Feb. 24, 1925. 1,527,916

O. PONTIUS

ROCKING APPARATUS

Filed Feb. 27, 1924 2 Sheets-Sheet 1

Fig. 1

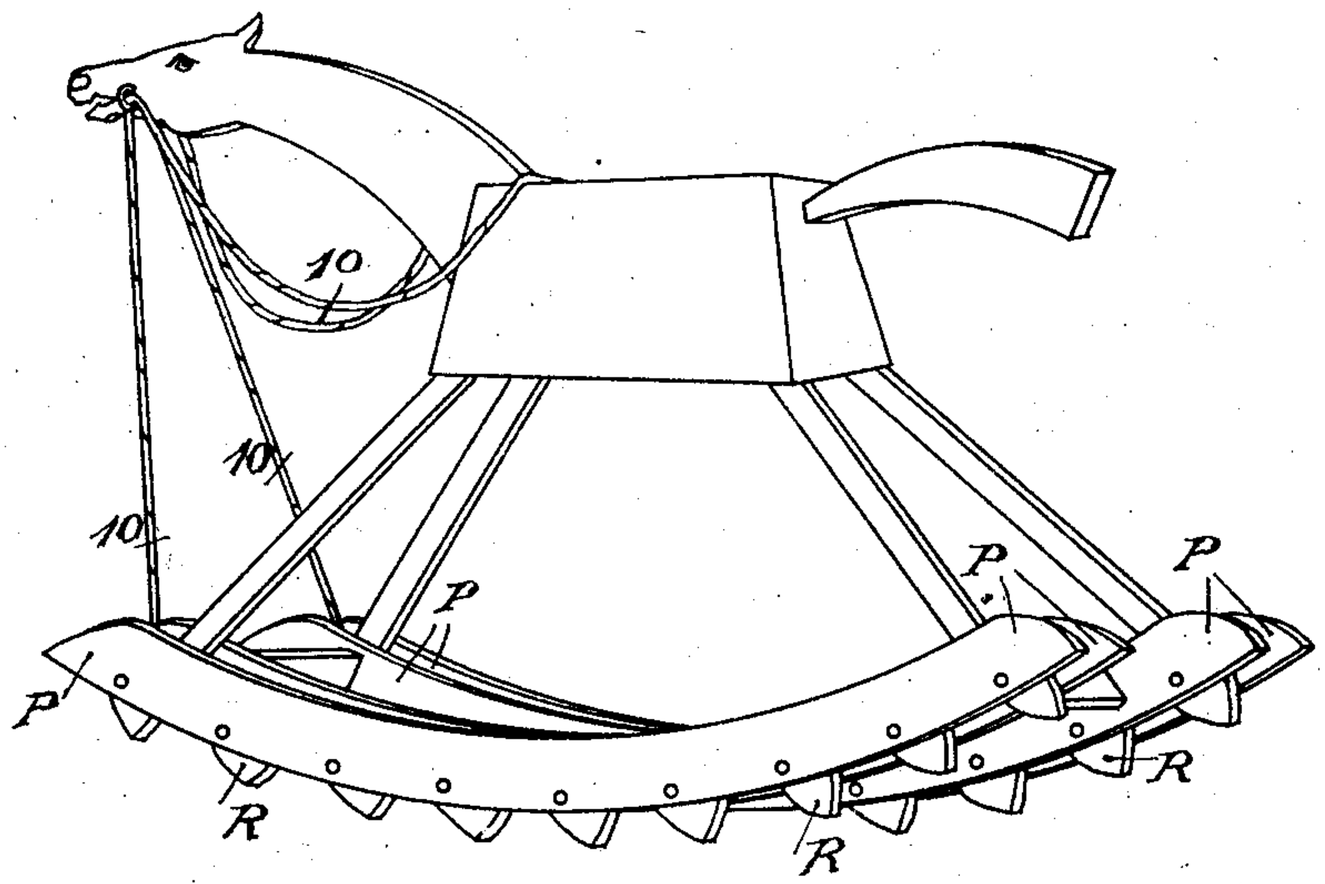



Fig. 2

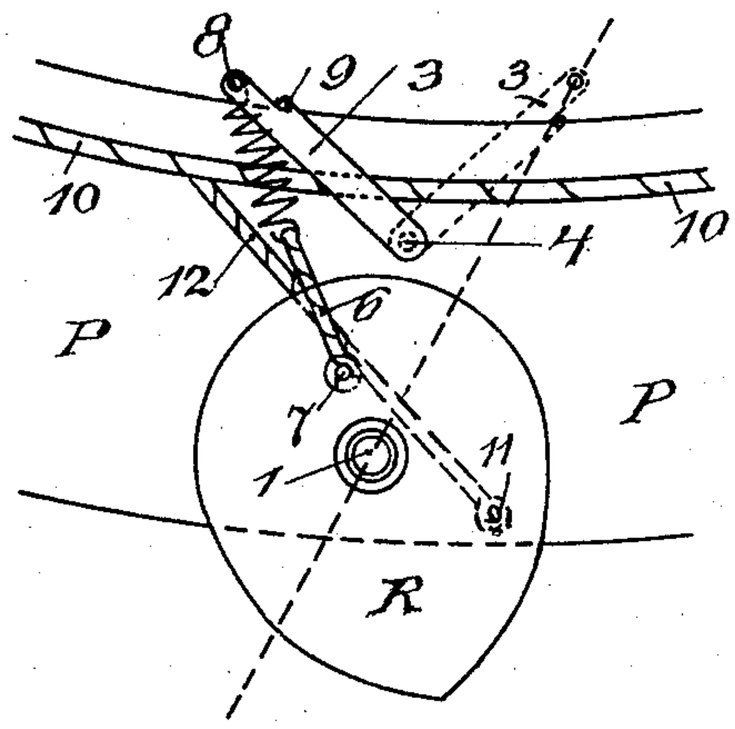
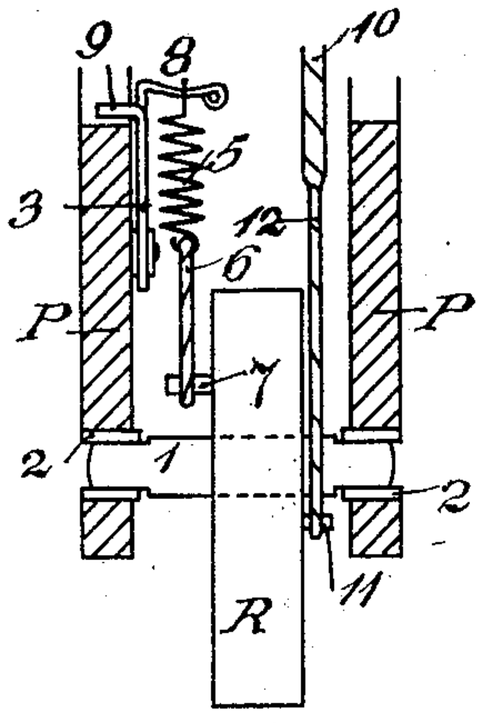



Fig. 3




Inventor: Oswald Pontius

per: Rueckheim

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Fig. 4

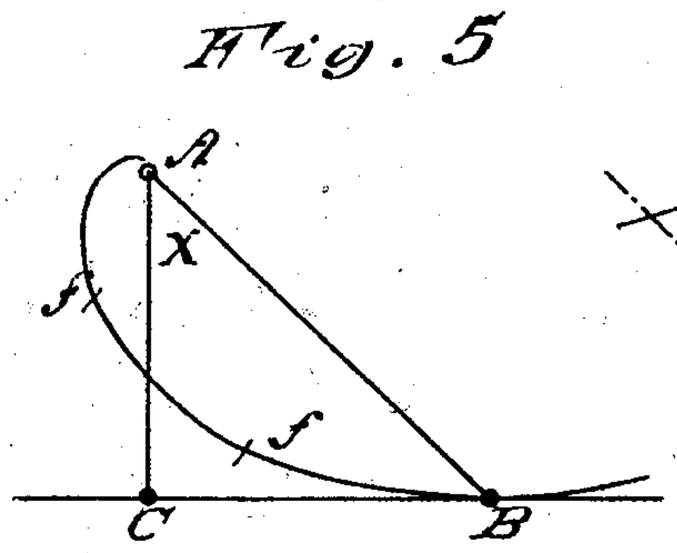



Fig. 5

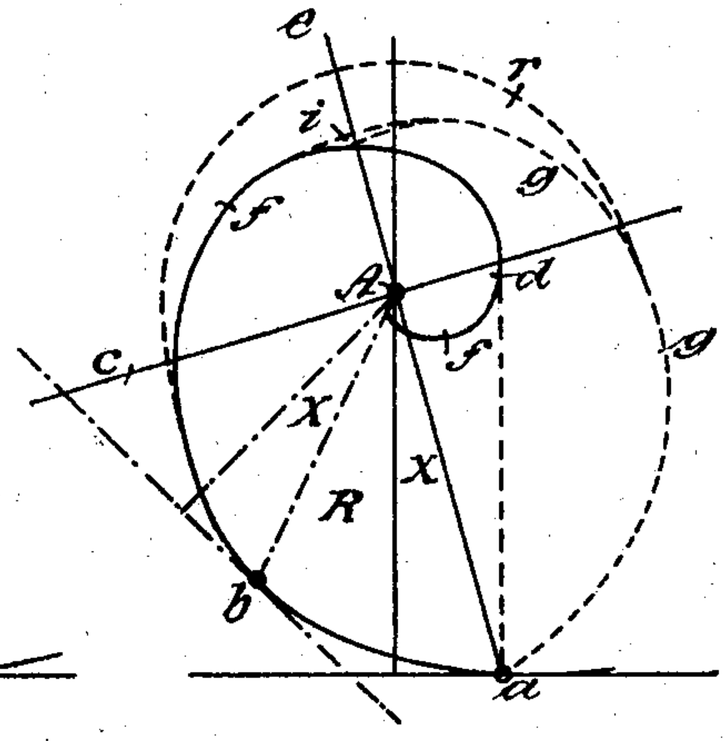



Fig. 6

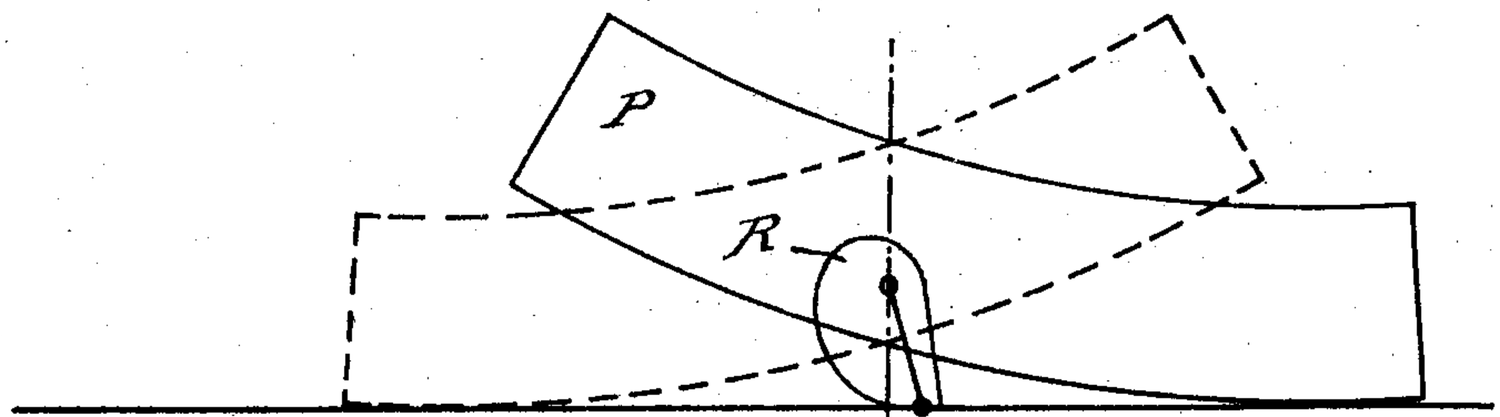



Fig. 7

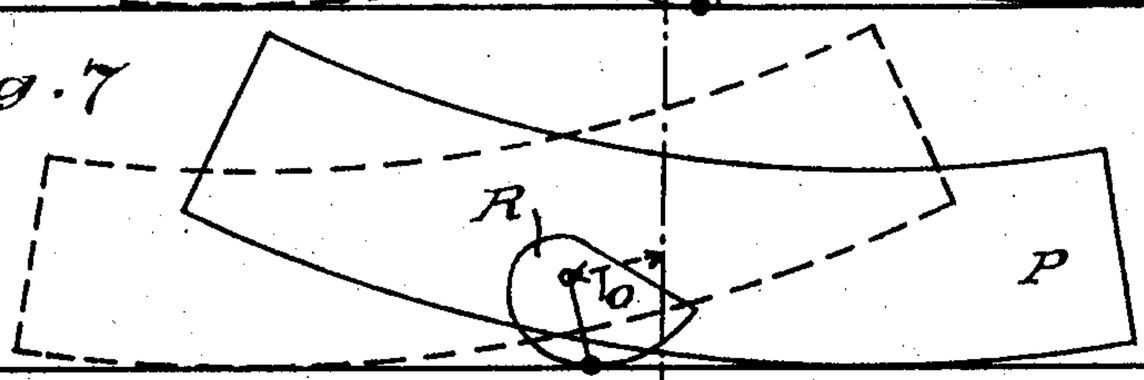
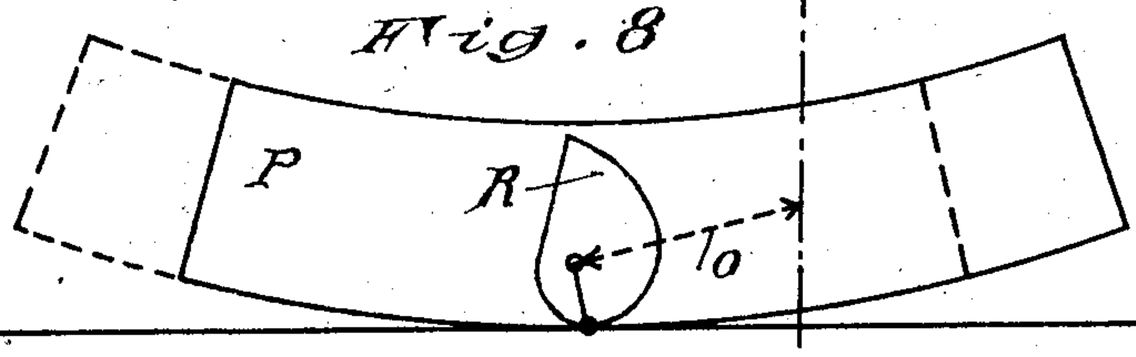



Fig. 8




Inventor: Oswald Pontius

per: Munn & Co

Atty.

Patented Feb. 24, 1925. 1,527,916

# UNITED STATES PATENT OFFICE.

OSWALD PONTIUS, OF MUNICH, GERMANY.

## ROCKING APPARATUS.

Application filed February 27, 1924. Serial No. 695,496.

*To all whom it may concern:*

Be it known that I, OSWALD PONTIUS, a citizen of Germany, residing at Munich, Germany, have invented certain new and useful Improvements in Rocking Apparatus, of which the following is a specification.

My invention relates to apparatus for amusement or exercise, of the kind which is frequently embodied in the form of a toy horse mounted on rockers, and is then called a rocking horse. In referring to my invention as relating to rocking horses and like apparatus I do not, however, mean to convey that the seat on the rockers is necessarily in the form of a horse or other animal. I include in this designation any apparatus having a seat mounted on rockers for the purpose of amusement or exercise.

The object of my invention is to provide an efficient apparatus of this kind which is capable of locomotion, in addition to rocking, and to which locomotion may be imparted by the act of rocking.

Rocking horses have heretofore been designed with this object in view, but without securing satisfactory results. The nearest approach to success has, I believe, been attained by having comparatively large levers pivoted to the rockers, so that in the course of the rocking movement these levers engage the ground and impart propulsion, but the mechanism is noisy, and the locomotion proceeds only in abrupt steps. If a series of small levers is substituted for the large levers, the movement is still accompanied by noise and by abrupt jerks which damage the floor and may be injurious to a child using the apparatus.

My invention overcomes these difficulties by means which are not only highly satisfactory in their effect but are also very simple. I attach to each rocker a series of rollers having tread portions of substantially spiral shape, and these rollers cause the apparatus, in the course of the rocking movements, to roll evenly and smoothly along the floor, steering or deflection also being provided for, by putting the rollers on one or the other side temporarily out of action, which may, for example, be done by pulling a line like a rein. Both forward and rearward propulsion are possible, if the spiral tread portions are duplicated.

The invention is illustrated in the annexed drawings, showing an example in which it is embodied as a rocking horse.

Fig. 1 is an elevation of the apparatus, and

Figs. 2 and 3 are sections, to a larger scale, of a portion of one of the rockers, with one of the rollers and associated mechanism.

Figs. 4 and 5 are diagrams explanatory of the general principle on which the rollers are designed, and

Figs. 6 to 8 illustrate diagrammatically the action of one of the rollers.

It will be seen from Figs. 1, 2 and 3 that the rockers P of the apparatus have series of rollers R pivoted thereto, for limited rotation, the rollers projecting below the bottom edges of the rockers. These rollers are as stated, of a particular kind, as regards shape, in that at least a portion of their tread is substantially spiral, though the shape may be varied within wide limits, and before proceeding to detailed description of the mechanism as a whole, in the example illustrated, I will deal more generally with the design, arrangement and function of the rollers which I use in my invention.

These rollers must, as stated, be capable of partial rotation, and are held in a normal position of rest either by gravity or by some auxiliary device, for example springs, or by gravity assisted by some such device. Normally they occupy this position of rest when raised from the ground by the rockers. Their function is to engage the ground when the rockers descend, and then under the thrust of the rockers to perform a partial rotation whereby the apparatus is propelled. When the rockers rise again, the rollers return to position of rest. The spacing of the rollers in each series depends in part on the size selected and on the curvature of the rockers, which may vary; the general principle on which the spacing should be based to obtain good results will become apparent from the following description.

In regard to the shape of the rollers, I will now refer to the Figs. 4 and 5. In Fig. 4 the segment *a*—*c* and the outer broken line, define the outline of a roller, which is symmetrical in relation to a line *a*—A—*e* passing through the axis A, but Fig. 4 illustrates

also a modification in which only a portion of this outline is incorporated in the roller as will be explained hereinafter. For propulsion in one direction, only a portion of the outline comes into operation, namely the segment *a*, *c*. In a given position of the rocker, approximately as shown in Fig. 6, the point *a* is on the ground, and when the rocker descends the segment *a c* rolls on the ground, like a segment of a wheel, as shown in Fig. 7. The mounting and shape of the roller are such that in the course of the whole movement the line connecting the axis A to the point of contact with the ground is never vertical, but makes with the vertical an angle *x* which remains substantially constant during the rolling movement. This angle *x* must be sufficiently large to give the torque required to make the roller roll, but must not be so large as to allow the roller to slip. In this respect the nature of the roller surface is, of course, a factor, in which due regard is had in selecting the material and fashioning the roller.

A particularly suitable shape for the roller is given by a portion of what is known as a logarithmic spiral. With a curve of this kind, such as shown at *f* in Fig. 5, there is a constant angle *x* between the vertical A—C and the line connecting A with the point of contact B with the ground. Continuing the logarithmic curve upwards from *c*, the curve turns spirally inwards through *d* towards the axis A, but for the example of construction shown in Figs. 6 to 8 only the part *a*—*d*, or thereabouts, is incorporated in the roller, *d* being given by the tangent *a*—*d*. In Fig. 4 the curve is designed for an angle *x* of 15°, and the operative segment is not a perfect spiral. To make a symmetrical roller I add the complementary outline *g* (Fig. 4) and round off the junction, as at *i*. With a symmetrical roller the direction of propulsion can be reversed by altering the position of rest of the roller, and an example of means for so doing will be described hereinafter with reference to Figs. 1 to 3.

With unsymmetrical or mutilated rollers the propulsion is confined in one direction, and with such rollers I may dispense with springs for restoring them to position of rest, the rollers being so shaped or weighted that they return to position of rest by gravity.

In either case the propulsion is smooth and even, and differs largely from the jerky propulsion obtained by the use of levers as hereinbefore referred to.

Before proceeding to detailed description of a specific example of the mechanism, I will set forth briefly the theoretical principles on which the method of propulsion is based.

The propulsion is induced by the fact that at each descent of an elevated portion of the rocker (Figs. 6 to 8) the axis A of each descending roller travels in an inclined plane *o*, the apparatus as a whole making a corresponding downward and forward movement. The operative part of each roller may be regarded as an inclined plane bent round the axis. If the curve *a*, *b*, *c*, *d* be developed as a straight line, and perpendiculars are erected at *a*, *b*, *c* and *d*, equal to *a*, A, *b*, A, *c*, A, and *d*—A, these perpendiculars will terminate in a straight line inclined to *a*—*b*—*c*—*d*, and the roller-axis will move down this line.

Referring to Figs. 6 to 8, when the raised left hand portion of the rocker P descends, and a roller R, still in its normal position of rest, touches the ground, the downward thrust of the rocker tends to shorten the distance between the roller axis and the ground. With a suitably selected angle X the friction with the ground is too great to allow the roller to slip, hence the roller axis must travel forwards and downwards, while the roller rolls on its tread, carrying the apparatus forward. In Figs. 7 and 8 the broken lines *o* represent the paths through which the roller axis travels from the position shown in Fig. 6, while the roller is rotating to the new positions shown in Figs. 7 and 8 respectively. In these figures the broken outlines of the rocker illustrate the conditions arising when the rearward portion of the rocker descends.

It will be understood that for maintaining substantial continuity of propulsion the spacing of the rollers in series must be such that when the propulsive effect of one roller is spent the propulsion is taken up, or continued, by the next roller, in front or rear.

To prevent friction between the ground and those portions of the rockers which are in contact with the ground in front of, or behind, the two rollers in operation for propelling the apparatus, I may depart from the spiral shape, as regards the upper portion of the rollers, and substitute a circular segment *r* as shown in Fig. 4, between the segment *a*—*b*—*c*, and the segment *g*. Resting on this circular portion, after the spiral tread has performed its office, the apparatus is able to roll along with very little friction while the next roller is in operation for propelling it. Alternatively I may provide additional ground rollers, which may be small, and are entirely circular, these being disposed in the intervals between the propelling rollers, or side by side therewith.

I will now describe in detail the specific example shown in Figs. 1 to 3, but desire to point out that many variations of the mechanism may be made without departing from the principle of the invention.

As shown in Fig. 1, the rockers P are provided in pairs, one pair at each side, each

pair carrying a series of rollers R. The two members of which each pair consists are just sufficiently far apart to afford between them adequate space to accommodate easily the rollers R and the mechanism associated therewith. The rollers protrude below the bottom edges of the rockers. Each roller has an axle 1, and the duplication of the rocker members on each side is solely or principally for the purpose of providing a bearing 2 for each end of the axle. With a single rocker member there would, in the absence of some special contrivance or of making the axle extend across to the other side, be only one end bearing for the axle, and I prefer the double bearing shown, for reasons of strength and durability. On the inside of one of the rocker members, there is provided adjacent to each roller a small lever 3, rotatable on a pivot 4, and this lever is connected to the upper part of the roller by an elastic member, such as the spring 5, and a cord 6. The lever has two projections 8 and 9, the former serving for the attachment of the elastic member, and the latter being directed outwards, above the top edge of the rocker member, so that it limits the downward swing of the lever. The elastic member tends to hold the roller in the proper normal position of rest, and to restore it to that position after rotation. The lever can be rotated into two alternative positions, one of which is shown by broken lines in Fig. 2, and in moving from one to the other it moves also the roller. The levers 3 may be connected to each other by means of a cord, attached to their projections 8, so that by pulling the cord they can be rocked collectively from one position to the other. By so rocking the levers 3, different portions of the rollers R are placed in position to engage the ground, and the direction of propulsion is thus reversed. A cord 10 is provided, with a loop forming reins for the rider, two lengths of this cord passing downwards from the horse's bit to eyes near the front ends of the rockers, whence each length of cord extends rearwards along the respective rocker to a coiled spring or equivalent device not shown, attached to the rocker, the purpose of the spring or equivalent device being to allow of moving the cord longitudinally by pulling the reins. Each of the rollers R has a stud 11 connected by a cord 12 to the cord 10, so that by pulling one of the reins the rollers on one side can be rotated partly, to place the circular portions of their circumferences in position to engage the ground. When this is done the rollers on that side are inoperative for propulsion, whereas those on the other side will continue to operate, so that the horse can be made to travel in a curve. If the rollers on one side only are reversed, the horse is made to turn in its tracks. The ends of the cord 10 may be joined together, between the two pairs of rockers, preferably in a manner which enables them to be disconnected easily and quickly; the child is then able to pull both reins, and use them for support, without influencing the rollers.

It will be understood that a great many modifications of detail can be made, and that the invention can be embodied in many forms, ranging from a simple apparatus for slow movement in one direction only to an elaborate apparatus capable of travelling forwards or backwards at a substantial speed and executed with refinements such as ball or roller bearings and rubber tyres on the rollers.

No substantial amount of energy is required for the purposes of propulsion. The friction at the bearings is small, and may in fact be practically eliminated by using ball or roller bearings, and the force required to extend the springs 5, if such springs are used, is also slight, because these springs need not be powerful. With non-symmetrical rollers the springs can be dispensed with, as already stated. The progressive motion is comparatively even and noiseless, because the rollers do not strike the ground perpendicularly, but infringe upon it at an acute angle, so that even without rubber tyres the action is nearly noiseless if the parts are made and assembled with reasonable precision and care.

I claim:—

1. A rocking horse or other rocking apparatus comprising in combination, a rocker and rollers disposed in line along said rocker so as to normally protrude below the latter, said rollers having tread portions conforming approximately to spiral curves and being arranged to roll with their tread portions on the ground, when the apparatus is rocked, and to return to their normal position, when lifted from the ground.

2. A rocking horse or other rocking apparatus comprising in combination, a pair of rockers and rollers disposed in line along said rockers, so as to normally protrude below the latter, said rollers having tread portions conforming approximately to spiral curves and being arranged to roll with their tread portions on the ground, when the apparatus is rocked, and to return to their normal position, when lifted from the ground.

3. A rocking horse or other rocking apparatus comprising in combination, a rocker and rollers disposed in line along said rocker, so as to normally protrude below the latter, said rollers having tread portions conforming approximately to spiral curves and being symmetrical in relation to a line taken through their axes and arranged to roll with their tread portions on the ground, when the

apparatus is rocked, and to return to their normal position when lifted from the ground.

4. A rocking horse or other rocking apparatus comprising in combination, a rocker and rollers disposed in line along said rocker, so as to normally protrude below the latter, said rollers having tread portions conforming approximately to spiral curves and being symmetrical in relation to a line taken through their axes and arranged to roll with their tread portions on the ground, when the apparatus is rocked, and to return to their normal position, when lifted from the ground and means for adjusting said rollers in two alternative positions of rest.

5. A rocking horse or other rocking apparatus comprising in combination, a rocker and rollers disposed in line along said rocker so as to normally protrude below the latter, said rollers having each two tread portions conforming approximately to spiral curves and being arranged to roll with their tread portions on the ground, when the apparatus is rocked, and to return to their normal position, when lifted from the ground.

6. A rocking horse or other rocking apparatus comprising in combination, a rocker and rollers disposed in line along said rocker so as to normally protrude below the latter, said rollers having each two tread portions conforming approximately to spiral curves and being symmetrical in relation to a line taken through their axes and arranged to roll with their tread portions on the ground, when the apparatus is rocked, and to return to their normal position, when lifted from the ground and means for adjusting said rollers in two alternative positions of rest.

7. A rocking horse or other rocking apparatus comprising in combination, a rocker and rollers disposed in line along said rocker so as to normally protrude below the latter, said rollers having tread portions conforming approximately to spiral curves and being symmetrical in relation to a line taken through their axes and arranged to roll with their tread portions on the ground, when the apparatus is rocked, and to return to their normal position, when lifted from the ground and a lever elastically connected to each roller and adapted to be rocked into two alternative positions of rest.

8. A rocking horse or other rocking apparatus comprising in combination, a rocker and rollers disposed in line along said rocker so as to normally protrude below the latter, said rollers having tread portions conforming approximately to spiral curves and being symmetrical in relation to a line taken through their axes and arranged to roll with their tread portions on the ground, when the apparatus is rocked, and to return to their normal position, when lifted from the ground, a lever elastically connected to each roller and adapted to be rocked into two alternative positions of rest and means for collectively rocking the levers of a plurality of rockers.

9. A rocking horse or other rocking apparatus comprising in combination, a rocker and rollers disposed in line along said rocker so as to normally protrude below the latter, said rollers having tread portions conforming approximately to spiral curves and being symmetrical in relation to a line taken through their axes and arranged to roll with their tread portions on the ground, when the apparatus is rocked, and to return to their normal position, when lifted from the ground, a lever elastically connected to each roller and adapted to be rocked into two alternative positions of rest, means for collectively rocking the levers of a plurality of rockers and means for collectively rotating a plurality of rollers so as to move their spiral tread portions out of contact with the ground.

10. A rocking horse or other rocking apparatus comprising in combination, a rocker and rollers disposed in line along said rocker so as to normally protrude below the latter, said rollers having tread portions conforming approximately to spiral curves and being symmetrical in relation to a line taken through their axes and arranged to roll with their tread portions on the ground, when the apparatus is rocked, and to return to their normal position, when lifted from the ground, a lever elastically connected to each roller and adapted to be rocked into two alternative positions of rest, means for collectively rocking the levers of a plurality of rockers and rein-like means for collectively rotating a plurality of rollers so as to move their spiral tread portions out of contact with the ground.

11. A rocking horse or other rocking apparatus comprising in combination, a rocker in two parallel parts and rollers disposed in line intermediate said parts, so as to normally protrude below the latter, said rollers having tread portions conforming approximately to spiral curves and being arranged to roll with their tread portions on the ground, when the apparatus is rocked, and to return to their normal position, when lifted from the ground.

In testimony whereof I affix my signature.

OSWALD PONTIUS.

Witnesses:

ALEXEI PHILIPPOFF,

A. DE SOTO.