(No Model.) 2 Sheets—Sheet 1.

A. D. EMERY.

LAY DRIVING MECHANISM FOR VERTICAL LOOMS.

No. 503,457. Patented Aug. 15, 1893.

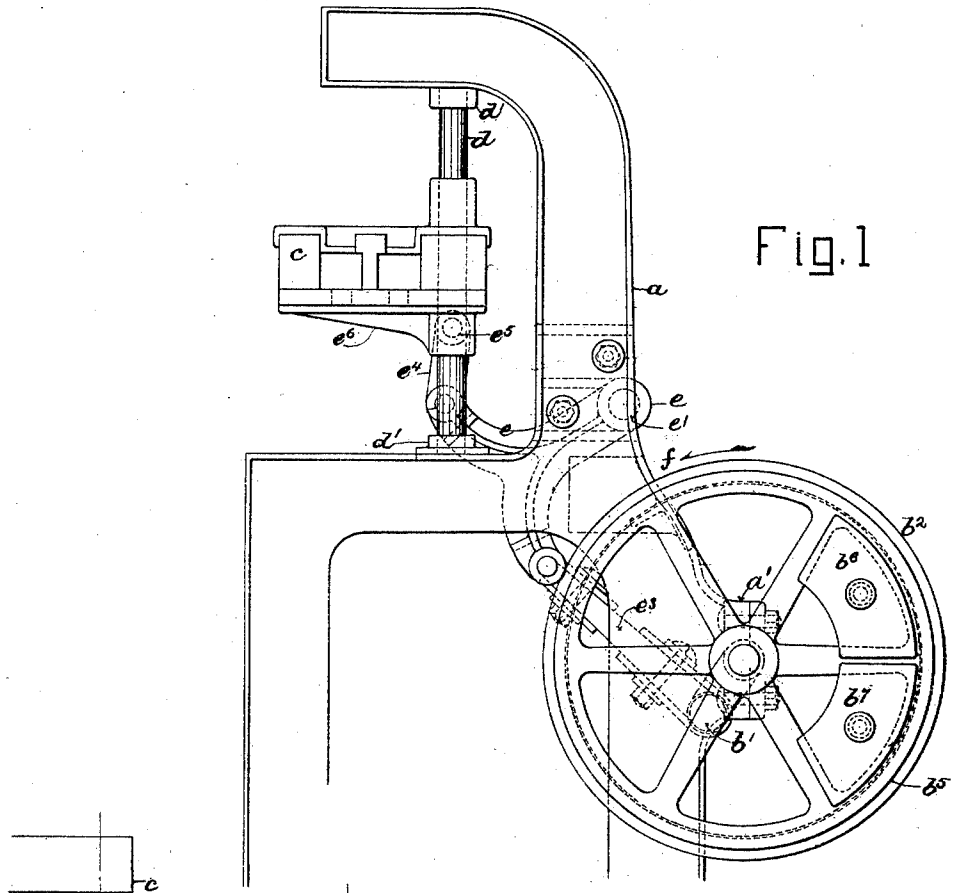

Fig. 1

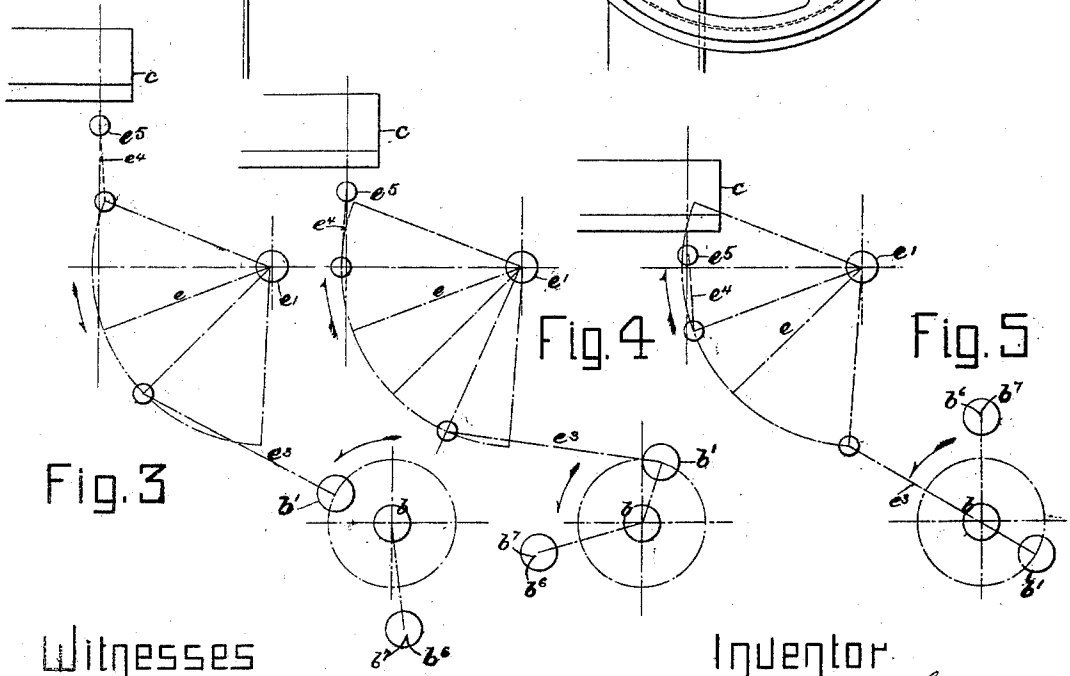

Fig. 3

Fig. 4

Fig. 5

Witnesses
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J. E. Burns.

by

Inventor
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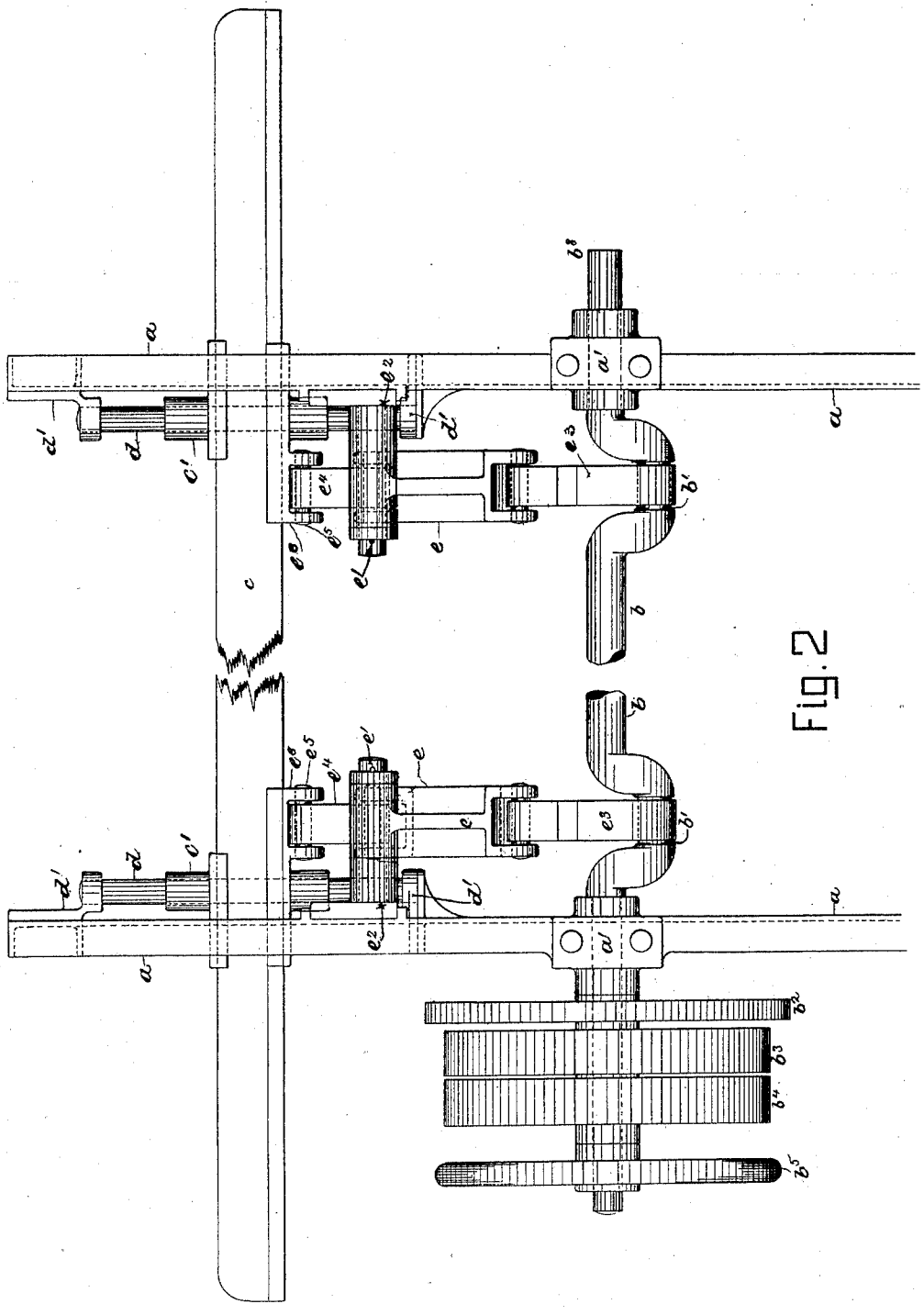

Fig. 2.

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UNITED STATES PATENT OFFICE.

ABRAM D. EMERY, OF TAUNTON, MASSACHUSETTS.

LAY-DRIVING MECHANISM FOR VERTICAL LOOMS.

SPECIFICATION forming part of Letters Patent No. 503,457, dated August 15, 1893.

Application filed October 6, 1890. Renewed December 1, 1892. Serial No. 453,684. (No model.)

To all whom it may concern:

Be it known that I, ABRAM D. EMERY, of Taunton, Massachusetts, have invented certain Improvements in Lay-Driving Mechanism for Vertical Looms, of which the following is a specification.

The objects of this improvement are to increase the compactness of organization of vertical looms, to present the lay-driving shaft in convenient position for manual operation when the necessity for such operation arises and to diminish to some extent the vibration to which vertical looms are ordinarily subject when in operation.

The invention consists in mounting upon the rear side of the frame of the loom the double crank shaft from which motion is derived to operate the vertically reciprocating lay; and in transmitting motion from the crank shaft to the lay by trains of devices each of which includes a bell-crank lever pivoted to the frame and having one of its ends linked to one of the cranks and its opposite end linked to the lay whereby the weight of the lay is carried upon the bell-crank levers. By this mode of organization, the principal portions of the trains of devices which transmit from the crank shaft the power to reciprocate the lay move in paths which are inclined from the path of movement of the lay, so that so much of the strain due to the moving of the lay as is transmitted to the bearings of the crank shaft is so transmitted in a direction substantially at an angle of forty-five degrees from the perpendicular, and a portion of the strain due to the moving of the lay is taken by the pivots which connect the bell crank levers to the frame. The crank shaft and the parts immediately connected with it are presented in positions in which they are easy of access and in which they are out of the way of the other moving parts of the loom structure.

The accompanying drawings exhibit so much of the loom structure as is required to show the construction and mode of operation of the improvement and are as follows, viz:

Figure 1 is a side elevation of a portion of the loom affording an end view of the lay and a view, partly in dotted lines, of one of the trains of mechanism for transmitting motion from the crank shaft to the lay. Fig. 2 is a rear elevation of the parts of the loom shown in Fig. 1, the central portion of the lay and the crank shaft being represented as broken away. Figs. 3, 4 and 5 are diagrams illustrating various positions assumed by the lay driving mechanism during a complete revolution of the crank shaft, or in other words, during a single beat of the lay.

The drawings represent the upper portions *a a* of the side frames of the loom on the rear of which the boxes *a' a'* afford the bearings for the opposite ends of the crank shaft *b*. The crank shaft *b* is provided between the bearings with two cranks *b' b'*. One of the overhanging ends of the crank shaft has affixed to it the brake-wheel b^2, the tight pulley b^3, the loose pulley b^4 and the hand wheel b^5, the latter being loaded upon one side by having affixed to it the weights b^6 and b^7, the purpose of which is to counterbalance the weight of the lay *c* during its movement. The lay is guided in its reciprocating movement in a vertical path by means of the vertical guide rods, *d d*, which extend through the tubular bearings *c' c'* affixed to the lay, and have their opposite ends secured respectively in the brackets *d' d'*, which are appropriately fastened to the side frames of the loom. Two similar trains of mechanism transmit motion from the crank shaft to the lay. Each of these trains of mechanism consists of a bell crank lever *e* having its axis of oscillation upon the pivot *e'* projecting horizontally inward from the bracket e^2 bolted to the side frame of the loom. One of the free ends of the bell crank lever is connected by the link e^3 with the crank *b'*, and the other free end of the bell crank lever is connected by the link e^4 with the pivot e^5 inserted through the downwardly depending ears of the bracket e^6 affixed to the under side of the lay.

In Fig. 1 the lay is represented as having completed one half of its downward stroke. The crank shaft is rotated in the direction indicated by the arrow *f*, on Fig. 1, and it will be seen that during the descending motion of the lay, the weights are making their upward movement. Thus the weight of the lay in descending is utilized to assist in elevating the weighted side of the hand wheel and similarly the weighted side of the hand

wheel in descending assists in elevating the lay.

It will of course be understood that if found desirable in practice two side weighted wheels like the wheel b^5 may be employed, in which case such additional wheel may be conveniently affixed to the end b^8 of the crank shaft.

It is not intended that the lay shall be fully counterbalanced, but on the contrary, that it shall be of such superior gravity that it will fall by its own weight when the loom is stopped, the side load being merely heavy enough to serve as what is known as a "running counterbalance."

In ordinary looms, in which the crank shaft is immediately beneath the lay, the counterbalancing weights are placed upon the counterbalance wheel in positions radially opposite the crank. In the present case, it will be seen that the counterbalancing weights are not radially opposite the crank, but are so placed with relation to the devices for transmitting motion from the crank shaft to the lay that the center of gravity of the weights is in its highest position when the lay is in its lowest position, and vice versa, as is diagrammatically illustrated in Figs. 3, 4 and 5. As will be seen on reference to these diagrams, the center of gravity of the side weights is on a radius within about sixty-four degrees of the radius of the crank, the radial position of the weights, relatively to the crank, being determined by the height of the crank shaft relatively to the medium position of the lay. Thus, if the crank shaft should be mounted in a lower position upon the frame, the distance of the weights from the crank would require to be increased; and, vice versa, if the crank shaft should be mounted in a higher position on the frame, the distance of the weights from the crank shaft would require to be diminished, in order that in either case the weights would be made to occupy their highest positions when the lay is in its lowest position, and vice versa.

By this organization the weight of the lay is carried upon the bell-crank levers, a portion of the strain and jarring effect resulting from the vertical reciprocating movements of the lay is delivered in an inclined backward direction, partly to the pivotal connection of the bell crank lever with the frame and partly to the crank shaft; and hence it results that there is less vibration of the loom structure than there would be if the crank shaft were situated immediately beneath the lay. In the latter case, all the vibratory movements imparted to the loom structure would be in a vertical direction, while by the present invention only a portion of those movements are in a vertical direction, the remaining portion being in a direction more or less inclined from the perpendicular.

What is claimed as the invention is—

1. The combination as herein set forth of a vertically reciprocating lay upon the front side of an upright loom, with a crank shaft in the rear thereof and below the level of the lay and two trains of mechanism for carrying the weight of said lay and for transmitting from said crank shaft motion to drive said lay, each of which trains of mechanism embraces essentially a bell crank lever pivoted to the frame of the loom between the crank shaft and lay and links connecting the lay and one of the cranks on said crank shaft with the free extremities respectively of said bell crank lever.

2. The combination, as herein set forth, of a vertically reciprocating lay upon the front side of an upright loom, a crank shaft in the rear thereof and below the level of said lay, trains of mechanism for carrying the weight of said lay and for transmitting from said crank shaft motion to drive said lay, each of which said trains of mechanism embraces essentially a bell-crank lever pivoted to the frame of the loom between the crank shaft and lay, and links connecting the lay and one of the cranks on said crank shaft with the free extremities, respectively, of said bell-crank lever; and means for counterbalancing said lay.

ABRAM D. EMERY.

Witnesses:
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