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E. DAVIS

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MOTION TRANSMITTING MECHANISM

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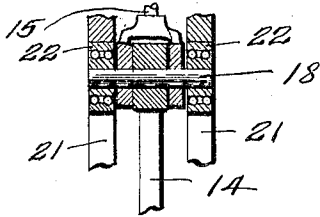


Fig. 2.

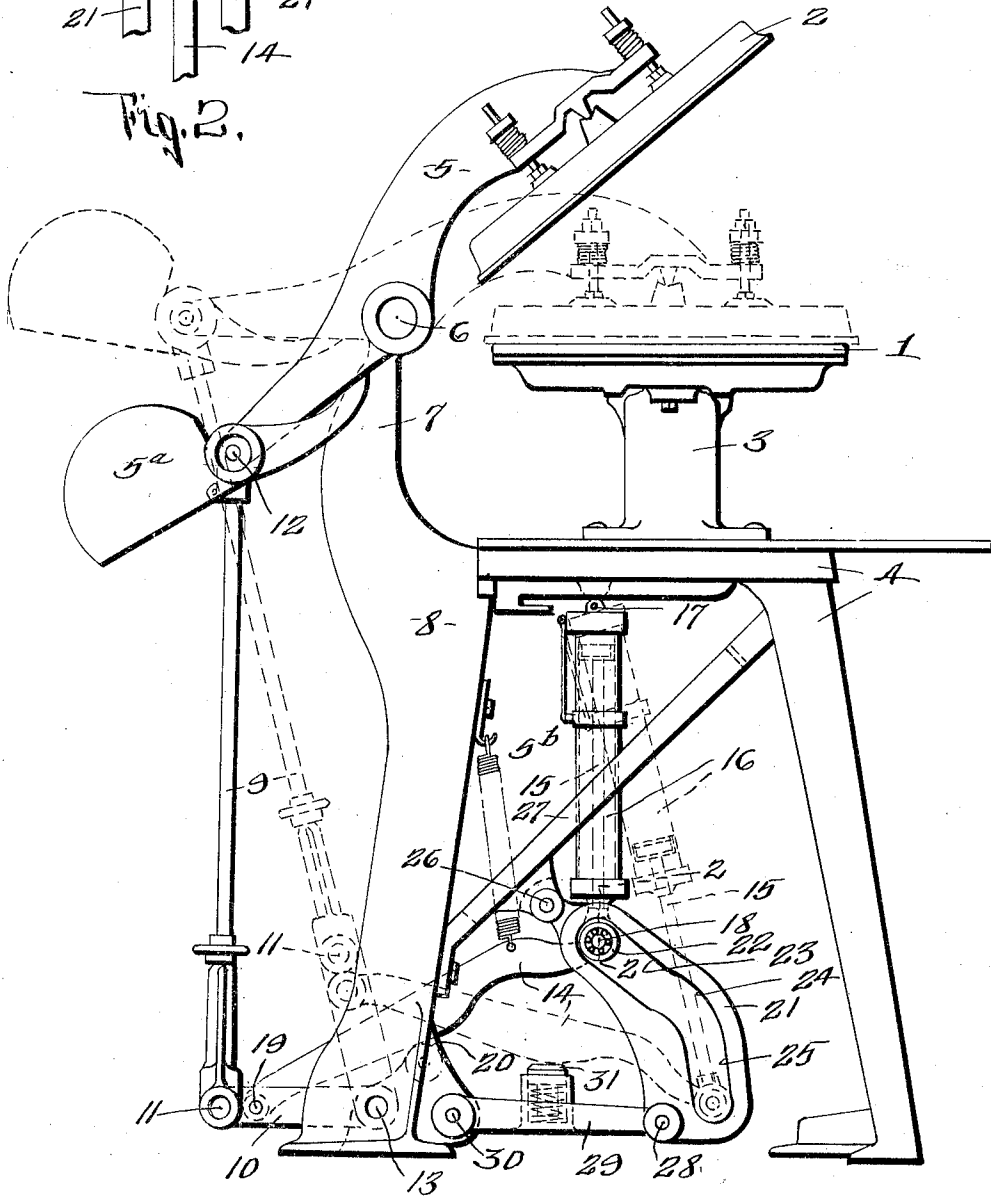


Fig. 1.

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MOTION TRANSMITTING MECHANISM

Application filed December 11, 1925, Serial No. 74,700. Renewed August 23, 1926.

This invention relates to motion transmitting mechanism particularly mechanism adapted for presses as garment and laundry presses, and has for its object a particularly simple and efficient mechanism whereby when heavy jaw pressure is applied the motion of the actuator or motor is transmitted to the press head with a great leverage requiring a comparatively great movement of the actuator to be transferred into a small movement of the press head or jaw, whereby a maximum pressure is applied with the least expenditure of energy or with a motor of minimum horse power. The invention consists in the novel features and in the combinations and constructions hereinafter set forth and claimed.

This mechanism is of the general type of that shown in my application Sr. No. 62,921, now Patent 1,680,729.

In describing this invention reference is had to the accompanying drawings.

Figure 1 is a side elevation of a machine embodying my invention, the press jaws being open, though shown closed in dotted lines.

Figure 2 is a fragmentary front elevation of a part seen in Figure 1, used to connect a motor means to the motion transmitting mechanism.

This motion transmitting mechanism comprises, generally, a jaw swinging part, a motor means, and a combined lever and pull link pivoted at one end thereof to the jaw swinging part and at its other end being connected to the motor means, and includes means for guiding the pull link to have first a direct lever action and thereafter a pull link action on the jaw swinging part, said last named means operating to give what might be called an irregular crank motion to the pull link connection between the motor means and the combined lever and pull link without using a crank or a link or any other part moving about a center and is an improvement in that respect over the patent above mentioned.

As here illustrated this mechanism is embodied in a garment or ironing press having coacting jaws of any conventional type, and

in the drawing 1 designates the lower buck or pressing element and 2 the movable press head movable toward and from the buck 1.

The buck 1 is mounted upon a suitable goose neck frame 3 which in turn is mounted upon the table or frame 4 of the machine. The press head 2 is carried by a yoke or press lever 5 pivoted at 6 between its ends to a standard 7, rising from the frame 4 of the rear leg 8 thereof, the rear arm of the lever carrying a suitable counter-weight 5a which balances, or partly counter-balances or over-balances the head 2. Suitable springs as shown at 5b usually act in conjunction with the weight 5a. However, the general construction of the parts just described forms no part of this invention.

9 and 10 designate jaw swinging means such as links of a toggle of the motion transmitting mechanism, these links being pivoted together at 11, and link 9 being pivoted at 12 to the rear arm of the yoke or lever 5, and the link 10 being pivoted at 13 to the frame. The link 9 may stand in an upright position when the press is open as shown in full lines Figure 1, and the link 10 is in horizontal position extending rearwardly from its axis 13.

14 is a combined lever and pull link connected to the toggle to straighten it and to apply pressure between the jaws. The motor means or actuator is shown as a reciprocally movable connecting rod 15 of a piston movable in a cylinder 16, which is pivoted at 17 to the underside of the table 4 of the frame to have an oscillating movement. The combined lever and pull link 14 is pivoted at one end to the toggle. It is here illustrated as pivoted at 19 to the link 10 near the joint 11 of the toggle and at 18 to the lower end of the piston rod 15. When the parts are in the position shown in full lines in Figure 1 the press is open. This combined lever and pull link 14 fulcrums between its ends on a fulcrum roller 20 carried by the base of the frame, the lever and pull link extending forwardly and upwardly from its point of connection

with the toggle, crosswise of the pivot 13 of the link 10.

The means for guiding the front end of the bodily shiftable combined lever and link 14, so that it has first a direct lever action almost in a straight line on the link 9 and thereafter a crank action to apply final pressure, comprises a stationary cam 21 carried by the frame and a follower associated with the combined lever and pull link 14 movable along the cam.

This follower is a pin or roller 22 located in line with the axis of the joint between the piston rod 15 and the combined lever and pull rod 14. This cam is in the form of a slot having a downwardly and forwardly inclined upper end portion at 23, a forwardly extending flattening out intermediate portion 24 at a less downward incline than the end portion 23 or inclined out of the horizontal to slow up the rate of head travel downwardly, and has a lower end portion 25 having greater incline almost approaching a vertical line. There are two of these triple stage cams and two rollers or followers 22 coacting respectively with the cams, the rollers being located on opposite sides of the combined lever and pull link.

The cams are here shown as connected at their upper ends at 26 to a brace 27 forming part of the frame and at their lower ends at 28 to a tie rod 29 secured at 30 to the frame and the rear leg thereof. The cams may be supported in any suitable manner, and that here shown is merely one way of conveniently supporting the cams. The spring 5b which is connected to the combined lever and pull link 14 tends to give a starting opening impulse to the link 14 when the air is exhausted from the cylinder. If desired an additional device for giving a quick starting impulse may be provided as a spring pressed head 31 arranged in the path of the lever 14 and here shown as carried by the tie rod 29.

When the press is closed the toggle links 9 and 10 are not moved in a straight or dead center line and also during the latter part of the closing movement, the combined lever and pull link 14 comes in contact with the spring pressed head 31 carried by the frame, or on the rod 29 and compresses the spring thereof. This spring tends to start the opening movement of the press when the power is released in the cylinder 16. The power is usually compressed air, but may be any fluid. Preferably a single actuating cylinder is used in which the piston is forced downwardly by the motive fluid in the cylinder and the press head closed by the pressure in the cylinder. The flow of motive fluid to and from the cylinder is controlled in any well known manner.

In operation, in closing the press the motive fluid, which is compressed air, is per-

mitted to flow in the cylinder 16 and during the first part of the downward travel of the piston, the combined lever and pull link 14 fulcrums at 20 and applies a direct upward thrust through the link 10 on the rear arm of the press lever 5, this direct thrust overcoming the inertia of the yoke 5, counterweight 5a and the head 2. The follower 22 travels down along the upper end portion 23 of the cam slot of each cam 21 during such lever action, and owing to the incline of the upper end portion 23 of the cam slot, the link 14 moves bodily forward as the toggle 9-10 straightens up to close the press and produce pressure.

When the follower 22 reaches the center of the cam slot, the press head 2 has about reached closed position, the link 14 has lifted off of the fulcrum roller 20 and the link 14 has completed its fast forward pulling movement to close the press head. Thus owing to the combined lever and pull link action, the press head is closed toward the back with a minimum movement of the piston, the piston still has left a travel of about one half of its stroke in the cylinder while the toggle has been nearly straightened.

During further and continued movement of the piston in the end portion 25 of the cam, the followers 22 move into said last or lower upright end portion 25 of the cam slots so that during the end of the power stroke of the piston, the joint 18 between the combined lever and pull link 14 and the piston rod 15 has a long throw which is converted into a slow, short and powerful movement of the head 2 by the final short movement of the toggle 9-10 toward its straight or nearly dead center line.

This mechanical movement is particularly advantageous in that owing to the cam and the combined lever and pull link, the resistance to the piston is constant or the pressure of the compressed air flowing into the cylinder is substantially equal throughout the stroke of the piston as first the movement of the piston is transferred through a lever to move the head through a long arc from open position to nearly closed position, and thereafter, a mechanical advantage to gain power is obtained by moving the cam follower through the long downwardly extending end portion of the cam slot while the pull link and toggle move the head through a small arc to apply heavy pressure.

The three way or stage cam 21 causes the press head to rapidly swing by movement of the roller 22 in the first cam portion 23, to decrease the rate of head travel by movement of the roller 22 in the leveling or flattening out cam portion 24, and finally causes the press head to travel slowly but with great pressing force when the follower moves down the steep cam portion 25. The intermediate cam portion 24 slows up the

speed of the oncoming press head just as it reaches the work to prevent undue impact against the work, noise and jar which otherwise would occur. Hence the press head 2 slowly engages the work on the buck 1, although the head rapidly approaches the work to save time. Then follows a slow but powerful compression by reason of the steep cam portion 25 despite the fact that the piston may rapidly travel its last half stroke at the same velocity as its first half stroke. Thus it is seen that the cam 21 is designed to use with maximum efficiency the power of the motor means to effect rapid head motion to close and open the press, slow motion to compress and release the work, and an intermediate retarding action to avoid impacting and jarring action when the head closes on the work.

What I claim is:—

1. A motion transmitting mechanism comprising a toggle, a reciprocally movable actuator, a combined lever and pull link pivoted at one end to the toggle and at its other end to the reciprocally movable actuator, a fulcrum for the combined lever and pull link coacting with the same between its ends, the lever and pull link being arranged to shift endwise relatively to the fulcrum and to lift off of the fulcrum, and means for causing the link to take a pivotal and endwise shifting movement during the movement of the actuator in one direction, said means comprising a cam and a follower on said link coacting with the cam.

2. The mechanism of claim 1, in which the follower coacting with the cam is coaxial with the pivotal joint between the combined lever and pull link and the actuator.

3. In a garment or laundry pressing machine in combination, motion transmitting mechanism including a toggle having a link normally arranged substantially vertically and a link normally arranged substantially horizontally; a pivotal connection between said toggle links; a supporting member, a pivotal connection between the substantially horizontal link and the supporting member; a combined lever and pull link pivoted at one end to the toggle, and normally inclined upwardly, with respect to the horizontal link, across the axis of the pivotal connection between the supporting member and the horizontal link, and pivotally connected at its other end to a reciprocally movable actuator; a fulcrum on which the combined lever and pull link normally rests; a cam follower and a cam, one of which is carried by the combined lever and pull link; the cam including a downwardly inclined upper end portion, an intermediate portion of different inclination and inclined out of the horizontal, and an abrupt upright lower end portion, so that upon initial movement of the actuator the combined lever and pull

link acts as a lever to thrust substantially upwardly on the vertical toggle link and then lifts off of the fulcrum and acts as a pull link as the follower passes over the intermediate and lower portions of the cam.

4. A motion transmitting mechanism comprising a reciprocally movable actuator, a combined lever and pull link for transmitting the movement of said actuator, a fulcrum for said combined lever and pull link, the combined lever and pull link being movable endwise relatively to the fulcrum, the actuator being connected to the lever and pull link to move laterally therewith relatively to the reciprocating movement of the actuator during the endwise movement of the combined pull link and lever and a cam to shift the combined link and lever endwise in combination with mechanism connected to the combined lever and pull link to be actuated by the pulling and lever action thereof.

5. In a motion transmitting mechanism comprising a toggle, a reciprocally movable actuator, a combined lever and pull link pivoted at one end to the toggle and at its other end to the actuator, a fulcrum for the combined lever and pull link coacting with the same between its ends, the combined lever and pull link being shiftable endwise relatively to the fulcrum and cam means for causing the lever and pull link to shift endwise and to govern the rate of such shifting during the movement by the actuator.

6. In a garment or laundry pressing machine in combination, cooperative pressing elements, one of which is movable with respect to the other; actuating mechanism connected with the movable pressing element and including a pivoted link; a cam and a cam follower, one of which is substantially fixed and the other of which is carried by the pivoted link in position to guide the direction of movement of one of the pivoted connections of said pivoted link and thereby control the speed at which the movable pressing element is actuated by the actuating mechanism; and a guide member connected to the other pivotal connection of said pivoted link.

7. In a garment or laundry pressing machine in combination a frame; cooperative pressing elements, one of which is movable with respect to the other; actuating mechanism connected with the movable pressing element and including a pivoted link; a cam follower carried by said pivoted link adjacent one of the pivotal connections thereof; a cam having a slot in which the follower operates to control the direction of movement of the pivotal connection and thereby control the speed at which the movable pressing element is actuated by the actuating mechanism; and a guide member, connected at one end to the pivoted link

and at its other end to the frame of the pressing machine.

8. In a garment or laundry pressing machine in combination, a frame; cooperative pressing elements, one of which is movable with respect to the other; actuating mechanism connected with the movable pressing element including a bodily shiftable member; pivotal connections on which said bodily shiftable member is mounted; a cam follower and a cam means, one of which is substantially fixed and the other of which is carried by said bodily shiftable member; the cam means including a cam having a cam slot formed with portions of varying inclination to govern the movement of the bodily shiftable member so as to obtain the desired speed and power from the actuating mechanism during each part of the closing movement of the press.

9. In a garment press or ironing press, a frame, coacting pressing elements, a swing member connected with one of the pressing elements, a horizontally disposed pull link having one end connected to the swing member, means to impart an upward movement to one end of the link when the press closes, and a cam in which the other end of the pull link moves, and means to impart a downward movement to said other end of the pull link as the press closes, including motor connected with the link up and down, the cam being formed with portions of varying degrees of slope so as to obtain the desired ratio of power and speed between the motor means and the swing member.

10. In a garment press or ironing press, a frame, coacting pressing elements, a swing member connected with one of the pressing elements, a horizontally disposed pull link having one end connected to the swing member, means to impart an upward movement to one end of the link when the press closes, a cam, a roller follower connected with the other end of the pull link and associated with the cam, means to impart a downward movement to the follower end of the pull link as the press closes including inclined motor means connected to the pull link adjacent the roller.

11. In a garment or laundry press, a frame and coacting pressing elements, toggle means interconnected with one of the pressing elements, a pull link having one end connected to the toggle, a cam in which travels the other end of the pull link, said cam including a horizontally directed portion to impart a horizontal pulling movement to the link to rapidly straighten the toggle to close the press, said cam also including a substantially vertical portion to impart final pressure to the movable pressing element, and motor means to operate the pull link to close the press.

12. In a garment or laundry press as de-

fined in claim 11, but characterized by an intermediate cam portion between the two cam portions named to slow up the down swinging press head prior to impact of the pressing elements.

13. In a garment or laundry pressing machine in combination, a frame; cooperative pressing elements, one of which is movable with respect to the other; actuating mechanism connected with the movable pressing element including a bodily shiftable member; pivotal connections on which said bodily shiftable member is mounted; a cam follower carried by said bodily shiftable member; cam means mounted on the pressing machine frame and formed with a cam slot therein having portions of varying inclination to govern the movement of the bodily shiftable member so as to obtain the desired speed and power from the actuating mechanism during each part of the closing movement of the press.

In testimony whereof, I have hereunto signed my name, at Syracuse, in the county of Onondaga, and in the State of New York, this 7th day of December, 1925.

ERNEST DAVIS.

CERTIFICATE OF CORRECTION.

Patent No. 1,820,051.

Granted August 25, 1931, to

ERNEST DAVIS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 47, after the word "not" insert the word quite; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 3rd day of November, A. D. 1931.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.