dead center line A—B referred to, as the point C, Fig. 5, the spring automatically will exert its tendency to turn the head lever as soon as the point C passes across the dead center line. In other words, the spring unit produces a biasing effect according as it acts on one side or the other side of the dead center line. Of course, utilization of the spring energy in this manner involves the doing of work by actual partial unstressing of the spring and during the reverse operation of closing the press the operator must replenish the expended energy by putting work into the spring.

The offset relation which enables the spring to automatically produce a counterbalancing bias effect, either partially or wholly, may be produced in other ways. For example, assuming the centers **30**, **26** to be coincident as shown in Fig. 5, the parts may be adjusted to reach an offset relation of said pivots by adjustment of the abutting parts on link **29** and lever arm **25**, such as the screw **40***a* conventionally shown. By backing off or unscrewing this screw the link member **29** is permitted to move farther in the clockwise direction until the spring center **30** is offset from center **26** and beyond the dead center line A—B.

Of course the offset relation between these pivots, however produced, must be relatively small in amount, only sufficient to release that energy which is necessary for the desirable counterbalancing or biasing effect. For example, in a full sized press where the front lever arm **25**, extending from the lever pivot to the head, is of the order of 2 feet long, the offset relation between the pivots **26**, **30** may be no more than ⅛ inch. It may be a little less or a little more but is of that order. Such a short lever enables the operator to overcome even a very heavy spring in closing the press, and also limits the automatic counterbalancing or opening effect to what will avoid shock and jar.

Again, the spring **32***a* may be utilized for producing only a partial counterbalancing effect on the head lever, other means being relied upon to assist in producing that effect, such as a tension spring **45** suitably connected to the lever mechanism for operating the parts, as will later appear more in detail. Spring **45**, for example, may be adjustable as to tension, or springs **45** of different values of tension may be included in different presses, in accordance with variations in weight of the pressing head, the size and weight of which for any machine depends upon the particular duty for which it is designed.

Speaking now of offset relation of the centers at the other end of link **29**, which is lowermost in Fig. 7, such relation may be taken advantage of in several ways and for various purposes.

In Fig. 7 the center **38**, where one end of the spring member is attached to a stationary part, is inward of the center **31**, or nearer to the head lever pivot, the amount of offsetting shown in Fig. 7 being again exaggerated for simplicity of illustration. Also, the said center **38** in Fig. 7 again is exactly on the dead center A—B. With that arrangement, therefore, the spring is on dead center biased neither one way or the other and exerts no tendency to turn either the head lever or the link **29**. However, rotation of link **29** toward the pressure applying position shown in Fig. 6 gradually extends the spring member, thus counteracting or compensating for its tendency to contract as the padding compresses. The same effect is produced if in the position shown in Fig. 7, the center **38** is located or placed at any point upward and to the right of the dead center line A—B, such as at the point D, Fig. 7. Either arrangement requires operator effort to move the link **29** to the position in which the pressure of the spring is applied to the head lever.

On the other hand, if the pivot **38** is located below and to the left of its dead center line A—B, say at the point E, Fig. 7, then, in closing the press, as soon as the center line A—B along link **29** passes beyond the pivot **38**, the spring member tends automatically to rotate link **29** toward the position shown in Fig. 6, because it is acting to one side of the pivot **31** and again exerts a biasing tendency. With such a press, closure of the press by the operator automatically causes the link to move over toward the full pressure applying position. If the pressure is quite heavy, such as several thousand pounds total pressure between head and bed, such a press desirably might include some suitable safeguard for the operator to prevent injury to her hand or arm if between the pressing members, such as control mechanism preventing link **29** from moving to pressure applying position until the operator takes both hands out of the danger zone and manipulates the control mechanism, or a guard which prevents her from having her hands in that zone while pressure is being applied.

The press shown in Fig. 1 is provided with a

linkage system for operating the parts, consisting of a foot treadle 46 pivoted to the frame at 47 and having a pedal 48. At 49 said treadle is connected to a link 50 pivoted at 51 to one arm of a lever 52, the free end of which arm is connected at 53 to link 42.

Fig. 1 shows pedal 48 in the intermediate or press closed position, but full pressure has not been applied. By pressing down on the foot treadle the lever 52 swings to the right until it abuts a preferably adjustable stop 54 on the frame. Arm 52 and link 42 together form a toggle, but said toggle need not reach fully straightened position when the stop 54 is contacted, as a result of which reverse motion of pedal 48 produced by the release treadle 55 will operate the parts reversely, release pressure, and open the press. During such motion the second arm 56 of lever 52 engages a yielding stop 57 to limit and cushion the motion of the parts. Counterbalancing spring 45 is preferably connected to the lever arm 56 and to the frame in such position and manner that when the press is closed and full pressure is applied the spring 45 is beyond or to the right of the pivot 57' about which the lever 52, 56 turns, so that said spring in the closed full pressure position tends to bias and thereby hold the links and levers in their "on" positions. Indeed, that end of spring 45 which is connected to the frame may be placed so far to one side of pivot 57' as to bias the link 29 enough to make it self-moving to full pressure position when the press is closed.

The press may be provided with means for adjusting the location of the relatively fixed center 38 about which the rigid link 29 pivots. In the arrangement shown, shaft 38 is mounted in the bifurcated arm of a lever 58 pivoted in the frame at 59 and having another lever arm 60 provided with a clevis 61 in which is adjustably threaded a rod 62 held against endwise movement in the frame and provided with an operating head similar to the head 63, but located directly back of it so that it is not visible in Fig. 1. By rotation of said head the lever 58 is turned back and forth, moving pivot 38 along the arc F, Fig. 1, extending in a direction generally transverse to the aforesaid center line A—B. The purpose of the adjustment is to vary the offset relation between the centers 38, 31 either to produce proper compensation for that contraction of the spring member which otherwise would occur during application of pressure, or to compensate for new or changed padding conditions or variations in thickness of work, or to cause the spring to function for automatically turning the link 29 to pressure applying position, as before described.

Again, the machine may be provided with means for adjusting the position of the center 57' about which the lever 52, 56 turns. For this purpose that center is mounted upon one arm of a bell crank lever 64 pivoted at 65 in the frame, the other arm of said lever being provided with a clevis 66 into which is adjustably threaded a rod 67 provided with the hand wheel 63 before referred to. By turning said hand wheel in one direction or the other, the center 57' is adjusted along an arc G.

The purpose of this adjustment is to predetermine the total pressure applied between the head and bed in the final closed full pressure position of the parts, because said adjustment limits and determines the final position of the rigid link 29, and thereby its angular relation to the head lever arm 25, when the abutment 54 is contacted. While the energy stored in the spring unit remains substantially constant throughout all operations of the press, subject only to fluctuations occasioned by offset relation between the various centers, as described, the component of that energy which becomes effective between head and bed in the final full pressure position depends upon the angle of application of the spring force to the head lever.

Fig. 11 shows in more or less detail another form of garment press embodying the invention, together with the operating linkage therefor, the head lever and spring unit being arranged in substantially the same way shown in the simplified diagrams Figs. 8 to 10 inclusive.

In this press the frame 68 supports a padded bed 69 cooperating with a plain metal pressing head 70 mounted on a head lever 71 pivoted at 72 in the frame. The spring unit comprises a rigid link member 73 pivoted at one end, 74, to the head lever and at its opposite end pivoted to one end of a spring member, marked generally 75, pivoted at 76 in the frame. Spring member 75 is generally of the same form illustrated in Fig. 3 and the centers about which the various parts turn may coincide or may be offset with relation to each other in the various ways and for the same purposes described in connection with Fig. 1.

The full lines illustrate the open position of the press. During operation the head lever is first moved down about center 72 to the dotted line position shown, thus closing the jack knife, as it were, and bringing the rigid link member 73 into position alongside of the spring member. Thereupon the spring unit, including both the spring member and the rigid link, is turned about centers 74, 76 to the dotted line position shown to apply the pressure of the stored spring energy to the head lever and thereby make it effective between head and bed.

The parts are operated by a link 77 connected at one end to the rigid link member 73 and at its opposite end, at 78, to a generally triangular frame 79 pivoted at 80 in the stationary frame 68. Said frame 79 supports a yielding, such as a rubber-footed, bumper member 81 adapted to engage a shoulder 82 of the stationary frame.

Also attached to frame 79 is a link 83 connected to the rear arm of a foot treadle 84 pivoted at 85 to a lever 86 pivoted at 87 in the stationary frame.

Also connected to the frame 79 is a link 88, the opposite end of which is connected to a release lever 89 pivoted at 90 in the frame and at its front end provided with a treadle 91 pivoted at 92 on lever 89 and normally held in the position shown by a compression spring 93.

Assuming the parts in the position shown in Fig. 11, the press is closed by pressure of the operator's foot applied to the foot treadle 84, which at first turns about the center 85 as an axis. This motion provides increased leverage enabling the operator readily to swing the head to closed position, which occurs approximately when treadle 84 engages an abutment 94 on lever 86. Thereupon further depression of the foot treadle causes it to turn about the center 87 as an axis, with reduced leverage, and the shorter travel of the foot treadle is now utilized for producing longer travel of link 77 to swing the spring unit to its effective position shown in dotted lines Fig. 11, until finally full pressure is

applied to the work at a time when the bumper 81 engages the stop 82.

Closing and pressure applying motion of the parts causes link 88 to elevate the release treadle 89. In its upper position the rear arm of the lever 91 engages a stop 95 on the frame.

To release the press the operator depresses the foot treadle 91 which at first turns about its rear end, where it engages stop 95, as an axis, with compression of spring 93, thus providing increased leverage for the operator at the beginning of the release operation. Treadle 91 moves down until finally its front arm contacts lever 89, whereupon levers 91 and 89 move together without relative motion to complete the press opening movement, thus returning all parts to the position shown in Fig. 11.

The machines shown in Figs. 1 and 11 respectively are designed for the production of relatively heavy pressure measured in thousands of pounds effectively distributed over the entire pressing area. The total effective pressure, for example, may be from one thousand to five thousand pounds, or even more. But the counterbalancing effects, if produced wholly or partially by the energy storing spring unit, as described, or any other effects produced by relative offsetting of pivots or centers, as described, produce or involve fluctuations in the stored energy by relatively small amounts, always within the range of the strength or weight of the operator. For example, such fluctuations may reduce or increase the force of the spring by 150 pounds, more or less.

The invention, however, is not limited to the use of such heavy pressures as described, and Figs. 12 to 14 inclusive show an arrangement in which the invention is utilized only to a limited extent, the total pressure produced being measured in hundreds rather than in thousands of pounds. This machine is of the form illustrated in my prior application for Flat plate ironers, filed March 14, 1936, Serial No. 69,143, to which reference may be had for a more complete description of the machine and its manner of operation, if desired, the present application being a continuation of the aforesaid application Serial No. 69,143, as to common subject matter here claimed.

Referring to Fig. 12, the press illustrated is of the table type, comprising a frame 100 adapted to rest upon a table or other support and provided with a stationary padded bed 101. On the frame is pivoted at 102 a hollow lever 103 supporting a plain surfaced metal head 104.

The energy storing unit comprises a rigid link member 105 pivoted on the head lever at 106 and normally or in open press position held against a stop 107 on the head lever by the tension spring member 108 connected at 109 to link 105 and at 110 to the stationary frame. This spring 108 is initially stressed or placed under tension at the time the machine is built and assembled, the energy thus stored in the spring being usable repeatedly for pressing operations, as will appear. As an example, it may be assumed that said spring, in its most unstressed condition, shown in Fig. 12, has a tension of say four or five hundred pounds. Since the spring is acting in Fig. 12 along a line below the pivotal axis 102, it is biased to exert its force, at a short lever arm, in a direction to elevate the head, and is producing a counterbalancing effect. This effect is reduced by the short lever arm to be just sufficient for the purpose.

To operate the spring unit the link 105 is provided with an arm 111 connected to a link 112 which in turn is connected to one arm 113 of a bell crank lever, the other arm 114 of which is provided with a handle 115. The shaft 116 of the bell crank passes through elongated slots 117 in the walls of the head lever and is journalled in a member 118 abutting a compression spring 119 at one end and at its opposite end having a wedge or cam surface 120 effective upon a like surface of the stem 121 to which the head 104 is attached. Spring 119, in normal position of the parts, is compressed and under light load.

To operate the press, assuming it open as in Fig. 12, the operator pulls down upon the handle 115. This operation lowers the head into contact with the bed or the work thereon. During such motion pivot 109 travels in an arc marked H to a position below pivot 102 and in so doing moves away from the anchorage point 110. As a consequence, spring 108 is further stressed and additionally loaded, an effect which is produced by the operator. In the machine shown, assuming an initial stress in the spring of 500 pounds, the operator may thus increase the stress to 550, 600 pounds or more because she is stretching the spring through a long lever arm. When the head contacts the bed, as in Fig. 13, pivot 106 coincides with the point 110, or at least nearly so. As a consequence, further downward pressure on handle 115 turns the bell crank at shaft 116 and swings the spring unit, including members 105 and 108, to the position shown in Fig. 14, where the force of the stressed spring is applied transversely of or at an angle to the effective arm of the head lever, and the effective component of said force is applied between the head and bed to produce pressure on the work.

Reverse operation of the parts, by lifting upward on the handle 115, first relieves the pressure by returning the spring unit to its original position, and then elevates the head, an operation which is assisted by the biasing or counterbalancing effect of the spring itself.

If the work is unusually thick, so that contact of the head with the work and partial compression of the work occur before the centers 106 and 110 coincide, the spring 119 permits the parts to accommodate themselves to the new condition. That is to say, further downward pressure on the handle permits the wedge member 118 to retreat or move to the left, compressing and shortening spring 119, and thus permitting the head lever to move downward without downward motion of the head 104 until the said centers coincide, whereupon the spring unit readily swings to its pressure applying position, as will be readily understood.

In this machine, therefore, the pressure producing spring unit is initially stressed and thereby is charged with potential energy which it never loses over an extended period, but each time the machine is operated the operator additionally stresses the spring by a material amount due to the fact that during swinging motion of the head lever the pivots 109 and 102 do not coincide. In other words, they are offset from each other more widely, in proportion, than are the corresponding pivots in the machines shown in Figs. 1 and 11. But when the closed press position is reached the spring unit nevertheless may be rotated back and forth between its effective and ineffective positions with the expenditure by the operator of only that amount of energy necessary to overcome friction.

In the forms so far described, the head and bed are relatively movable by rotation about a pivot connecting them, and the two members of the energy storing unit, to-wit, the rigid link and the spring member, are connected, one to a movable element, such as the head lever, and the other to a stationary element, such as the frame, and the knuckle joining the rigid link and spring reaches a position coinciding with or closely neighboring the pivot center connecting the head and bed, so that the rigid link and spring open and close with swinging motion like a jack knife as the press is opened and closed. These several features are not necessary, as will appear from consideration of another form of machine shown in Figs. 15 to 18 inclusive. Here the head and bed are not directly connected by a single pivot center, but one is stationary and the other has a parallel ruler motion with respect to the stationary member. Also, the rigid link and spring members of the energy storing unit are respectively connected to two elements both of which move, but relative motion between which is accompanied by relative motion between head and bed. Again, the knuckle joining the rigid link and spring members is not located near a pivot center connecting head and bed, but remote therefrom. This form of machine is illustrated in my prior application for Mechanical ironing device, filed October 6, 1934, Serial No. 747,241, to which reference may be had for a more complete description of the machine and its manner of operation, if desired, the present application being a continuation of said application Serial No. 747,241, as to common subject matter here claimed.

Referring to Fig. 15, the machine comprises a member **125** which is fixed or stationary with reference to the ironing board or bed member **126** conventionally shown. The head, shown conventionally at **127**, may be of the sadiron type, as illustrated in the said application Serial No. 747,241, or may be a full sized head with an area approximating that of the bed, as in the other machines herein described.

Whatever is the form of the head, it is carried by an arm **128** attached to a member **129** movable with reference to member **125**, the particular arrangement shown including parallel links **130** of equal length connected to members **125** and **129** at points equally spaced, so that member **129** and the head carried thereby have parallel ruler motion with respect to the stationary parts.

The energy storing unit in this arrangement consists of a rigid link **131** pivoted at **132** to an arm **133** of member **129**, the free end of the link being connected at **134** to one end of the energy storing tension spring **135** which is connected at **136** to one of the links **130**, a stop **137** limiting motion in one direction of link **131**. **138** indicates a suitable device, such as a pull rod, connected to the rigid link member for operating the same.

Fig. 15 shows the open position of the press and its operating parts. It is assumed that spring **135** has some tension therein which was applied when the machine was originally built and assembled. Fig. 15 illustrates the most released or unstressed condition of the spring. The press is closed in any suitable manner, such as by applying the hand to the head and pulling it down toward the bed, causing the member **129**, links **130** and members **131**, **135** of the spring unit to move through the position shown in Fig. 16 to the position shown in Fig. 17, where the press is closed with the head in contact with the padded bed or with the work upon it. In this position, also, spring **135** is now fully stressed and the force thereof has been increased by the work done upon it by the operator. Pivots **132**, **136** are in coincidence or very nearly so, depending upon padding conditions, as described heretofore in connection with the other forms of machine. The operator now pulls on the rod **138**, thus turning the spring unit including members **131**, **135**, to the position shown in Fig. 18. Here the stress of the spring is exerted across pivots **132**, **136**, one on element **133** and the other on element **130**. The tendency is to swing member **130** clockwise in Fig. 18, a motion which would permit the spring to shorten. While both said members are movable, the effect is to apply the pressure of the spring, or more accurately, the effective component thereof, between the head and bed, with the production of pressure upon the work.

Reverse motion of the parts first releases the work from spring pressure by return motion of the spring unit to the position shown in Fig. 17, followed by opening movement of the press.

In this machine, as in the machine shown in Figs. 12, 13 and 14, the invention is utilized only to a limited extent, the machine being adapted more for the lower values of pressure, measured in pounds or hundreds of pounds, than for heavy pressure, and during each cycle of operations the spring performs work and work is done upon it by the operator to restore the expended energy.

The invention is not limited to the use of an energy storing unit of the forms so far described, because said unit obviously may take other forms equally as useful.

For example, Fig. 3 shows an arrangement utilizing a spring which is actually a compression spring but which is harnessed up or coupled to the mechanism so that it acts after the manner of a tension spring of the form conventionally shown in Fig. 9. Equally as well the spring actually may be a compression spring and be so coupled to other parts as to act as a compression spring, in which case it is so arranged that in pressure applying position it applies its force to the head lever or other movable part in the opposite direction from that when it is a tension spring. In other words, if the spring is actually a compression spring, and is arranged to act as one, the spring unit would be turned in Fig. 8 to a position below the head lever instead of above it, the operation otherwise being the same.

Also, the energy storing unit need not include a spring made of metal in the form of coils or the like. For example, Fig. 19 shows an arrangement in which the energy storing unit resembles that shown in Fig. 3 in that it connects two shafts **30**, **38**, but it comprises a suitable device, such as a cylinder and piston using trapped fluid pressure to produce endwise expansion. Such device is conventionally represented as a Sylphon bellows **140** mounted within a casing **141** against the head **142** of which the bellows pressure is applied at one end, the opposite end of said casing being provided with one or more members **143** for connection to pivot shaft **38**. At its opposite end the bellows applies its pressure to the head **144** of a yoke, the arms **145** of which extend along the outside of sleeve **141** to the opposite end of the bellows where they are connected to a rod **146** for attachment to pivot shaft **30**. The Sylphon bellows may be provided with a pipe connection **147** having a

valve 148, through which connection fluid pressure may be supplied to the bellows from any source to stress the unit to any desired value of initial compression therein, the expansible compressed fluid, such as air, being then trapped in the bellows by closing the valve 148. Any possible leakage from time to time may be supplied from the source, as will be readily understood, but the intention is to supply sufficient energy in the form of trapped and stressed fluid pressure to create the desirable operating force, and to turn the energy storing unit for applying pressure to the work or releasing it therefrom, without loss of energy over a complete cycle of operations of the press.

Fig. 20 shows another arrangement in which the energy storing unit is a single member, in this case a metal spring, instead of embodying a rigid link and an energy storing member, as in some of the forms before described. The combined link and spring member here is marked 150. It is a loop of resilient metal of proper size, weight and strength to accept and retain the desirable store of energy. The loop has two side arms 151 joined at one end by the arched portion 152, the opposite free ends of said arms terminating one in a pivotal connection at 153 to an element 154, while the opposite arm terminates in or is provided with a yoke 155 pivotally connected at 156 to an element or elements 157. The elements 154, 157 are respectively connected to or associated with the pressing head and bed and are relatively movable. For example, the element 157 may be a portion of the frame which supports the stationary bed, while the element 154 may be attached or connected to the head, head lever, or any part for operating the same. Several satisfactory arrangements for the purpose, utilizing such a spring, are illustrated in my prior application Serial No. 69,143 before referred to.

In the form just described the combined link and spring member 150 is initially loaded or stressed by force imparted thereto at the time it is originally installed in the machine. Its force is exerted, when it is in the full line position Fig. 20, in a direction along the line X—X, in which the energy storing unit is ineffective because it cannot apply its force in a manner to tend to produce relative motion, and consequently pressure, between the head and bed. Centers 153 and 156 are coincident or coaxial, so that the energy storing unit may be rotated about said centers as an axis to the dotted line position Fig. 20, in which the force of the spring is now exerted in a direction transverse to the line X—X or along the line Y—Y. This is the effective position of the spring unit because now it is able to effectively exert its tendency to produce relative motion between the elements to which its arms are connected and thereby produce pressure between the pressing members. The dotted lines, Fig. 20, illustrate, but exaggerate for purposes of illustration, actual expansion of the spring in a direction parallel to the plane of the drawing, that motion being utilized for the production of pressure in a manner which will be readily understood.

Other forms and arrangements of energy storing unit will be apparent to those skilled in the art, the only requirement for a unit satisfactory for the intended purpose being that it shall include any suitable body part or member, such as the spring 12, Fig. 10; spring 32, Fig. 5; spring 75, Fig. 11; spring 108, Fig. 12; spring 135, Fig. 16; spring 150, Fig. 20, or the expansible and contractible bellows-like container or casing 140 filled with compressed fluid, Fig. 19, said body being elastic or resilient in the sense that when deformed by externally applying an initial stress to it to store energy within it, it has or acquires the tendency or ability to return to its original form and thereby give back its stored energy.

In all forms of the invention shown the energy storing unit is more or less initially stressed at the time of assembly and initial set-up of the machine to charge the resilient or elastic body portion of said unit with energy. Said unit is mounted in such manner as to be capable of adjustment either to an ineffective or to an effective position. In the ineffective position, while the energy of the unit is applied to elements to which the unit is connected, the direction of its application is such that it is not and cannot become effective upon the pressing members to produce pressure between them. In the effective position of the unit, however, the energy not only is applied as before, but now in a direction in which it can become effective to produce pressure between the pressing members. The unit is capable of embodiment in various forms and of arrangement in various ways in a pressing machine which may be employed not only for pressing garments and textile fabrics but for other uses, as will be apparent. In all cases, whether the operator additionally stresses the energy storing member during each cycle of operations or not, the parts may be so arranged that all fluctuations in stored energy as the result of its employment for various purposes are compensated for by operator effort, the net result being that whatever energy is initially stored in the unit is never lost, but is retained and used throughout the life of the machine. Moreover, in all cases the parts are so arranged that the machine may be operated by the ordinary operator of such machines without unusual or exhausting or tiring exertion, no more, indeed, than is necessary for the operation or control of pressing machines now in use. Nevertheless, the cost of operation and maintenance is materially reduced as will be readily understood. Other advantages of the invention will be apparent to those skilled in the art.

The general mode of operation of the press is as follows:

In the open position of the press, Figs. 8, 11, 15 and 12 the work to be ironed is placed on the bed 2, 69, 101, 126 and the counterbalanced head member 3, 70, 104, 127, is brought down to contact the bed which results in a slight stressing of the spring 12, 75, 108, 135 to supply the slight energy necessary to automatically return the head member again to its raised position. The force for the ironing pressure is permanently stored in the spring. During this downward movement of the head member the link 9, 73, 105, 131 to which one end of the spring is secured also moves down around one end as a pivot to coincide with the spring. When the head member contacts the bed member the ironing pressure is not yet applied until the link and spring are rotated around one end as a pivot, this movement being accomplished by a suitable handle or foot treadle. The ironing pressure is now applied but to remove the latter it is merely necessary to reverse the foregoing steps.

What I claim is:

1. A pressing machine, comprising a frame, cooperating head and bed members relatively movable into and out of registering pressing relation,

one of said members being fixed on the frame and the other movably mounted thereon, operating mechanism connected to the frame and the movable member and including two elements which tend to move relatively as pressure between said members is applied or relieved, and a pre-stressed resilient energy storing unit pivotally connected to said elements for relatively moving them and the unit maintaining its pre-stressed condition during the operation thereof, the axes of the two pivotal connections are in a common plane when said members are in pressing relation, whereby turning adjustment of said unit about said pivotal axes varies that component of its force effective upon and tending to produce pressure between the pressing members.

2. A pressing machine, comprising a pre-stressed resilient energy storing unit including two members responsive to the stored energy and relatively movable thereby, a movable pressing head and a fixed pressing bed mounted for relative movement to produce or relieve pressure between them, and means pivotally associating the members of said unit respectively with the head and bed when in pressing relation on axes which are in a common plane for rotatable adjustment of said unit simultaneously about both axes to vary that component of its force which tends to relatively move said members and produce pressure between said head and bed with the energy maintained in said unit both when moved and when stationary.

3. A pressing machine, comprising cooperating movable head and fixed bed members, a frame on which the bed member is mounted and on which the movable head pivots, a movable operating device connected to one of said members and adapted when moved to produce pressure between them, and a pre-stressed resilient energy storing unit pivotally associated both with the frame and with said device on axes which are in a common plane when the press is closed, whereby said unit may be adjusted around said axes to vary that component of its force which is effective upon said operating device to increase or reduce pressure between said members but maintaining the energy stored in the unit constant.

4. A pressing machine, comprising cooperating movable head and fixed bed members, a frame on which the bed member is mounted and on which the movable head pivots, a movable operating device connected to one of said members and adapted when moved to produce pressure between them, and a pre-stressed resilient energy storing unit pivotally associated both with the frame and with said device on axes which are closely adjacent when the press is closed, whereby said unit may be adjusted around said axes to vary that component of its force which is effective upon said operating device to increase or reduce pressure between said members but maintaining the energy stored in the unit constant, said device comprising a pivoted lever and said unit including two parts hinged together, the hinge axis being near the lever axis when the press is closed so that said parts have relative swinging motion during opening and closing press movements.

5. A pressing machine, comprising a stationary frame supporting a bed member, a pivoted lever mounted to turn on a center in the frame, a head member operated by said lever and movable toward and from the bed member by lever movement, a resilient energy storing unit having two portions responsive to the stored energy and respectively pivotally connected one to the said lever and the other to said frame on centers which are closely adjacent when the press is closed, whereby said unit may be turned around said centers as an axis to vary that component of its force which is effective to produce pressure between said members with the energy in the unit remaining unchanged during movement of the unit and also while stationary.

6. A pressing machine, comprising a stationary frame supporting a bed member, a pivoted lever mounted to turn on a center in the frame, a head member operated by said lever and movable toward and from the bed member by lever movement, a resilient energy storing unit having two portions responsive to the stored energy and respectively pivotally connected one to the said lever and the other to said frame on centers which are closely adjacent when the press is closed, whereby said unit may be turned around said centers as an axis to vary that component of its force which is effective to produce pressure between said members, said two portions of said unit being hinged together on a center which is closely adjacent the lever center when the press is closed, whereby said portions open and close with swinging motion as the press opens and closes.

7. A pressing machine, comprising a stationary frame supporting a bed member, a pivoted lever mounted to turn on a center in the frame, a head member operated by said lever and movable toward and from the bed member by lever movement, a resilient energy storing unit having two portions responsive to the stored energy and respectively pivotally connected one to the said lever and the other to said frame on centers which are closely adjacent when the press is closed, whereby said unit may be turned around said centers as an axis to vary that component of its force which is effective to produce pressure between said members, said two portions of said unit being hinged together on a center which is closely adjacent the lever center when the press is closed, whereby said portions open and close with swinging motion and material reduction of stored energy is avoided as the press opens and closes.

8. A pressing machine, comprising a relatively movable head member and a stationary bed member, a resilient energy storing unit including two parts hinged together at a common end on a center and mounted for swinging motion as the machine opens and closes and the other end being free of any connections with the members, one of said parts being pivotally connected to one of said members and movable therewith independently of the other part as the machine opens and closes, the other part being pivotally connected to the other member, and means for rotating the two parts as a unit to vary that component of its stored energy which is effective to produce pressure between said members, the energy in the unit being maintained substantially constant during rotation of the unit and also when said unit is stationary.

9. A pressing machine, comprising relatively movable head and bed members of which the head member is pivotally movable and the bed member is fixed, a pre-stressed energy storing unit including a resilient body, and two elements operatively associated respectively with said members and said elements being pivotally connected with said unit in such manner that the permanently stored energy of said body tends to

apply the force of the body between the members when the latter are in contact, said pivotal connections being substantially on a common axis in press closed position of said members, and said unit being rotatably adjustable about said axis to vary the direction of application of the force of said body to said elements and thereby increase or diminish that component of its force which is effective upon said members, thereby to secure the desirable pressure between said members.

10. A pressing machine, comprising a work supporting bed member which is relatively stationary during the application of pressure, a cooperating movable pressing head member, and an energy storing unit including a pre-stressed resilient energy storing device and a rigid link device hinged together, one of said devices being pivotally connected with the bed member on one axis and the other device being pivotally connected with the head member on another axis, said two axes being closely adjacent when said members are in pressing relation, said devices having relative swinging motion about their hinge connection as the head member closes to bring said axes on a common axis in press closed relation, and said unit being thereafter rotatably adjustable about said adjacent axes to produce and relieve pressure upon the work.

11. A pressing machine, comprising a frame, relatively movable cooperating pressing members of which one is fixed on the frame, a part movably mounted in the frame and controlling the other member, a resilient energy storing unit attached to the frame and pivotally connected to said part, said unit including two members pivoted together and arranged to open and close with swinging motion as the pressing members are relatively moved in closing and opening the press, said unit being swingable to various positions to vary the magnitude of its effect upon the pressing member controlled by said part at the same time maintaining the energy stored in the unit during such variations, said unit including spring and link members pivoted together and arranged to open and close with swinging motion, one thereof moving with said part, and operating means for controlling the relative movement of the pressing members and movement of the energy storing unit.

12. A pressing machine, comprising a frame, relatively movable cooperating pressing members of which one is fixed on the frame, a part movably mounted in the frame and controlling the other member, a resilient energy storing unit attached to the frame and pivotally connected to said part, said unit including two members pivoted together and arranged to open and close with swinging motion as the pressing members are relatively moved in closing and opening the press, said unit being swingable to various positions to vary the magnitude of its effect upon the pressing member controlled by said part at the same time maintaining the energy stored in the unit during such variations, said unit including spring and link members pivoted together and arranged to open and close with swinging motion, one thereof moving with said part, and operating means to swing the energy storing unit to that position where its force will be ineffective between the pressing members to open the press.

13. A pressing machine comprising relatively movable head and bed members of which one member is fixed and the other is pivotally mounted, a link pivotally secured at one end to one of the members and shiftable relative thereto and the other end being free of any connection with the members, a spring secured at one end to the other of said members and the other end of the spring secured to the free end of said link, said spring having its energy permanently stored therein when the ironer is assembled and a relatively small part of the energy being expended to counter-balance the head member in the non-ironing position during each opening movement of the press and which is replaced upon closing the press when the movable member is shifted relative to the bed member, and means for shifting said link adjacent said spring and for shifting the link around its pivot together with the spring with the head and bed members in contact with each other whereby an ironing pressure will be set up between the head and bed members by the force in the spring without the expenditure of energy.

14. A pressing machine comprising a movable head member and a fixed bed member forming a pair of pressing elements connected for relative closing and opening movement into and out of pressing engagement, a link pivotally connected to one element, permanently prestressed spring means connected between the free end of the link and a point on the other element, said link pivot connection and said point being so disposed that they are brought close to coincidence when said elements engage, whereby with said elements in engagement said spring and link together may be swung about said link pivot as an axis to vary the angle at which the force of said spring means acts between said elements, and means for so swinging said spring and link, said means also being effective upon said head member to produce closing and opening movement of said head member.

15. A garment press of the wide open movable head and fixed and bed type, comprising a frame supporting a fixed bed, a pivoted head controlling lever, and a permanently prestressed spring unit comprising link and spring members of substantially the same length when the spring member is stressed, said members being joined on an axis at one end, and their free ends being pivoted one to the frame and the other to said lever at points spaced from the lever pivot by substantially the length of said members, the arrangement being such that when the press is closed with the spring stressed said members lie side by side with their free end pivots substantially coinciding in an axis about which they may be swung together to various angular positions for applying the force of said spring to said lever to produce heavy pressure between the head and bed, and when their joint axis substantially coincides with the lever pivot said lever and the member connected thereto may be swung together about the lever pivot to open and close the movable head.

16. A pressing machine comprising a frame member, a work supporting bed, a lever member pivoted in the frame member, a pressing head operated thereby and movable toward and from engagement with the bed, an energy storing unit comprising a spring part adapted to exert a heavy pressure and a link part, one end of said spring part being connected with one end of said link part forming a reaction point, the other end of said link part having a pivot connection with one of said members, the other end of said spring part having an anchorage on the other of said members, the distance between said pivots being approximately equal to the distance between said

anchorage and said reaction point, the parts being assembled with said spring part heavily and permanently stressed, said reaction point being substantially alined with said lever member pivot when said head is in open position, one of said parts being movable with said lever member as said head closes to cause relative approach of said anchorage and said link part pivot approximately to alinement, whereby with said anchorage and said link part pivot approximately in alinement said energy storing unit is easily rotatable about said axis of alinement to a position to cause said spring part to apply head closing pressure where one of said parts is connected with said lever member, and said energy storing unit being rotatable to remove its head closing pressure and to permit the press to open.

17. A pressing machine as in claim 16 in which a stop member is provided for limiting movement of said link part in the open position of the pressing machine to prevent loss of energy in the spring.

EDWIN E. FOSTER.