No. 801,668. PATENTED OCT. 10, 1905.

E. P. LEHMANN.

TOY.

APPLICATION FILED MAY 31, 1904.

Fig. 5.



Fig. 1.

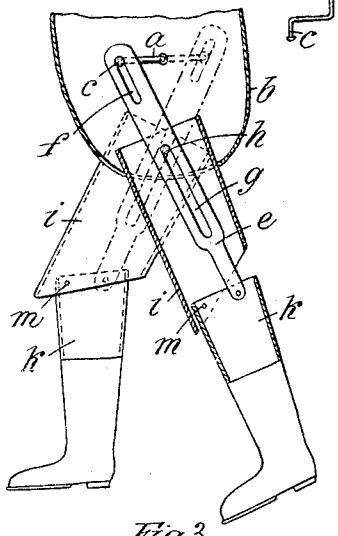


Fig. 2.

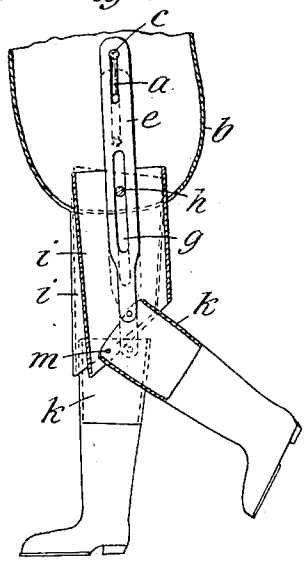


Fig. 3.

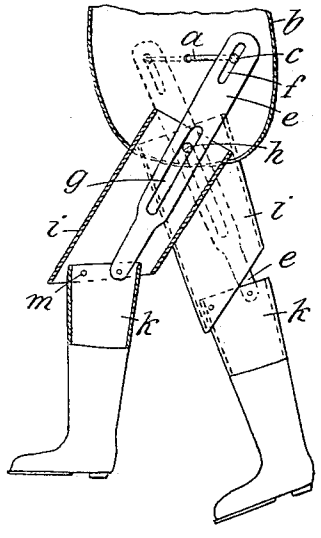
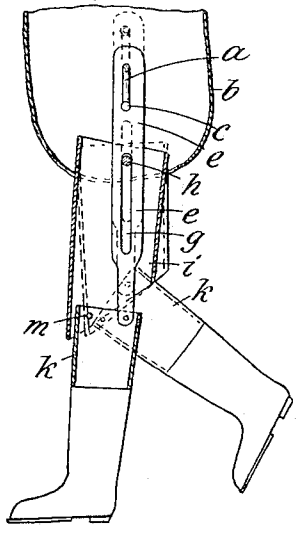


Fig. 4.



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TOY.

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Application filed May 31, 1904. Serial No. 210,516.

To all whom it may concern:

Be it known that I, ERNST PAUL LEHMANN, a subject of the King of Prussia, German Emperor, residing at No. 6 Plauerstrasse, Brandenburg-on-the-Havel, in the Kingdom of Prussia, Germany, have invented certain new and useful Improvements in Toys; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improved toy representing a human or an animal figure; and the object of my invention is to produce in the said figure a combined oscillating and bending motion of limbs, such as the legs or arms, imitating as much as possible the natural normal movements of such limbs and employing means of great simplicity for producing such motions.

In the accompanying drawings I have represented my invention applied to the legs of a human figure, and in Figures 1, 2, 3, and 4 the lower part of the body with the legs and mechanism to impart motion to the same are shown in vertical section, each successive figure representing another position of the parts corresponding to four successive positions of the revolving crank-shaft, every position showing the cranks advanced by ninety degrees with relation to the previous position. Fig. 5 is a separate view of the crank-shaft.

According to the natural movements of the human legs, the imitation of which is to be obtained, a reciprocating oscillating motion is to be imparted to the thighs *i* and an alternating bending and stretching motion to the lower legs *k*. I am aware that mechanical means to obtain a combined motion of this kind are not new, but have been employed before in toys and mechanical animals. The purpose of my invention is to provide means of greater simplicity and better adapted for the use in cheap toys constructed of sheet metal and wire; but besides greater simplicity I also have succeeded in obtaining for the thighs of the figure a larger amplitude of throw without thereby forcing the lower leg to bend in the wrong direction to form an angle with the thigh in surpassing the straight or stretched line of the thigh and lower leg in the advanced position.

Referring to Figs. 1 to 4 of the drawings, *b* is the body of the toy figure, and *a* a crank-shaft traversing said body and adapted to receive rotary motion through any suitable means—such, for instance, as a train of wheels and a spring-barrel located within the body *b*, but not shown in the drawings. The cranks *c* and *d* of said shaft are arranged at an angle of one hundred and eighty degrees with relation to each other for alternating the motions of the two legs.

If the invention should be applied to impart motion not to a pair of limbs but to a single limb, such as an arm, the shaft *a* would require but a single crank.

Each of the cranks *c* and *d* of the shaft *a* works within a slot *f* of a rod *e*, the said slot *f* being located at or near the upper end of said rod, the lower end of which is pivoted to the lower leg *k*, as at *m*, which lower leg *k* is pivoted to the thigh *i*, as at *n*. The thighs *i* are pivoted to the body *b* by a common traversing-pin *h* or by separate pins. It will be seen that the rod *e* being reciprocated by the crank of shaft *a* will impart an oscillating motion to the thigh *i*, as the lower end of said rod *e* is connected to the lower leg *k*, and the said lower leg is connected to the thigh *i*, as described. The traversing-pin *h* may pass through a slot *g* of the rod *e*, as shown; but this is not essential. It will be seen that by making the cranks *c d* work within the slots *f* of the rod *e* at or near the upper end of said rod and by connecting the lower end of said rod to the lower leg *k* an ample throw is imparted to the thighs *i*, owing to which ample throw the toy will perform a lively striding motion such as soldiers use to perform when marching.

It will be equally seen that while the cranks *c d* of the shaft *a* impart to the rod *e* and to the legs a reciprocating oscillating motion of ample throw, the said rod *e* is only slightly lifted and lowered by the said cranks, owing to the slots *f*, within which the said cranks are working. Supposing the said slots *f* in the rods *e* were missing, the rod *e* during every revolution of the shaft *a* would be lifted and lowered to the full extent of the cranks, and in such case the rod *e* when approaching the end of its downward throw would force the lower leg *k* beyond the straight or stretched position with relation to the thigh *i* to form an angle with the thigh in the wrong way.

To properly combine the oscillating motions of the thighs with an ample throw and of the lower legs bending only in one direction, I have found it necessary to employ a driving-rod, such as *e*, independent of the thighs *i*, instead of making the cranks *c d*

work within slots of the thighs proper, as in other known constructions for obtaining the combined motion described.

By employing an independent driving-rod, such as *e*, I am enabled to locate the shaft *a* at a suitable distance from the pivot-point *h* of the thighs without thereby limiting the throw of the oscillating motions of the thighs, and by locating the shaft *a* distant from the pivot *h* a wheel or wheels can be easily placed upon the said shaft *a*. This is a very important consideration in view of the necessity of a compact and simple arrangement of the driving means in toys of this character.

Referring again to Figs. 1 to 4 of the drawings, the working order of the device is as follows: Supposing all parts to take the position indicated in Fig. 1 when rotary motion of the crank-shaft *a* is started, the crank *c* of said shaft *a* will rise into the position indicated by Fig. 2 and the rod *e* will be slightly lifted. The upper end of rod *e* will be swung from the left to the right, while the lower end of said rod will be swung in the opposite direction, thereby forcing the thigh *i* to follow the oscillating motion from the right to the left, while at the same time the rod *e* in its rising motion pulls the lower leg *k* into the bent position shown in Fig. 2. As the crank-shaft *a* moves on from the position of Fig. 2 to the position of Fig. 3 the rod *e* will be further swung from the left to the right in its upper portion and in the opposite direction in its lower portion. The thigh *i* thereby will be swung into its forward position, while the lower leg *k* slowly approaches to its straight or stretched position, as the crank *c*, while descending from its highest position (shown in Fig. 2) slides down in the slot *f* of rod *e* without forcing the said rod down to the full extent of the lowering motion of the crank. From the position of Fig. 3 the crank *c* moves on to the position shown in Fig. 4. The driving-rod *e* returns the thigh *i* into its central position, and as the said rod *e* takes its lowest position the lower leg *k* becomes stretched to take a straight line with the thigh *i*. The shaft *a* still continuing its rotary motion the crank *c* will now rise again from the position of Fig. 4 to the starting-point. (Shown in Fig. 1.) The crank-pin *c* slides up within the slot *f* of the rod *e* without materially lifting the rod, and the position of the lower leg *k* remains nearly the same, as shown in Fig. 4, while the thigh *i* is swung from the central position to the rear. It will again be observed that if the slots *f* in the rods *e* should be omitted the motions of the lower legs *k* could not be correct and natural, as the cranks would carry the rods *e* too far down in the descending motion and would lift the rods *e* too soon in the rising motion, thereby producing a false effect, as indicated above.

While one of the crank-pins *c d* of shaft *a* imparts motion to one driving-rod *e*, as described, the other crank-pin drives the other rod *e*, and as the two crank-pins *c d* are set at an angle of one hundred and eighty degrees the legs will be moved in opposite directions.

I claim as my invention—

1. In a toy, the combination, with a crank-shaft, of a driving-rod slotted near one end to receive the crank-pin of said shaft, a limb pivotally connected to the opposite end of said driving-rod and another limb pivotally connected both to the first-named limb, and to the body of the toy.

2. In a toy, the combination, with a crank-shaft, of driving-rods slotted near one end, crank-pins set at angles with relation to each other and working within said slots, lower legs pivoted to the opposite ends of said driving-rods, and thighs pivoted both to the said under legs and to the body of the toy.

3. In a toy, the combination, with a crank-shaft, of a driving-rod slotted near one end to receive the crank-pin, a lower limb pivoted to the opposite end of the driving-rod, and an upper limb pivoted to the first limb and connected to the body of the toy by a pivot passing through a slot in the medial portion of the driving-rod.

4. In a toy, the combination, with a crank-shaft, of a driving-rod slotted near one end to receive the crank-pin, a lower limb pivoted at one extremity to the first limb at one side of the driving-rod, the driving-rod slotted in its medial portion and fulcrumed on a pin fixed in the body of the toy, said pin also serving as a pivot to secure the other extremity of the upper limb to the toy-body.

5. In a toy, the combination, with a crank-shaft, and crank-pins set at an angle to each other, of driving-rods slotted near one end to receive the crank-pins and also slotted in their medial portions, a pin fixed in the body of the toy and passing through the medial slots to serve as a fulcrum for the drive-rods, lower leg portions pivoted to the opposite ends of the driving-rods from the crank-pins, and thighs pivoted at one extremity to the lower leg portions at one side of the driving-rod pivots and pivoted at the other extremity to the fulcrum-pin.

In testimony whereof I affix my signature to this specification in the presence of two witnesses.

ERNST PAUL LEHMANN.

Witnesses:
WOLDEMAR HAUPT,
HENRY HASPER.