June 27, 1933. H. M. SVEBILIUS 1,915,840

TOY SUPPORTED MOTOR

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Fig. 1

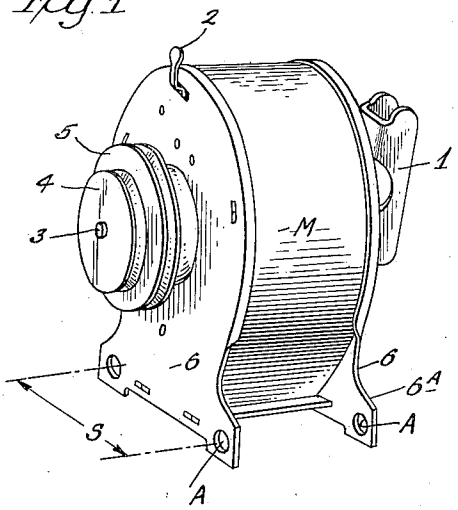


Fig. 8

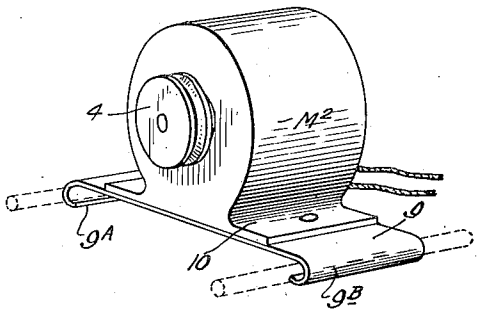


Fig. 4

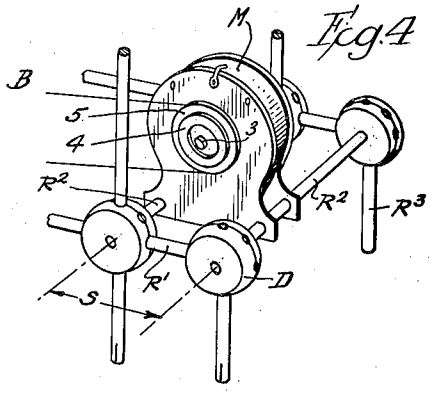


Fig. 7

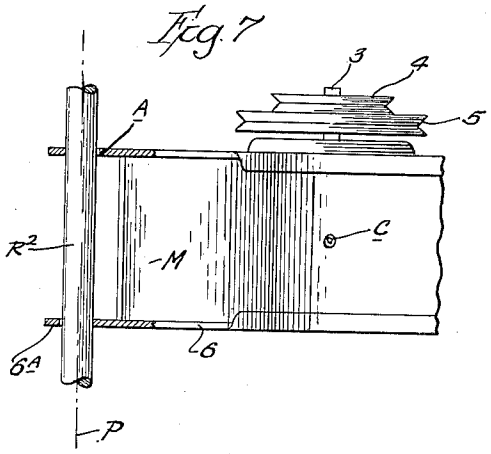


Fig. 9

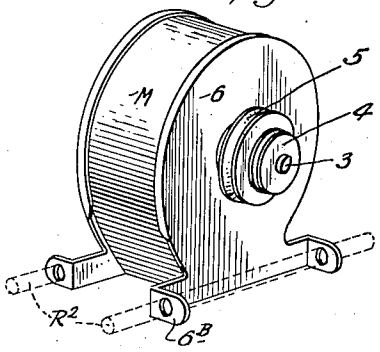
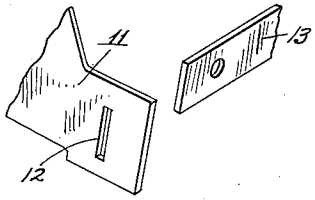


Fig. 10



Inventor:
Henry M. Svebilius
by Albert Scheibli
Attorney

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Fig. 2

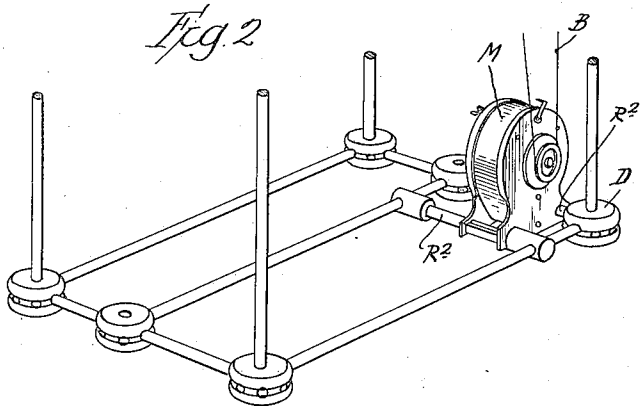


Fig. 5

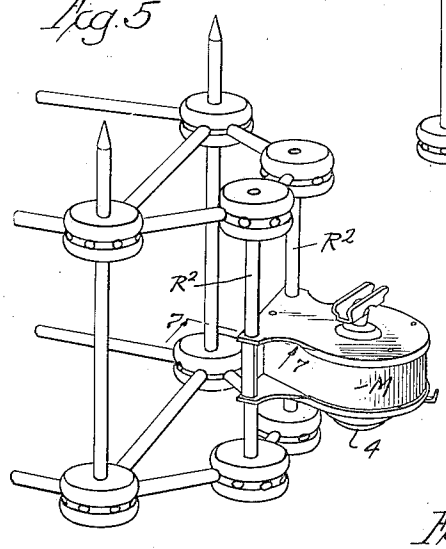


Fig. 3

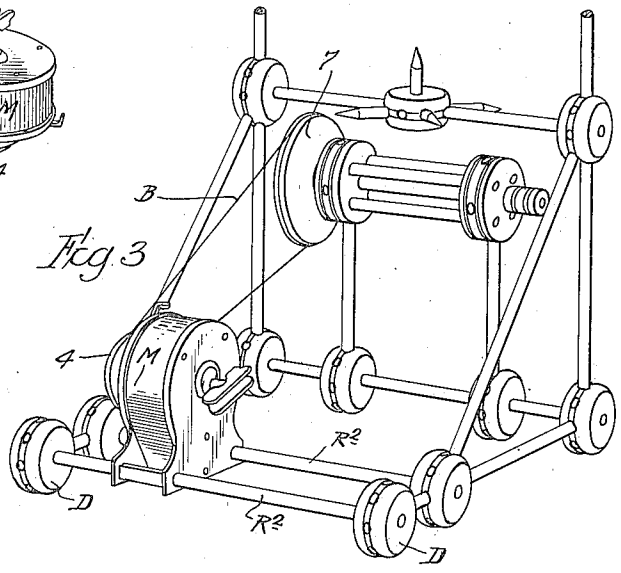
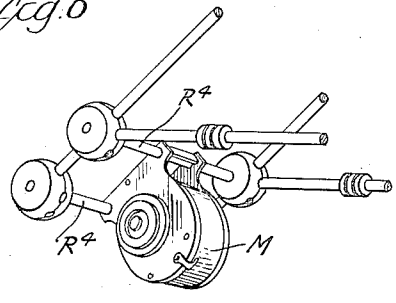


Fig. 6



Inventor:
Henry M. Svebilius
by Albert Scheible
Attorney

Patented June 27, 1933 1,915,840

UNITED STATES PATENT OFFICE

HENRY M. SVEBILIUS, OF EVANSTON, ILLINOIS, ASSIGNOR TO THE TOY TINKERS, INC., OF EVANSTON, ILLINOIS, A CORPORATION OF ILLINOIS

TOY-SUPPORTED MOTOR

Application filed January 7, 1933. Serial No. 650,618.

My invention relates to motors for actuating the movable parts of a mechanism-simulation or other structure erected from structural toy elements which include rods, and in its general objects aims to provide a motor which can be directly supported by such rods in any desirable position without requiring fastening elements of any kind, and in such a manner as to permit an adjustment of the position of the motor.

Toy construction sets consisting of rods of equal cross-section and assorted lengths, together with rod-connecting members for interchangeably connecting such rods have long been in wide-spread use; and originally the rod-connecting members in such sets were designed for use merely in the erecting of rigid structures. But in more recent years such sets have also included members for rotatably inter-connecting selected rods so as to permit the erection of operative mechanism-simulations of widely varying types, as for example the types shown in my copending application #587,013 relating to a toy construction element adapted for interchangeably affording either rigid, rotary or slidable connections to rods of uniform diameter.

While the movable parts of structures erected with the aid of the novel element disclosed in my said copending application may be manually actuated by also assembling certain elements of the set to form a hand-crank, the fascination to the normal child is greatly increased if the movement can be effected by the use of a motor. However, even when the erected structure includes grooved wheels designed so that they can be rotated by endless strings or other bands serving as driving belts, it is usually difficult to insure both a sufficiently rigid spacing of a suitable motor from such a pulley and an ample clearance for the string or other driving belt.

For example, if the motor is merely seated loosely on the table or floor on which the toy structure was erected, the tension of the cord which serves as a belt is apt to slide the motor toward the said structure, thereby causing the driving belt to slip.

These difficulties cannot be overcome by fastening the motor to the table, because an occasional varying of the distance between the motor and the driven wheel may be required to compensate for the stretching of the belt, and also because such an entirely independent supporting of the motor and the erected structure makes it difficult for a mere child to aline the general plane of the driven wheel in the structure with the driving wheel on the motor. Besides, moreover, such a rigid fastening of the motor to the surface on which it rests would not permit the belt to be shifted easily from one to another of two different diametered drive wheels on the motor, as is often desirable for varying the speed at which the moving parts of the toy structure are actuated, since this would require the erected structure to be carefully moved to a corresponding extent.

Moreover, in many of the most fascinating mechanism-simulations the needed belt-driven wheel is most advantageously positioned when it is not near the table top or other support on which these structures are erected; and in many cases other parts of such structures are disposed so that they would be in the path of driving belts leading to motors set upon the table, or so that the belts must be undesirably long (and hence slack) to clear rods or other parts of the structures.

While the just recited difficulties might be overcome with many mechanism simulations by clamping a motor to the erected structure, this in turn has the objections that the commercial low-powered motors (including both spring-actuated motors and electric motors) are not designed so as to be conveniently supported except upon a horizontal surface, and that the fastening of such commercial motors to any erected structure of this class would require a wide variety of fastening elements for use with different structures; also, that it is difficult for a mere child to adjust and readjust the position of a thus fastened motor, particularly when the clamps, bolts or other auxiliary fastening require tools for tightening and loosening them.

Moreover, with many structures, the advantageous position of an actuating motor

is not one which will permit convenient access for the tightening or even attaching of clamps or the like.

My present invention aims to overcome all of the heretofore recited objections by providing a motor which can readily be attached directly to rod members of a toy construction set without the use of any tools; which will enable the motor to be supported in any desired position; which will permit the motor to be shifted instantly in its position (without the use of any tools) for suitably tensioning or slackening the belt, or for aligning the motor pulley with the driven pulley; and which will utilize gravity for effectively latching the motor in its adjusted position. Moreover, my invention aims to provide a highly simple and inexpensive construction for this purpose, and one which can be employed equally well with rods of either round or rectangular section.

Illustrative of the manner in which I accomplish the purposes of my invention,

Fig. 1 is a perspective view of a spring-wound motor designed for direct attachment to two parallel rods.

Figs. 2, 3 and 4 are fragmentary perspective views of mechanism simulations each showing such a motor as supported by horizontally extending rods.

Fig. 5 is a fragmentary perspective view of a portion of a mechanism simulation showing the same motor supported by two upright rods.

Fig. 6 is a fragmentary view showing the same motor supported by and depending from two horizontal rods disposed at different elevations.

Fig. 7 is a fragmentary and enlarged section taken along the line 7—7 of Fig. 5, with the clearance between the rod and the perforations in the motor end plates exaggerated, showing the slight tilting of the motor by gravity.

Figs. 8 and 9 are perspective views showing two other embodiments of my invention.

Fig. 10 is a perspective view of portions of a motor and of a corresponding bar for a toy construction set, showing one adaptation of my invention for use with metal bars or strips.

Generally speaking, I accomplish the purposes of my invention by providing parallel guideways upon the motor housing, stator or other stationary member of the motor, and forming each guideway so as to leave only slight clearance for one of the rods of the toy construction set when that rod is slid through the guideway; the two guideways being sufficiently spaced for receiving parallel rods connected to each other by other elements of the set, and desirably also extending parallel to the axis of the rotor of the motor.

For example, Fig. 1 in general shows a conventional type of toy motor in which an interior spring is wound by manually rotating a handle 1, this spring being free when a latch lever 2 is moved to its releasing position for rotating a shaft 3 carrying two grooved drive wheels 4 and 5 of relatively different diameters. To adapt this motor M for use with a structural toy set which includes rods R of substantially uniform diameter, I provide each end plate 6 with a pair of spaced apertures A, each of which apertures alines with an aperture in the other end plate and has its bore slightly larger than the said uniform rod diameter.

The spacing between the two apertures in each end plate may be widely varied, according to the general size of the motor and the convenient positioning of the apertured plate portions, provided that this spacing permits the corresponding two rods to be readily supported in a similar spacing by other elements of the toy construction set; but is also desirable to have this spacing sufficient for reducing any tendency of a belt pull toward rocking the motor about either one of the two rods which support it.

With a motor having separately formed sheet metal end plates, such as that of Fig. 1, I desirably form each of these end plates 6 so as to include two ears 6A projecting away from each other from the lower edge of the plate so as to form legs, and provide each such leg with one of the said apertures A, thereby easily securing an aperture spread S corresponding to the spread of the axes of two disks D when connected firmly by a rod R^1 of a certain short length, as in Fig. 4.

With the apertures in either end plate disposed so that each thereof alines with an aperture in the other end plate, any child can readily slide two rods R^2 (of equal length) through a pair of the alined apertures and then slip the adjacent ends of these rods respectively into the axial bores of two disks D connected by such a short rod. Then these two pairs of disks can be connected to other portions of the mechanism-simulation by other rods, so as to cooperate in supporting the motor in a wide variety of positions.

For example, the four disks at the ends of the parallel rods which extend through stationary or stator parts of the motor may seat edgewise on a table or floor, as shown in Fig. 3, or may be supported at some distance above such a support by leg-forming rods R^3 as in Fig. 4. Or, at least one of the two rods R^2 which extend through the stator of the motor be socketed at one end in a radial bore of such a disk D, as shown for one rod in the upper portion of Fig. 2.

In the just mentioned Figs. 2, 3 and 4, the common axial plane of both the rods which extend through stationary parts of the motor is horizontal, and each of these rods projects freely beyond the motor so that the motor

can be shifted longitudinally of the rods to bring the operative drive wheel (4 or 5) and its belt B into proper alinement with the corresponding driven wheel, such as the wheel 5 in Fig. 3. However, when the motor is not raised slightly to facilitate such a shifting, the weight of the motor will prevent it from being slid accidentally along the rods which directly support it, so that I obtain a normally latched and yet instantly adjustable positioning of the motor.

But the convenient use of my rod-supported motor is by no means limited to positions in which the motor is upright, as in Figs. 2, 3 and 4, since my simple rod-guiding and rod-gripping guideways will also function effectively when the common axial plane of the two motor-supporting rods is at an incline, or is upright, and even when the body of the motor is at lower elevation than these rods. For example, Fig. 6 shows the motor M as suspended from two rods R^4 which have their common axial plane inclined.

In Fig. 5, the motor-supporting rods are upright, so that the medial plane of the usual groove in the drive wheel 4 on the motor is horizontal and the shaft of the motor is upright. With the motor thus positioned, the center of gravity C of the motor is at a considerable distance from the common axial plane P of the supporting rods, as shown on an enlarged scale in Fig. 7. Consequently, gravity will tilt the motor to the extent permitted by the difference between the diameter of each such rod and the stator apertures A through which that rod extends; thereby causing the bore of the upper aperture to engage the rod at the rod edge farthest from the motor, and the bore of the lower aperture to engage an opposite edge portion of the rod, as also shown in Fig. 7. Consequently, the motor is normally latched by gravity against sliding downwardly, but can instantly be adjusted as to its elevation when the motor is slightly rocked (in a counter-clockwise direction in Fig. 7) to overcome the normal gravity-effected tilting.

Since the heretofore described slidable positioning of the motor on the two supporting rods, as well as the normal latching of the motor by gravity against accidental sliding, do not depend upon the type of motor, it will be obvious that my invention is not limited in its application to manually rewound spring motors, and that it can be applied for example to any suitable size of an electric motor.

Moreover, while I have heretofore described my invention in connection with a motor in which each of the guideways for the motor-supporting rods consists of two alined bores or apertures having a common axis parallel to the axis of the motor shaft, and in which these guide apertures are formed in legs for the motor, I do not wish to be limited to these or other details of the construction and arrangement here disclosed, since many changes might be made without departing either from the spirit of my invention or from the appended claims. For example, Fig. 9 shows a motor in which the legs 6B are bent so that the rod-receiving apertures have their axes in planes at right angles to the axis of the motor shaft 3.

Nor do I wish to be limited to the use of integral parts of a motor for affording the needed guideways, or the use of an alined pair of spaced bores for constituting each guideway. Thus, Fig. 8 shows the two guideways as constituted by the curled end portions 9A and 9B of a sheet metal strip 9 which underhangs and is fastened to the base 10 of an electric motor M^2, thereby permitting the interchangeable attaching of such a twin guideway provision to different types or makes of previously completely assembled motors.

So also, I do not wish to be limited to the use of my invention in connection with toy construction sets in which the rod elements are generally cylindrical wooden rods, as the underlying principles of my invention may be employed also with toy structural sets which include metal strips, it being merely necessary to shape the cross-section of the guideways so as to conform to that of such strips. For example, Fig. 10 shows a leg portion 11 of a motor, allied to one of the legs 6A in Fig. 1, but provided with a rod-receiving bore 12 of a rectangular section for slidably receiving the metal bar 13 of which an end portion is also shown in the same figure.

With all of the illustrated embodiments, the cost of providing the needed guideways is quite nominal, and indeed less than the cost of any means for clamping a motor to parts of an erected mechanism-simulation or other structure. And by entirely eliminating both the use of auxiliary fastening elements and the need of tools, I greatly expedite the attaching and as well as detaching of the motor, require neither tools nor skill for adjusting the position of the motor, and also prevent the loosening of the motor from its supports which would so readily occur with the use of bolts or the like when subject to jarring.

I claim as my invention:

1. For use with a structural toy assembly which includes two rods of equal diameter, a motor comprising a rotor and a stator, the stator having portions thereof constituting two parallel guideways each formed for slidably receiving one of the said rods when the rods are parallel to each other, each of the guideways being of such a size as to cramp the rod extending through it, when the motor is tilted with respect to either of the rods.

2. A motor for use with two rods of a structural toy assembly, as per claim 1, in

which the said guideways extend parallel to the axis of the rotor of the motor.

3. For use with a structural toy assembly which includes rods of equal diameter, a motor comprising a rotor and a stator, the stator having lower portions thereof formed to afford legs adapted to seat on a horizontal surface and also having these lower portions formed to afford parallel guideways, each of which guideways slidably fits over one of the rods.

4. Means for actuating rotatable parts of a structural toy assembly which includes two rods of equal diameter, comprising a motor including stationary parts presenting two pairs of alined bores, through which pairs of bores the said rods respectively extend, each bore being of such a size in proportion to the diameter of the rods that a rod can be slidably inserted through that bore and will be gripped by wall portions of the bore when the rod thereafter is out of parallelism with the axis of the bore.

5. Means for actuating rotatable parts of a structural toy assembly which includes two substantially parallel rods of equal diameter, comprising a motor including a motor body and two end plates projecting beyond the motor body, each end plate being provided with a pair of spaced bores each spaced outwardly from the motor body, the bores in one end plate alining respectively with those in the other end plate, and all of the said bores being only slightly larger in diameter than the rods.

6. A motor for use with a structural toy assembly which includes two substantially parallel rods of equal diameter, comprising a motor body, and two parallel end plates each projecting downwardly from the motor body to afford two spaced legs adapted to seat on a horizontal surface; each leg having a bore extending transversely of the end plates and of a diameter for slidably receiving one of the rods, the legs of each end plate having their bores respectively alining with the bores in the legs of the other end plate.

7. A motor for use with a structural toy assembly which includes two substantially parallel rods of equal diameter, comprising a stationary motor body, a shaft rotatable with respect thereto, and two parallel body-supporting parts projecting beyond the motor body; each of the said parts being provided with two bores, each of which bores is of a diameter for slidably receiving one of the rods; the bores in one of the said parts respectively alining with the bores in the other part, and all of the said bores having their axes in a plane parallel to the axis of the said shaft.

8. A motor as per claim 7, in which the two bores in each of the body-supporting parts are at opposite sides of, and symmetrically disposed with respect thereto, a plane diametric of the shaft and at right angles to the aforesaid plane.

9. For use with a structural toy assembly which includes two rods of equal diameter, a motor comprising a rotor and a stator, the stator being provided with two parallel and rigidly spaced guideways each formed for slidably receiving one of the said rods when the rods are parallel to each other, and each adapted to grip the slidably received rod when the rods are moved out of parallelism with each other.

Signed at Chicago, Illinois, January 4th, 1933.

HENRY M. SVEBILIUS.