March 3, 1970 A. SCHWARZKOPF 3,498,604

MERRY-GO-ROUND WITH PLURAL ARMS JOINTLY ROTATABLE ABOUT A VERTICAL AXIS AND INDIVIDUALLY ACTIVATABLE IN AUTOMATIC SEQUENCE FOR RISING AND FALLING MOTION

Filed Feb. 14, 1968 3 Sheets-Sheet 1

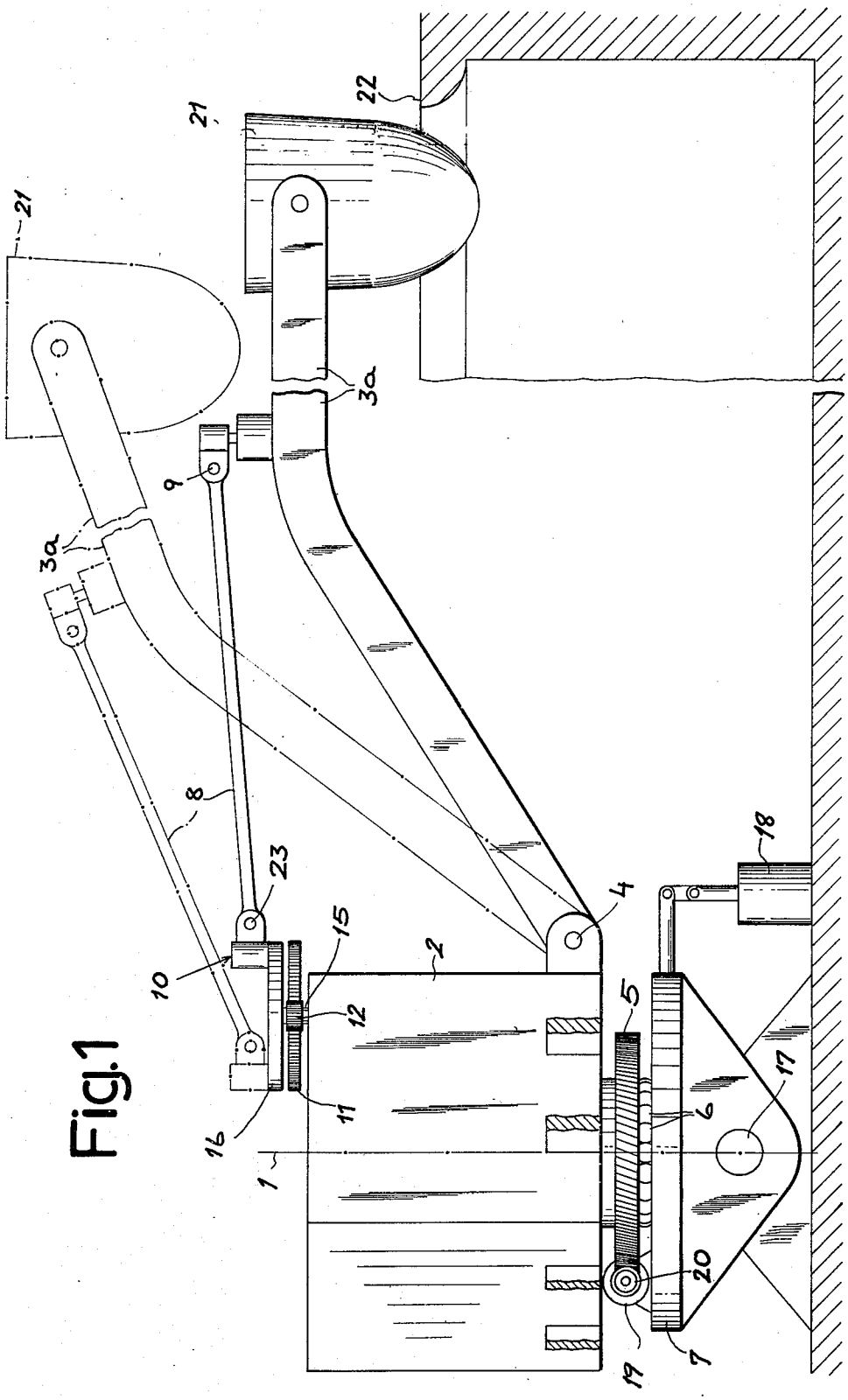

Fig.1

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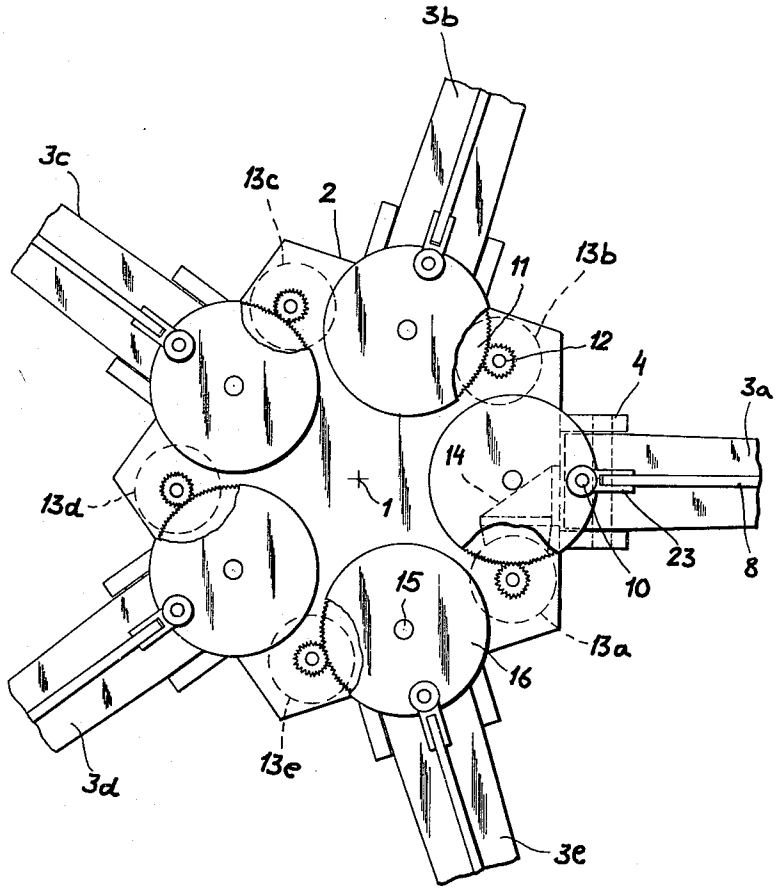

Fig. 2

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Filed Feb. 14, 1968 3 Sheets-Sheet 3

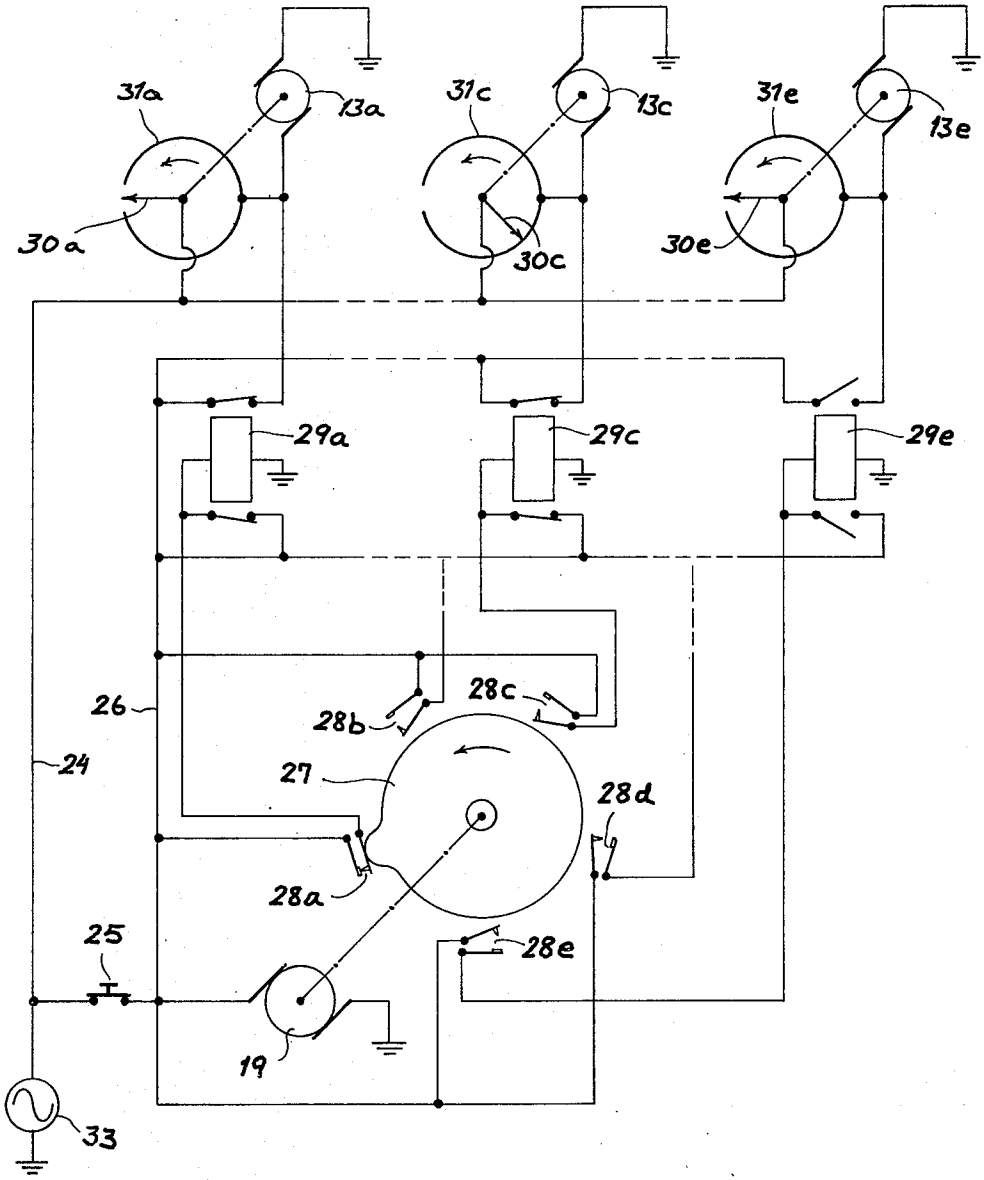

Fig. 3

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MERRY-GO-ROUND WITH PLURAL ARMS JOINTLY ROTATABLE ABOUT A VERTICAL AXIS AND INDIVIDUALLY ACTIVATABLE IN AUTOMATIC SEQUENCE FOR RISING AND FALLING MOTION

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ABSTRACT OF THE DISCLOSURE

Merry-go-round with car at the ends of radial arms extending outwardly from a common hub which rotates about a generally vertical axis, each car also swinging in an axial plane while revolving with the hub. Separate motors individually control the swing of each arm and are sequentially placed in operation at the beginning of a ride; when rotation stops, they are individually stopped as each arm reaches its bottom position in which the cars can be unloaded.

My present invention relates to a merry-go-round of the type wherein a number of passenger cars revolve about a central axis and, at the same time, undergo vertical undulations to simulate riding of waves or travel over hilly terrain. This effect, which adds to the pleasurable experience of carousel rinding, has hitherto been achieved by the use of undulating tracks, e.g. as disclosed in U.S. Patent No. 3,297,319, or through complex linkages between the car-supporting outrigger arms and the central driving mechanism.

One of the problems encountered in such systems is the need for letting each car come to rest at the level of a platform or other type of landing to facilitate the boarding of the cars and the discharge of passengers therefrom. With swingable outrigger arms mounted on a common hub it is necessary either to dispose the several landings at different levels or to provide means insuring a return of each arm to a predetermined level, preferably to its lowermost position, at the end of any ride.

The general object of my invention is to provide improved means for so controlling the vertical oscillations of the several passenger cars of a merry-go-round of this description as to insure their correct positioning at loading level during standstill.

A more particular object of the present invention is to provide means in such merry-go-round for controlling the swing of the individual cars in a more or less random pattern, thereby increasing the excitement of the ride.

These objects are realized, pursuant to the present invention, by the provision of an individual drive for the swinging of each outrigger arm in a substantially radial plane, i.e. an approximately vertical plane which includes or passes close to the central axis of rotation; the individual swing drives of the several arms are independent of one another, and of the central drive, except that the beginning and the end of the swing should approximately coincide with the beginning and the end of rotation of the entire system about its central axis. Thus, the individual swing drives may be sequentially actuated at the start of rotation and arrested at different times as the system comes to a halt, the swing of each arm being stopped just as the car thereof reaches its loading level (e.g. its bottom position). As the several swing drives may operate at different speeds, the pattern of rising and falling motion may be randomly varied.

The invention will be described in greater detail with reference to the accompanying drawing in which:

FIG. 1 is a side-elevational view of the central hub and of the outrigger arms of a multicar carousel according to the invention;

FIG. 2 is a top view of the central part of the system of FIG. 1; and

FIG. 3 is a circuit diagram for the central and individual drives of the system of FIGS. 1 and 2.

The merry-go-round shown in FIGS. 1 and 2 comprises a central hub **2** rotatable about an axis **1** and provided with a nonrotatable base **7** which, if desired, may be swung about a horizontal pivot **17** under the control of, say, a hydraulic jack **18**. At least at the beginning and at the end of each ride, however, the base **7** is assumed to be in its illustrated horizontal position so that the central axis **1** stands vertical. Hub **2** is provided with a bottom disk **5** which is designed as a worm gear and is supported on base **7** through the intermediary of annular ball bearings **6** centered on axis **1**. A motor **19** rotates the worm gear **5** and with it the hub **2** through a worm **20** in mesh therewith, this arrangement permitting the use of high-speed electric motors of relatively low power as part of the central drive.

Hub **2**, shown to be of polygonal (here pentagonal) configuration, is provided with a plurality of outrigger arms **3***a*, **3***b*, **3***c*, **3***d*, **3***e*, each pivoted to a respective side thereof by a corresponding hinge **4**. A passenger car or cabin **21** is pivotally suspended on the free end of each outrigger arm, as particularly illustrated for arm **3***a*, and occupies during standstill of motor **19** the position shown in full lines in FIG. 1 in which the car rests on the level of a loading platform **22**. The vertical position of each outrigger arm is controlled by a linkage which, again as illustrated in detail for the arm **3***a*, includes a rod **8** articulated at **9** to a point of the arm remote from hub **2**. The other end of rod **8** is hinged at **23** to a stud **10** which is freely rotatable on a disk **16** on which it is eccentrically pivoted to form a crank pin; stud **10** and hinge **23** together constitute, in effect, a universal joint between disk **16** and rod **8**. Disk **16** is rigid with a spur gear **11** engaged by a pinion **12**, and is rotatably journaled at **15** on the hub **2**.

Associated with each outrigger arm **3***a*–**3***e* is an individual drive motor **13***a*, **13***b*, **13***c*, **13***d*, **13***e* which is mounted within the hub by a bracket **14** and has an upwardly projecting shaft carrying the respective pinion **12**. In the standstill position illustrated in FIGS. 1 and 2, the joints **10** are all disposed at their greatest distance from axis **1** so that the arms **3***a* etc. are at bottom level and the cars **21** confront the platform **22** which may form a common landing around the entire carousel. When power is applied to the system, motor **19** is energized and hub **2** begins to turn along with its cars **21**. Thereafter, the individual motors **13***a*–**13***e* are successively actuated to begin the vertical swing of the outrigger arms in staggered relationship. FIG. 1 illustrates the elevated position of arm **3***a* in dot-dash lines. At the end of the ride, motor **19** is disconnected and motors **13***a*–**13***e* cut out one by one as the respective cars **21** return to their bottom position.

In FIG. 3 I have shown a representative circuit arrangement for carrying out the sequence of operation just described. A source of operating current, indicated diagrammatically at **33**, constantly energizes a main bus bar **24** which, upon closure of a main switch **25**, is tied to an auxiliary bus bar **26** forming part of the operating circuit of motor **19**. The motor then entrains, preferably via a step-down transmission not shown, a cam **27** associated with five pairs of switch contacts **28***a*, **28***b*, **28***c*, **28***d*, **28***e*. These contacts, when closed

in different angular positions of hub **1** (FIGS. 1 and 2), energize respective relays of which only three, designated **29***a*, **29***c* and **29***e*, have been illustrated; each of these relays, in its turn, controls the operation of a respective swing motor **13***a* etc., only the motors **13***a*, **13***c* and **13***e* having been shown in FIG. 3.

It will be assumed that switch **25** has been just closed and that cam **27** has completed less than a full revolution, having briefly closed contacts **28***c* at the beginning of its sweep. This has energized the relay **29***c* which, through its lower armature, has locked to auxiliary bus bar **26** and has attracted its upper armature to operate the associated motor **13***c*. It will be noted that each of motors **13***a*, **13***c* and **13***e* is provided with an associated wiper **30***a*, **30***c* and **30***e* cooperating with a respective contact **31***a*, **31***c* and **31***e* each tied to one motor terminal. As long as these motors are at rest, the associated wipers are aligned with the gaps of their homing arcs, as illustrated for the wiper **30***a*, whose relay **29***a* has just been energized by closure of contacts **28***a*, as well as for wiper **30***e* associated with the as yet unoperated relay **29***e*; these wipers are also connected to bus bar **24** so that, in their off-normal positions, they complete an alternate energizing circuit for the corresponding motor. This alternate circuit is, however, ineffectual as long as the corresponding relay **29***a* etc. remains locked. After the switch **25** has been opened by the attendant or automatically to terminate the ride with resulting de-energization of main motor **19**, the holding circuits of all the relays **29***a*–**29***e* are broken so that motors **13***a*-**13***e* remain energizing only through their respective holding circuits until the wipers **30***a*–**30***e* register with the gaps of their contact arcs **31***a*–**31***e*. These wiper positions, generally reached at different times, coincide with the bottom positions of the respective outrigger arms.

Cam **27** is representative of a variety of means for consecutively starting the several swing motors **13***a* etc. If desired, these motors could also be energized by hand, either from within each passenger car or centrally by the operator.

I claim:

1. A merry-go-round comprising a central hub rotatable about a generally vertical axis; a plurality of outrigger arms extending radially from said hub in different directions, each arm being pivotally mounted on said hub for swinging in a substantially radial plane; central drive means for rotating said hub about said axis; a passenger car at the free end of each of said arms; stationary landing means for loading and unloading each passenger car during standstill of said central drive means; and individual drive means for raising and lowering each of said arms during operation of said central drive means; each of said individual drive means being provided with independent control circuitry effective upon termination of rotation of said hub for arresting the respective arm in a position in which the passenger car thereof lies substantially level with said landing means; said control circuitry including energizing means operative upon beginning rotation of said hub for sequentially starting said individual drive means.

2. A merry-go-round as defined in claim **1** wherein said individual drive means includes a crank member for each arm on said hub and elongated link means connecting said crank member with a point of the associated arm remote from said hub.

3. A merry-go-around as defined in claim **2** wherein said individual drive means further comprises a gear rigid with said crank member, a pinion in mesh with said gear and a motor for rotating said pinion.

4. A merry-go-round as defined in claim **3** wherein said crank member comprises a disk adjoining said gear and a universal joint eccentrically disposed on said disk in engagement with an end of said link.

5. A merry-go-round comprising a central hub rotatable about a generally vertical axis; a plurality of outrigger arms extending radially from said hub in different directions, each arm being pivotally mounted on said hub for swinging in a substantially radial plane; central drive means for rotating said hub about said axis; a passenger car at the free end of each of said arms; stationary landing means for loading and unloading each passenger car during standstill of said central drive means; and individual drive means for raising and lowering each of said arms during operation of said central drive means, each of said individual drive means being provided with independent control circuitry effective upon termination of rotation of said hub for arresting the respective arm in a position in which the passenger car thereof lies substantially level with said landing means; said individual drive means including a crank member for each arm on said hub and elongated link means connecting said crank member with a point of the associated arm remote from said hub.

6. A merry-go-round as defined in claim **5** wherein said control circuitry includes energizing means operative upon beginning rotation of said hub for sequentially starting said individual drive means.

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