No. 649,708. Patented May 15, 1900.

E. J. PRINDLE.

MECHANICAL MOVEMENT.

(Application filed Feb. 20, 1900.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

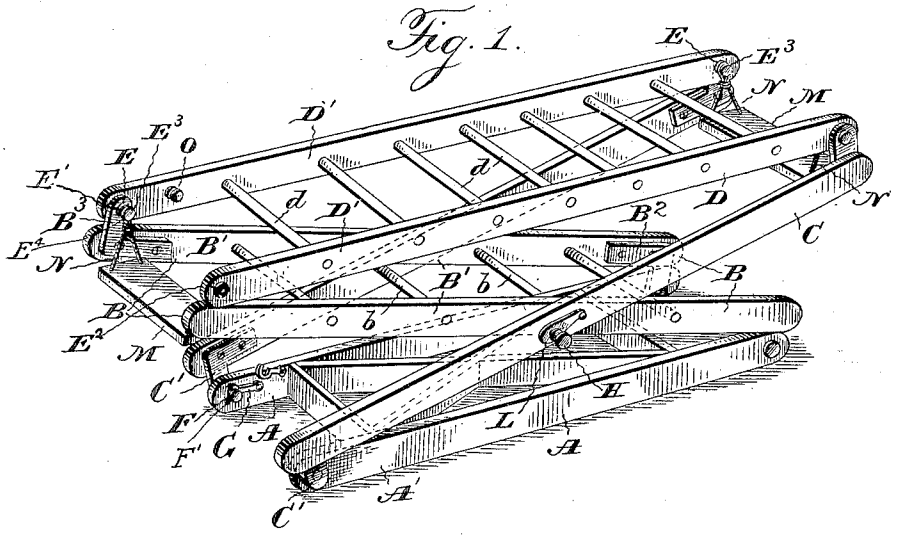
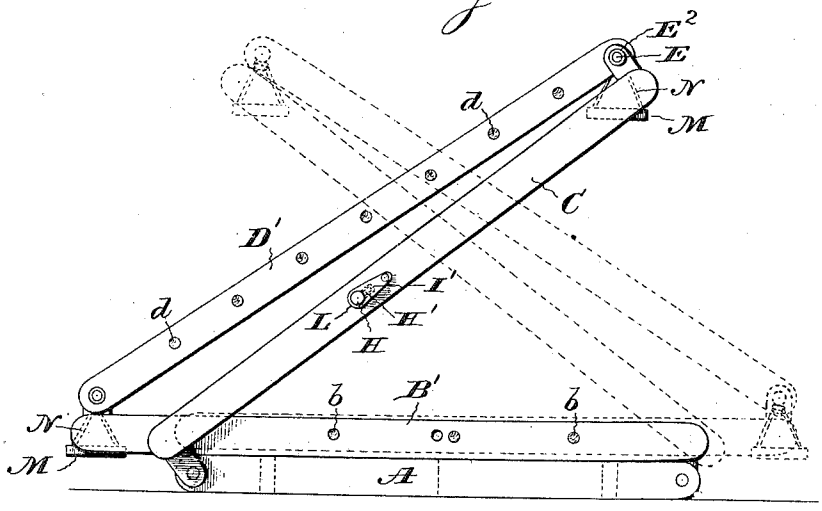


Fig. 2.



Witnesses:
Jas. E. Hutchinson.
Henry C. Hazard.

Inventor.
Edwin J. Prindle by
Prindle and Russell his attys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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Fig. 3.

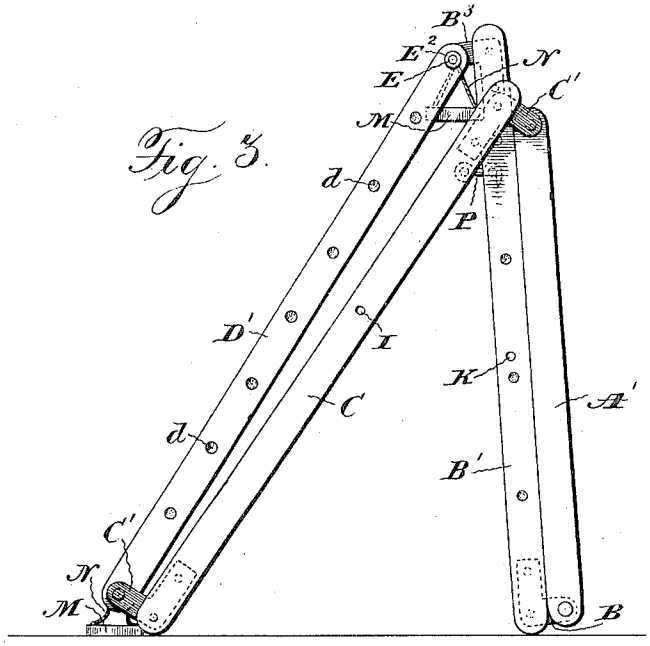
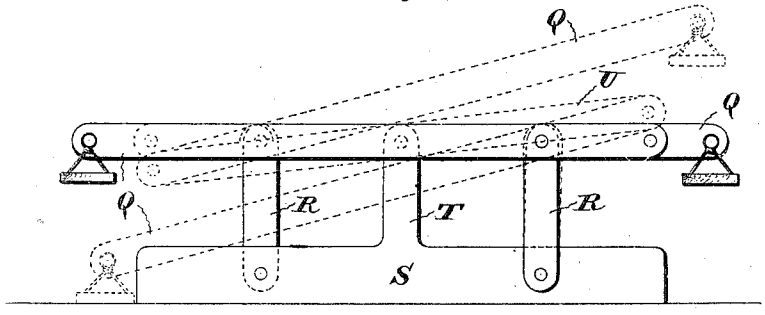


Fig. 4.



Witnesses:
Jas. E. Hutchinson
Henry C. Hazard.

Inventor.
Edwin J. Prindle, by
Prindle and Russell, his Attys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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(No Model.)

3 Sheets—Sheet 3.

Fig. 6.

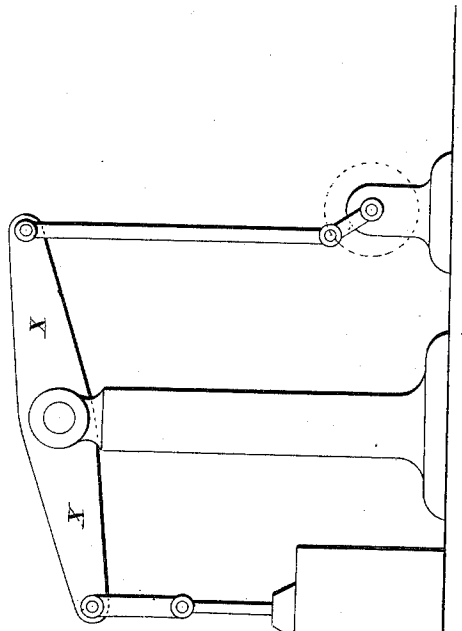
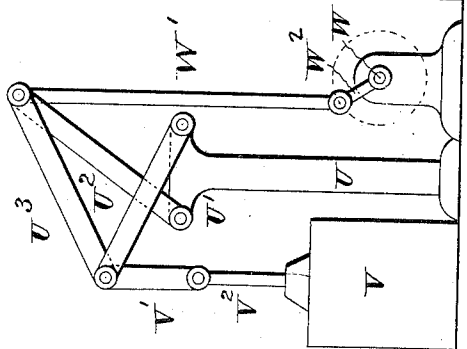


Fig. 5.



Witnesses:
Jas. E. Hutchinson
Henry C. Hazard

Inventor.
Edwin J. Prindle, by
Prindle and Russell, his Attys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

EDWIN J. PRINDLE, OF WASHINGTON, DISTRICT OF COLUMBIA.

MECHANICAL MOVEMENT.

SPECIFICATION forming part of Letters Patent No. 649,708, dated May 15, 1900.

Application filed February 20, 1900. Serial No. 5,918. (No model.)

To all whom it may concern:

Be it known that I, EDWIN J. PRINDLE, of Washington, in the District of Columbia, have invented certain new and useful Improvements in Mechanical Movements; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of my invention applied to a table, the board forming the top being removed. Fig. 2 is a side elevation of the structure shown in Fig. 1 when used as a seesaw, the latter being shown in full lines in one extreme position and in dotted lines in the opposite extreme position. Fig. 3 is a side elevation of the structure shown in Fig. 1 when used as a step-ladder. Fig. 4 shows in side elevation an alternative construction of seesaw. Fig. 5 illustrates my invention applied to an upright engine, and Fig. 6 is an illustration of a beam-engine having the same capacity for movement as the engine illustrated in Fig. 5.

Letters of like name and kind refer to like parts in each of the figures.

The object of my invention is to produce a mechanical movement which, among other uses, is capable of being applied to the construction of a combination article of furniture, the latter being adapted at different times, among other things, to serve as a table, a step-ladder, and a seesaw; and to such ends my invention consists in the combination article of furniture hereinafter specified, substantially as and for the purpose described.

In carrying my invention into practice I provide a frame which consists, essentially, of a link A, two levers B and C, each of which is pivoted at one end to the link A, and a link D, to which the opposite ends of the levers B and C are pivoted. I prefer to pivot the levers to the opposite ends of the links; but if desired either the levers or the links can be extended beyond the pivots. The links can be of equal or of different lengths, as can also be the levers. While I have described and can construct each of the links A and D and levers B and C of a single piece, I prefer to form them of parallel bars that are spaced apart, the parallel bars A′ and D′ of the links A and D and the bars B′ of the lever B being braced by cross-pieces, and the parallel bars of the lever C being outside of and farther apart than the bars to which they are pivoted. I prefer to form the braces which connect the side bars of the link D and of the lever B of round rods *d* and *b*, similar to the rounds of a ladder, although steps set at an angle, such as are commonly used on step-ladders, or other form of bracing can be used.

Four hinge-plates are attached to the bars of the lever B, two of them B^2 and B^2 being pivoted to the link A and two B^3 and B^3 to the link D. Each of such hinge-plates is preferably so formed that the pivot-hole thereof is offset to one side of the lever B toward that link to which it is pivoted, so that the lever B and the links A and D can be folded against each other in parallel position for convenience in storing. I have shown the four hinge-plates that are carried by the parallel bars forming the lever C as offset in a similar manner, the object being to make the levers symmetrical to each other in appearance. The pivot-holes of the levers B and C can, if desired, be located in the longitudinal central lines of their side bars. The hinge-plates B^3 and B^3, connecting the lever B with the link D, are located on the inner sides of the bars of the lever and pivoted on pins E and E, which are fastened to the side bars of the link D, preferably by having a shoulder E′, which bears against the hinge-plate and by having their outer ends passed through washers E^2 and upset. On the inner ends of the pins are formed necks E^3, outside of which are flanges E^4. The bars forming the lever C are similarly pivoted to the opposite ends of the bars of the link D and by similar pins, except that the hinge-plates are located outside of such bars and that the washers are omitted. The hinge connections between the lever B and link A are similar to those between such lever and the link D, except that the pins are formed without the necks and flanges. The connection between the hinge-plates C′ and C′ of each bar of the lever C and the corresponding bar of the link A is by means of a pin F, which is formed on or secured to such hinge-plate C′ and which projects through and beyond such

bar, the pin having a groove or hole F′, which is engaged by a hook G or notched plate that is pivoted on the link A, such engagement preventing the withdrawal of the pin from the hole through the bar.

Near the central portion of one or both of the bars of the lever C is a pin H, which occupies a hole I in such bar and is adapted to be thrust into a hole K in the adjacent bar of the lever B when the holes are in alinement. The pin has a lug H′, which is adapted to bear on the outer surface of the bar of the lever C and prevent engagement of the pin with the bar of the lever B. An enlargement I′ of the hole I in the bar of the lever C is provided to permit the lug H′ to pass through such bar, and a spring-plate L is secured to such bar and is provided with a hole for the passage of the pin H, such plate bearing against the lug H′ when the pin is withdrawn to inoperative position, and thus preventing the detachment of the pin from the bar of the lever C.

From each of the pairs of pins E and E on the link D is hung a platform M, which is conveniently supported from the pins by a cord N, which passes over the necks of the pins and has its ends passed through holes in the platform and knotted. At one end of the link D the last round *d* is farther from the ends of the bars than at the opposite end of such link, and at such first-mentioned end I provide one or more pairs of knobs O and O, which are attached opposite to each other to the insides of the bars of the link and serve for supporting the platform M at such end at different points along the bars.

In using the structure above described as a table the link A is placed on the floor and the levers B and C are crossed, which brings the link D at the top of the structure. The pin H is now turned so that the lug H′ is opposite the enlargement of the hole in the bar of the lever C and the pin is thrust through the hole in the bar of the lever B when such holes are brought into alinement. The structure is now rigid and can be used as an ironing or other table by laying an ironing or other board upon it. The platforms M and M, which are suspended by the cords N and N, serve as shelves. The extra knobs O and O provide for adjusting one of the shelves in or out. By providing several holes I in the bar of the lever B the table can be secured at any desired angle through the engagement of the pin H with the proper hole. The structure in the above-described condition can, when the ironing-board is not upon it, conveniently be used as a clothes-rack.

By simply withdrawing the locking-pin H the structure can be used as a seesaw. The platforms M and M, which are suspended from the link D, serve as seats, and when the link is set in motion the seats alternately rise and fall with a motion that has a long vertical component and a comparatively-short horizontal component. The amount of up-and-down motion obtained is about equal to that of the ends of a lever having twice the length of the link D when such lever is mounted on a fixed fulcrum, as in the case of the ordinary seesaw. For the purposes of a seesaw both the upper and the lower link can be made of rope or other flexible connection. The lower link may be dispensed with by placing the lower ends of the levers in depressions in the ground or between fixed objects.

By folding the link A against the lever B, as shown in Fig. 3, a convenient step-ladder is produced, the rounds of the link D serving as the rounds of the ladder. The link C connects the lower end of the ladder, consisting of the link D, with the prop, consisting of the lever B, and effectively prevents such prop from sliding forward. There is but slight chance that the prop will be forced toward the ladder and allow the latter to fall; but if desired such action can be effectively prevented by connecting the lever B with the link A or with the link C, as by a hook P, as shown.

The levers B and C of my mechanical movement are, in effect, the same as though a lever having a length equal to their combined length were divided at the fulcrum into two levers and these levers were fulcrumed at points which are separated from each other by the length of the link A, the levers being disposed in opposite directions and parallel. The link D communicates the motion of one lever to the other, so that with a structure only half as long as the original lever the same amount of vertical motion of the ends of the levers is produced for a given amount of angular motion of such levers. I thus have a mechanical movement which is very compact in a longitudinal direction and which serves the purpose of a lever twice its length.

In Fig. 4 I have illustrated an alternative construction in which two levers Q and Q are fulcrumed on links R and R, which are pivoted to the base S at some distance apart. Between the links is a pillar T, on which is fulcrumed a connecting-lever U, which is pivoted at each end to one of the levers Q and Q. Such construction is equivalent to a single lever having a length equal to twice the distance from the end of one of the levers Q to its fulcrum R. The construction is thus shorter than a single lever by the distance between the two links R and R, and with the same degree of angular movement produces the same travel of the lever ends.

In Fig. 5 I have illustrated my mechanical movement as applied to a marine engine in place of the usual beam. On a pillar U between the cylinder V and crank-shaft W is mounted my mechanical movement, consisting of a stationary link U′, at whose ends are pivoted two levers U^2 and U^2, which are crossed and pivoted at their upper ends to an upper

link U^3. To one end of the upper link U^3 is pivoted a connecting-rod V', whose lower end is pivoted to the piston-rod V^2. To the opposite end of the upper link U^3 is pivoted a connecting-rod W', whose lower end is pivoted on the crank-pin W^2 of the crank-shaft W. By such construction the upper ends of the two connecting-rods travel in substantially the same paths as they would if they were, as shown in Fig. 6, connected to the ends of a lever X, having the length of each arm equal substantially to the length of the upper link U^3 of the construction illustrated in Fig. 5. Such result is obtained with substantially the same degree of angular movement of the lever and link and with substantially the same curvature of paths of the upper ends of the connecting-rods. Therefore without sacrificing any advantage by the use of my mechanical movement I can reduce the length of a beam-engine one-half.

I desire it to be understood that my mechanical movement is capable of application to other uses than those to which I have shown it applied.

Having thus described my invention, what I claim is—

1. The combination of two crossed levers, two link connections between said levers, such connections being on opposite sides of the crossing-point of the levers, and distinct and independently-usable means connected with the levers on the same side of the crossing-point thereof as one of said connections, such connections having lengths sufficient to produce motion of said distinct and independently-usable means substantially toward and from the plane of the opposite connection, substantially as and for the purpose described.

2. A structure comprising crossed levers, a link connection between them and above their crossing-point, and distinct and independently-usable means connected with the levers above their crossing-point, at points removed from the longitudinal center of such link connection, substantially as and for the purpose described.

3. A structure comprising crossed levers, upper and lower link connections on opposite sides of their crossing-point, and distinct and independently-usable means connected with the levers on the upper side of such crossing-point, at points removed from the longitudinal center of the upper of such link connections, substantially as and for the purpose described.

4. A structure comprising crossed levers, upper and lower link connections between said levers and on opposite sides of the crossing-point of the levers, and two distinct and independently-usable means connected with the upper of said links, at points removed from the longitudinal center thereof, substantially as and for the purpose described.

5. A structure comprising crossed levers, a longer upper link and a shorter lower link connecting said levers on opposite sides of their crossing-point, and distinct and independently-usable means carried by said upper link, at points removed from the longitudinal center thereof, substantially as described.

6. A structure comprising two crossed levers, upper and lower links which are pivoted to said levers, and two platforms carried by said structure on the upper side of the crossing-point of such levers, substantially as described.

7. The combination of two crossed levers, upper and lower links which are connected to said levers, and platforms carried by the upper of said links at its opposite ends, substantially as described.

8. The combination of two crossed levers, upper and lower links which are connected to said levers, and platforms pivoted to the upper of said links, substantially as and for the purpose described.

9. The combination of two crossed levers, two links which are connected to said levers, and two platforms pivoted to the ends of one of said links, substantially as and for the purpose described.

10. The combination with a structure comprising two crossed levers, and two links which are connected to said levers, of two platforms suspended from two pivots carried by said structure, substantially as and for the purpose described.

11. The combination with a structure comprising two crossed levers, and two links which are connected to said levers, of two platforms pivoted to said structure, and means for adjusting one of said platforms toward or from the other, substantially as and for the purpose described.

12. The combination of two crossed levers, two links which are connected to said levers, two platforms which are suspended from one of said links, and a detachable connection between said levers, substantially as and for the purpose described.

13. The combination of two crossed levers, two links which are connected to said levers, two platforms which are suspended from one of said links, means for adjusting one of said platforms along the link from which it is suspended, and a detachable connection between said levers, substantially as and for the purpose described.

14. The combination of two crossed levers, two links which are pivoted to said levers, and a detachable connection between one of said levers and one of said links, substantially as and for the purpose described.

15. The combination of two crossed levers, two links which are pivoted to said levers, a detachable connection between said levers, and a detachable connection between one of said levers and one of said links, substantially as described.

16. The combination of a longer link consisting of parallel bars connected by crosspieces, a shorter link, and two levers which are pivoted to said links, substantially as and for the purpose described.

17. The combination of an upper link consisting of parallel bars connected by crosspieces, a shorter lower link, two levers which are pivoted to said links, and means for detachably and rigidly connecting said levers, substantially as and for the purpose described.

In testimony that I claim the foregoing I have hereunto set my hand this 20th day of February, 1900.

EDWIN J. PRINDLE.

Witnesses:
G. B. PRINDLE,
J. L. LAWLOR.

Corrections in Letters Patent No. 649,708.

It is hereby certified that in Letters Patent No. 649,708, granted May 15, 1900, upon the application of Edwin J. Prindle, of Washington, D. C., for an improvement in "Mechanical Movements," errors appear in the printed specification requiring correction as follows: On page 4, line 1, before the word "link," the word *upper* should be inserted; line 3, before the word "link," the word *lower* should be inserted; line 6, the article "an" should read *a*, and the following word "upper" should be stricken out, and in line 8 the word "lower" should be stricken out; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 5th day of June, A. D., 1900.

[SEAL.]

F. L. CAMPBELL,
Assistant Secretary of the Interior.

Countersigned:

C. H. DUELL,
Commissioner of Patents.