

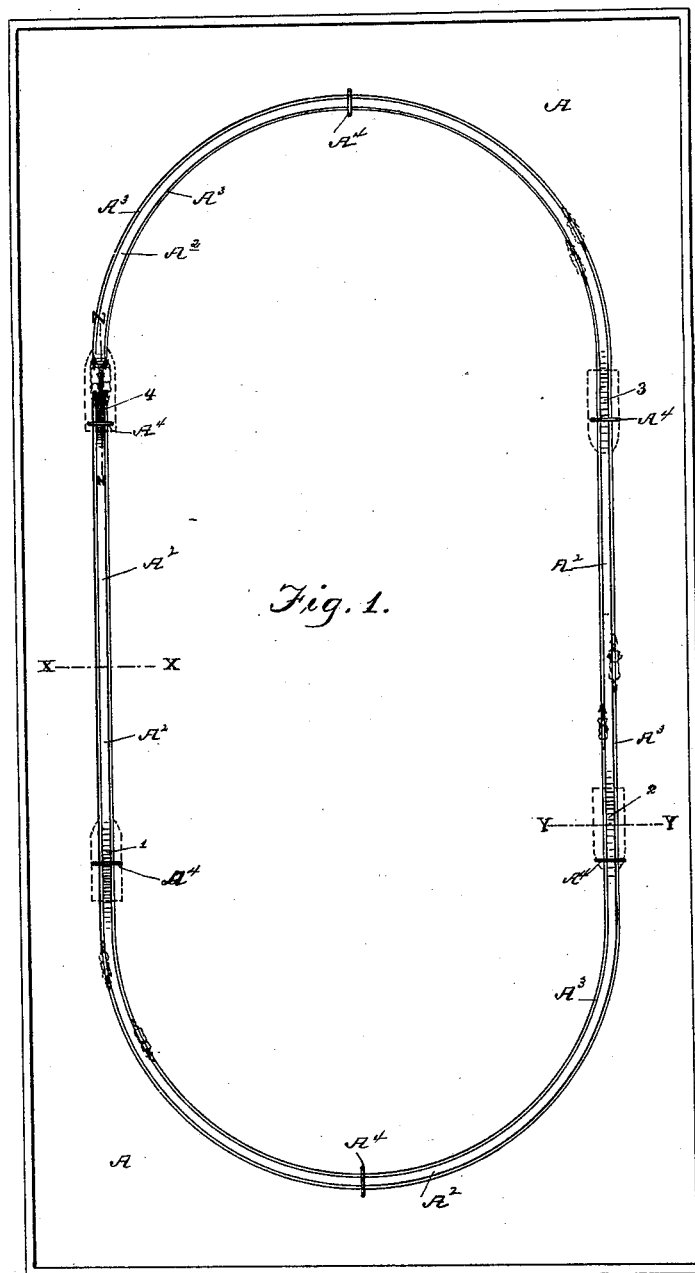
(No Model.)

3 Sheets—Sheet 1.

E. F. MURDOCK.  
TOY.

No. 420,389.

Patented Jan. 28, 1890.



WITNESSES

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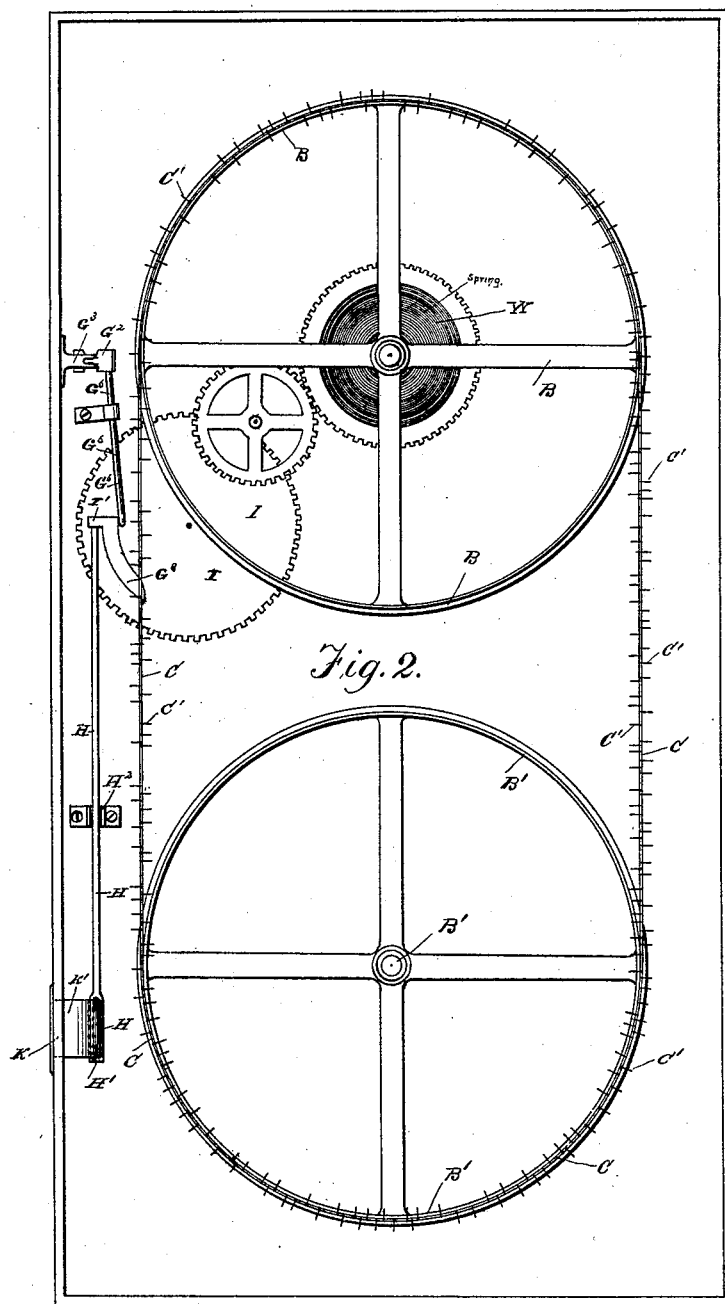
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# UNITED STATES PATENT OFFICE.

EDWIN F. MURDOCK, OF WASHINGTON, DISTRICT OF COLUMBIA.

## TOY.

SPECIFICATION forming part of Letters Patent No. 420,389, dated January 28, 1890.

Application filed June 11, 1889. Serial No. 313,867. (No model.)

*To all whom it may concern:*

Be it known that I, EDWIN F. MURDOCK, a citizen of the United States, and a resident of Washington, District of Columbia, have invented new and useful Improvements in Toys, of which the following is a full and exact description, reference being had to the accompanying drawings, making part of this specification.

My present invention relates to that class of automatic toys in which two or more figures are guided to move through predetermined paths or orbits under the influence of an impelling mechanism in simulation to a racing contest; and it consists primarily in the novel form and composition of the actuating mechanism and the mode of applying the latter so as to engage or control the movements of the figures at intervals during one complete excursion, all as hereinafter fully described, and the novel features pointed out in the claims.

In the drawings illustrating one embodiment of my present improvement, Figure 1 is a plan view of the invention, showing in full lines the position of the figures at the starting-point and in dotted lines their possible positions at three other points on the track. Fig. 2 is a plan view of the invention, showing the driving mechanism, the track and figures being removed, also part of the starting and stopping mechanism. Fig. 3 is an enlarged sectional view on the line *xx* in Fig. 1, showing the manner of engaging the figures and guiding the impelling mechanism. Fig. 4 is an enlarged sectional view on the line *yy* in Fig. 1, showing the deflectors for disengaging the impelling mechanism and figures. Fig. 5 is an enlarged sectional view on the line *zz* of Fig. 1, showing the starting and finishing point of the track. Fig. 6 is an enlarged detail view of the starting and stopping mechanism. Fig. 7 is a detail view showing an alternative means for carrying the figures over the spaces where they are disengaged from the impelling mechanism. Fig. 8 is a side elevation of Fig. 7, also showing means for disengaging the cross-arms from the figures.

The device considered as a whole comprises a number of mechanisms or instrumentalities, each adapted and arranged to perform a dis-

tinct office in the general combination and susceptible of modification in their individual forms without change in their co-operative relation. These several co-ordinate elements are, for convenience of description, designated, first, the figures or other objects representing the contestants; second, guiding mechanism, whereby the path or course of each figure is determined; third, a motor device; fourth, an intermitting impelling mechanism between the motor device or some portion of it and the figures; fifth, a detent mechanism operating upon the motor device to release the latter or set it in motion and after a determined period to re-engage the motor device to arrest the latter preliminary to the next succeeding operation, and, sixth, a starting and stopping mechanism for inaugurating the movement of the figures and arresting them at or near the termination of their course preliminary to the next succeeding excursion.

The figures here shown as horses may be of any form, construction, or material.

The guiding mechanism may be of any desired or approved construction adapted to co-operate with the figures *F* for controlling their respective courses.

In the illustration given the guiding mechanism comprises the tracks or ways *A*<sup>3</sup> and the supporting-rollers *F*, the latter mounted upon or at the base of the figures, together with a dependent arm or rod *F*<sup>2</sup>, fitted to move freely between the tracks. The rollers *F* form the base or support for the figure, while the dependent arm *F*<sup>2</sup>, by its engagement with the sides of the slots formed between the tracks upon which the rollers travel, serves to prevent lateral movement of the figure and as a guide for directing or determining the course or path through which each figure is compelled to pass. When, as is usual, the figure is of light material, a counter weight or balance may be attached to the dependent arm below the track to sustain the figure in upright position and increase the weight of the movable body.

The "motor device," so called, comprises a prime mover—such as a spring *W*, or equivalent device—and a driver, here represented in the form of a belt *C*, the two being connected through suitable intermediate devices, so that the prime mover will operate either

directly or indirectly upon the driver to impel the latter continuously in the same direction. The belt C is supported upon two drums or pulleys B B', the spring being connected to the arbor of the pulley B.

What is herein designated as the "intermitting impelling mechanism" is located or arranged between the driver or belt C and the figures or their support, and it is so constructed as to cause the disengagement of the driver from the figures at regular or irregular intervals during each complete movement of the figures over the designated course and their re-engagement at irregular intervals, which is effected by disconnecting the figures from the driver at predetermined points along the course and subsequently re-engaging at a different portion of the driver. Thus, in the example given the driver C is provided with a series of irregularly-spaced arms C', adapted to engage one of the figures or some portion of its support, there being a series of these arms for each of the figures. The arms C' stand normally in position to engage the figures and impel them along the course, and so long as they remain in this position each figure will move in unison with the driver, and the relative positions of the several figures will be governed by the positions of the arms C' with which they happen to be in engagement; hence if no other means were provided for controlling the connection between the driver and the figures the latter would retain throughout their movement over the course the same relative positions they assumed when first brought in connection with the driver. To obviate this and introduce the element of chance, provision is made for releasing the figures at intervals and causing their re-engagement by another arm in the series, and as these arms are irregularly spaced the intervals occurring between the release and re-engagement of the figures will vary in time, and thus the positions of the figures relative to each other and the driver will be changed from time to time.

One mode of effecting the disengagement and re-engagement of the driver and figures is shown in the drawings, wherein cam-surfaces or deflectors D, located at intervals in the length of the course, operate upon the arms C' to withdraw them from engagement with the figure or its support during a longer or shorter interval, (the time depending upon the length of the deflectors,) leaving the figure to traverse this interval by its inertia and at a diminishing rate of speed. The re-engagement is effected by causing or permitting the arms on the driver to again enter the path traversed by the portion of the figure with which it co-operates, when the figure will be carried on to the next point of disengagement. It will be obvious that while the figure is traversing the space covered by the deflector the driver gains upon it, so that when the re-engagement takes place it will be with one of the arms C in rear of that previously

engaged. It will thus be seen that while in engagement with the driver each figure will be moved at the same rate of speed and occupy a position corresponding with that of the arm with which it is engaged at the time, and when they are released and re-engaged each figure will have lost, as compared with the movement of the driver, a distance equal to the space between the arms from which it was disengaged and the arm by which it is subsequently re-engaged, and as the arms of each series are independently and irregularly spaced the distance thus lost by one figure will differ from that lost by another, so that the figure in advance at the time of disengagement may at the moment of re-engagement occupy the same or a different relative position with respect to the other figures.

When cam-surfaces or deflectors are employed, or when from any other cause the movement given to the figure is insufficient to carry it to the point of re-engagement with the driver, supplemental or additional propelling means may be provided, and in the drawings there are illustrated two varieties, the one consisting of inclines 1 2 3 4, down which the figure is conducted as it approaches the point of re-engagement, and the other shown at Figs. 7 and 8, comprising a spring-arm C<sup>3</sup>, moving in unison with or attached to the driver and provided with a cross-piece or arms projected into the path traversed by the figure or some portion of it, (in the present instance the dependent arm F<sup>3</sup>), said arms C<sup>3</sup> serving to engage and advance the figure should the latter come to a standstill before reaching the point of re-engagement, after which the arms are withdrawn by means of a cam-plate or deflector C<sup>4</sup>, and the figures transferred to the arms C' of their respective series.

From the foregoing description and a consideration of the operation of the impelling mechanism it will be seen that the characteristic features of the intermitting impelling mechanism are the release and re-engagement of each figure by a separate series of impelling devices connected with the main driver, such release and re-engagement occurring at a point or points intermediate the start and finish and serving to effect a transfer from one to another of the impelling devices in each series, thereby positively changing the relative positions of the several figures while traversing the designated course.

The "detent mechanism," so called, operates primarily to start or release the motor mechanism and incidentally to actuate the starting and stopping mechanism. It is here shown, in one of its simplest forms, as a gear-train connected to the motor device and provided with a stop I', arranged to make contact with one end of a lever H for arresting the motor device. The other or lighter end of the lever H has its movement in proximity to a chute K' and is adapted to be depressed, and thus cause the release of the motor de-

vice whenever a weight—such as coin—is introduced through the chute and engages the lever. As soon as the coin is removed or drops from the lever, the latter is returned to its former position, engages the stop, and arrests the motor device. The members of the gear-train are properly proportioned so that in the interval between the release and re-engagement of the stop the figures will be carried through or over the entire course, whether the latter be measured by one or more times around the track.

At the starting-point the figures are maintained normally out of engagement with the impelling mechanism, as by locating one of the deflecting cam-surfaces at that point. It is necessary, therefore, to provide means for starting the figures and causing their engagement with the impelling devices, and thus inaugurate the contest, and when, as in the present instance, the machine is designed to be wholly automatic it is desirable that some means be provided for insuring the stoppage of all the figures at a given point preparatory to the next succeeding contest. The mechanism for performing these operations is herein designated as the "starting" and "stopping" mechanism of the general combination, although, as will presently appear, it may be employed for performing either operation—that is to say, it may be used for stopping alone, other devices being provided for starting, and vice versa. The starting part may consist of any arrangement of devices that will operate to carry the figures from the starting-point forward into engagement with the impelling devices, and in the present instance the incline 4, in conjunction with a rod G, performs this office. The figures, being stationed upon the incline, are carried by gravity against the rod G, where they are retained in position, and by the withdrawal of the rod they are permitted to descend the incline, and are thus brought within the influence of the impelling devices. In the present instance the rod G also serves as a stop for arresting the movement of the figures at the end of the race, it being connected to the motor device through suitable intermediate devices for effecting its withdrawal after the release of said motor device and its return to normal position—that is to say, intersecting the paths traversed by the figures, after the latter have been started on their journey.

In the form shown in the drawings, Fig. 6, the rod G is held normally across the path traversed by the figures and against the tension of a spring G' by means of a lever G<sup>2</sup>, whose upper end plays between stops or shoulders on the rod, while the lower end rests in contact with one end of a lever G<sup>6</sup>, the opposite end G<sup>7</sup> of said lever making contact with a cam-surface G<sup>8</sup> on one member of the gear-train. When the motor device is at rest, the parts are in this position, which they retain until by the movement of the motor device the

cam-surface G<sup>8</sup> passes off the lever G<sup>6</sup>, when the spring G' quickly withdraws the rod G and effects the release of the figures. Before the motor device is arrested the cam-surface G<sup>8</sup> is again brought into engagement with the lever G<sup>6</sup>, and the latter, acting through the lever G<sup>2</sup>, again projects the rod G across the path traversed by the figures and in a position to hold the latter when they arrive at this point.

When the belt form of driver is employed with the arms C' mounted thereon, it is desirable that some means be employed for maintaining said arms in position while traveling in contact with the figures—that is to say, while impelling the figures. This office is performed by the rods or guides E, supported upon brackets E', between which the arms traverse, said guides being cut away or deflected laterally at the disengaging-stations, to permit the arms to be deflected, and thus withdrawn from engagement with the figures.

I claim—

1. In an apparatus such as described, the combination, with the figures and a continuously-operating driver connected to a motor device, of an intermitting impelling mechanism intermediate the figures and prime mover, said impelling mechanism including a series of engaging-arms for each figure and one or more cam-surfaces or deflectors operating to effect the release and re-engagement of the figures at intervals, substantially as described.

2. In an apparatus such as described, the combination, with two or more figures guided to traverse predetermined paths and a motor device provided with a driver, of an intermitting impelling mechanism intermediate the driver and figures, said impelling mechanism being provided with a series of irregularly-spaced engaging-arms for each figure and one or more releasing and re-engaging surfaces located intermediate the extremes of the paths traversed by the figures, substantially as described.

3. In an apparatus such as described, the combination, with the guided figures and the motor device, of an intermitting impelling mechanism intermediate the driver of the motor device and the figures, said impelling mechanism including a series of engaging-arms for each figure and intersecting the path traversed by a part moving in unison with the figure and one or more deflecting-surfaces in the path traversed by the series of arms for temporarily disengaging the latter from the moving figures, substantially as described.

4. In an apparatus such as described, the combination, with the figures and the guiding mechanism therefor, of intermitting impelling mechanism for each figure for alternately releasing and re-engaging the latter, a motor device operating said impelling mech-

anism, and a detent mechanism controlling the starting and stopping of said motor device, substantially as described.

5. In an apparatus such as described, the combination, with two or more separate figures and guiding devices therefor and a continuously-moving driver forming part of the motor device, of an intermitting impelling mechanism, such as described, having a separate series of irregularly-spaced arms for engaging each figure, and one or more releasing-surfaces for each series of arms, substantially as described.

6. In an apparatus such as described, the combination, with a figure and guiding devices for directing its movements in an orbital path, of a rotating driver forming part of the motor device, an intermitting impelling mechanism, such as described, intermediate the driver and figure, and a starting and stopping mechanism, substantially as described.

7. In an apparatus such as described, the combination, with a figure and the guiding devices therefor, of an intermitting impelling mechanism provided with a series of arms arranged to traverse in engagement with the figure to propel the latter, a deflecting cam or surface located at the starting-point and operating to prevent the arm from engaging the figure, a starting device operating to advance the figure and cause it to engage the impelling mechanism, and one or more cams or surfaces between the starting and stopping points engaging the arms of the impelling device to release the figure and cause its re-engagement by another arm, substantially as described.

8. In an apparatus such as described, the combination, with the figure, the intermitting impelling mechanism, the motor device, and a detent mechanism for the latter, of a starting and stopping mechanism operating upon the figure independent of the said impelling devices to start the figure into engagement with the impelling mechanism and to stop the figure when disengaged from the impelling mechanism at the end of the course, substantially as described.

9. In an apparatus such as described, the combination, with a track, of two or more figures mounted on said track, a driving mechanism provided with impelling-arms to engage the said figures, and deflectors to engage and release the said arms from engagement with the figures, substantially as described.

10. In an apparatus such as described, the combination, with a track, of two or more figures mounted on the said track, a driving mechanism provided with impelling-arms to engage the said carriages, and cam-surfaces placed in the path of said impelling-arms for releasing them from engagement with the said figures, substantially as described.

11. In an apparatus such as described, the combination, with a track, of two or more figures mounted on the said track, a driving

mechanism, a continuous belt passing under the said track, impelling-arms attached to the said belt and adapted to engage the said figures, and deflectors to engage and release the said arms temporarily from engagement with the said figures, substantially as described.

12. In an apparatus such as described, the combination, with a track, of two or more figures mounted on the said track, a driving mechanism provided with impelling-arms adapted to engage the said figures, an incline at or near the finishing-point of the track, and a device to retain the figures on the said incline and release them, as desired, substantially as described.

13. In an apparatus such as described, the combination, with a track, of two or more figures mounted on the said track, an incline at or near the finishing-point of the track, a driving mechanism, impelling-arms attached to the driving mechanism at irregular intervals and extending into the path of either figure, and a device to retain the figures on the said incline and release them as desired, substantially as described.

14. In an apparatus such as described, the combination, with a track, of two or more figures mounted on the said track, an incline at the finishing-point of the track, a driving mechanism adapted to engage the said figures upon leaving the incline, a bar adapted to be interposed in the path of the figures on the incline, and mechanism for so interposing the said bar, substantially as described.

15. In an apparatus such as described, the combination, with a track, of two or more figures mounted on the said track, an incline at the finishing-point of the track, a driving mechanism adapted to engage the said figures upon leaving the incline, the bolt G, adapted to be interposed in the path of the figures on the incline, the spring G', the cam G<sup>2</sup>, and suitable connection between the cam and bolt to interpose it in the path of the figures on the incline, substantially as described.

16. In an apparatus such as described, the combination, with a track, of two or more figures mounted on the said track, a driving mechanism, impelling-arms connected to the said mechanism and adapted to engage the said figures, said arms being irregularly placed on the driving mechanism and extending laterally to the opposite side of the member to which they are applied, and deflectors to engage the impelling-arms to temporarily disengage them from the said figures at predetermined intervals, substantially as described.

17. In an apparatus such as described, the combination, with a slotted track, of two or more figures mounted on the said track, a driving mechanism, impelling-arms connected to the said mechanism and adapted to engage the said figures, said arms being irregularly placed on the driving mechanism and extending laterally to opposite sides, devices arranged to disengage the impelling-arms

from the figures through predetermined parts of the track, and devices to convey the said figures over these parts, substantially as described.

5 18. In an apparatus such as described, the combination, with a track, of two or more figures mounted on the said track, a driving mechanism, impelling-arms connected to the said mechanism and adapted to engage the  
10 figures, said arms being irregularly placed on the driving mechanism and extending laterally to opposite sides, devices arranged to disengage the impelling-arms from the figures at predetermined parts of the track,  
15 arms attached to the driving mechanism at intervals, adapted to engage the said figures when disengaged by the impelling-arms to convey them over the parts of the track where such disengagement occurs, and devices  
20 placed in the path of such arms to disengage them from the figures after so conveying them over to said parts of the track, substantially as described.

25 19. In an apparatus such as described, the combination, with a track, of two or more fig-

ures mounted on the said track, a driving mechanism having a flexible belt attached to the driving mechanism and passing under the said tracks, impelling-arms mounted on the said belt at intervals and extending on  
30 opposite sides of the same and adapted to engage the figures, and guide-rods to maintain the arms in position, substantially as described.

20. In an apparatus such as described, the combination, with a track, of two or more figures mounted on the said track, a driving mechanism having a flexible belt attached to the driving mechanism and passing under the said track, impelling-arms mounted on  
40 the belt at intervals on opposite sides of the same, and deflectors adapted to engage the impelling-arms to disengage the same from the figures during parts of the excursion of the same, substantially as described.

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Witnesses:

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