Jan. 26, 1960 D. E. BRADLEY, JR 2,922,648

AMUSEMENT RIDE

Filed July 2, 1956 2 Sheets-Sheet 1

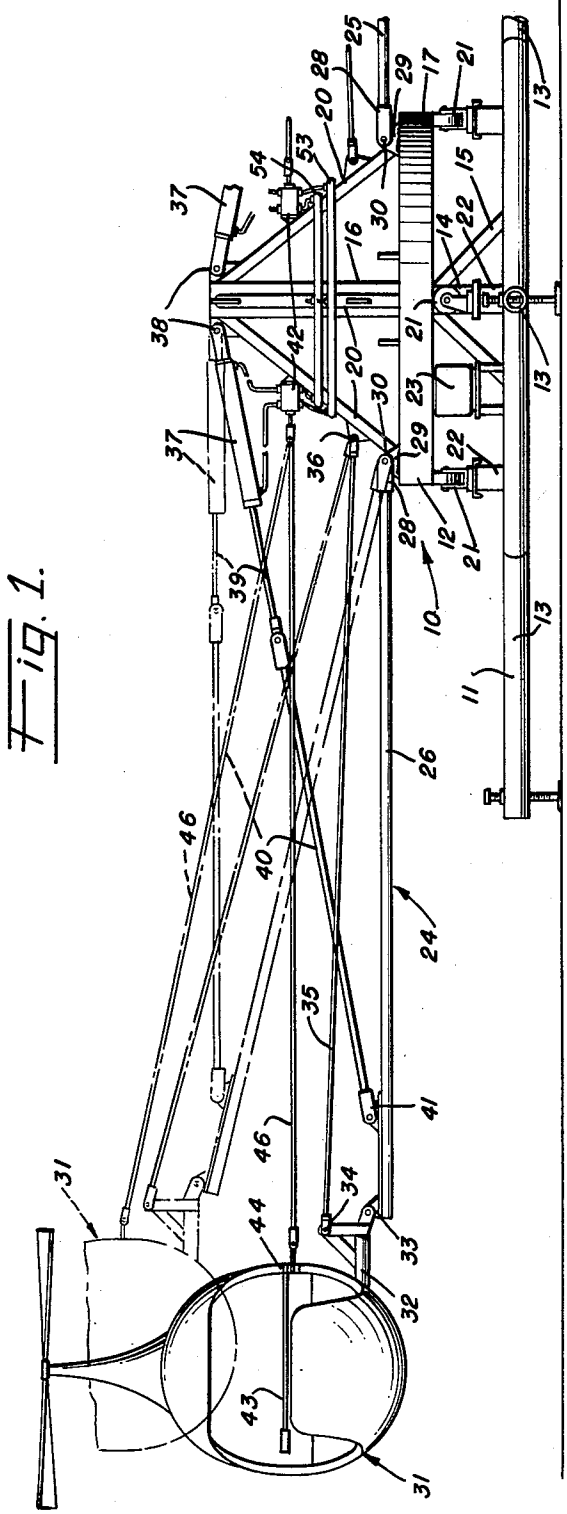

Fig. 1.

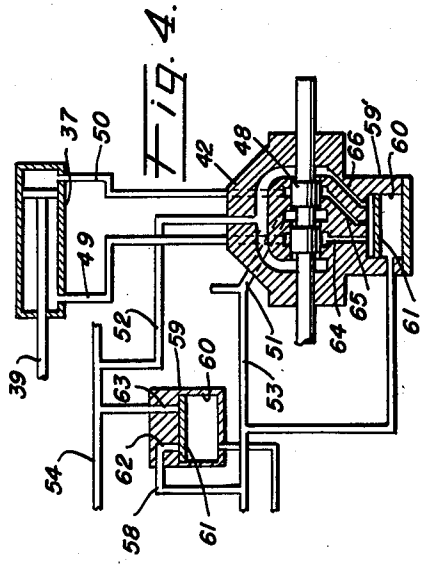

Fig. 4.

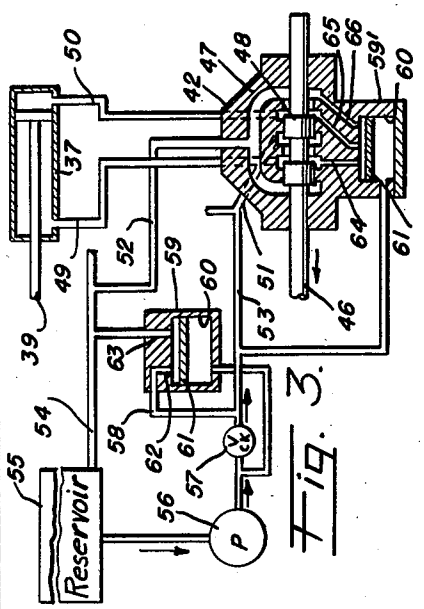

Fig. 3.

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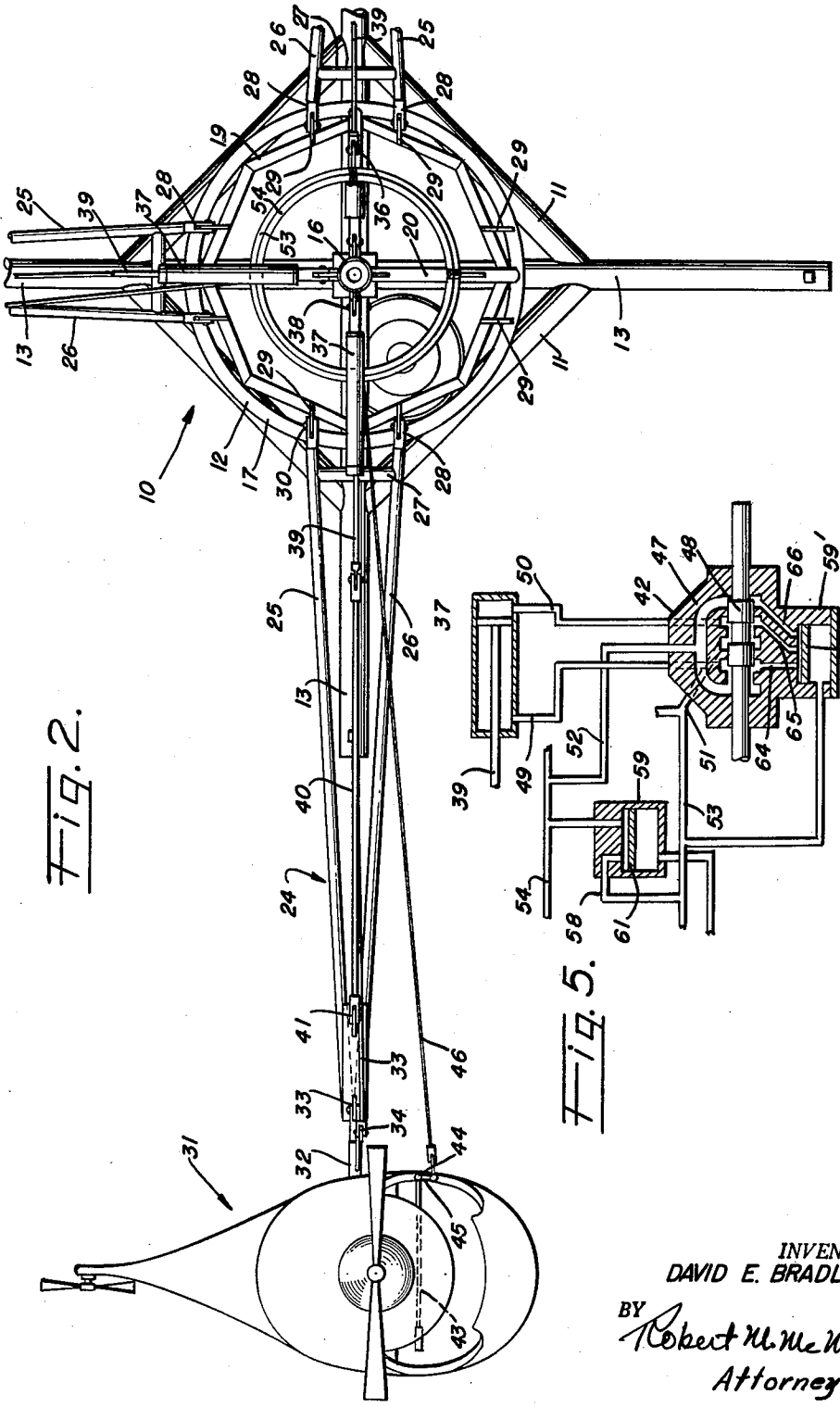

Fig. 2.

Fig. 5.

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AMUSEMENT RIDE

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The present invention relates generally to an amusement device, and is more particularly concerned with an amusement ride in which the passengers are carried in a carriage or gondola shaped to simulate an aircraft, such as, for example, a helicopter.

It is one object of the invention to provide in a device of the above character, an individual support for each gondola, which is arranged to be actuated by its own power means, under the control of the passenger in the gondola, so as to cause the gondola to remain at a constant elevation or move to an elevated or lowered position as desired.

It is a further object to provide in addition to the individually operable controls for each gondola, an overriding control which will act automatically under certain conditions to return all the gondolas to a lower position irrespective of the operating position of the individual controls.

Further objects of the invention will be brought out in the following part of the specification, wherein detailed description is for the purpose of fully disclosing the invention without placing limitations thereon.

Referring to the accompanying drawings, which are for illustrative purposes only:

Fig. 1 is a fragmentary elevational view of apparatus embodying the present invention;

Fig. 2 is a fragmentary plan view of the same; and

Figs. 3, 4 and 5 are views diagrammatically illustrating the control means for the respective operating positions thereof.

Referring more specifically to the drawings, for illustrative purposes, the apparatus is disclosed as embodying an upstanding framework as generally indicated at **10**, and which is composed of a lower fixedly mounted base structure **11**, and a surmounting rotatably mounted upper portion **12**.

The base portion is made up of a plurality of ground rails **13** which are adapted to extend over the ground surface and form a stable support for a central upstanding pedestal **14**, and which may be further braced by angle bracing members **15**.

The rotatable upper portion of the framework is fabricated to include a central tubular sleeve **16** which is rotatably mounted on the upper end of the pedestal **14**. At the lowermost end of the sleeve **16**, a ring member **17** is secured to the central sleeve **16** in concentric relation for rotational movement therewith by means of appropriate structural members which are arranged to provide the required rigidity and strength. In addition, the ring member may be further retained in position by means of a plurality of angularly inclined bracing members **20** which are shown as extending from the upper side of the ring and are inclined to bring their upper ends into engagement with the upper end of the central tubular sleeve **16** where they are welded or otherwise suitably secured. The rotatable upper portion as thus far described forms in effect a rotatable hub of more or less skeletal construction with the ring member **17** forming

a circumferentially extending rail which is further supported and stabilized in its rotational movement by a plurality of castors **21** which are pivotally mounted on post members **22** carried by the base portion **10**. While only one castor is shown in position to form a rolling support for the ring **17**, it is to be understood that a plurality of castors **21** may be utilized, in which case they will be symmetrically spaced to support the ring **17** at circumferentially spaced intervals. The upper portion is arranged to be rotated by means of a suitable motor **23** which will be connected with a suitable source of electric supply and appropriate control apparatus (not shown). This motor is connected through a suitable transmission to the upper portion **12** so as to impart rotation thereto at the desired speed or speeds.

A plurality of radially extending boom structures **24** are secured around the upper portion **12** and pivotally connected thereto for vertical swinging movements. As shown, the booms are of generally A-type construction, being formed by a pair of side rails **25** and **26** which are radially converged from the rotatable upper portion and secured together at their outermost ends by any suitable conventional means. The innermost ends of the rails **25** and **26** are in spaced apart relation and are secured to a spacer member **27** as by welding or other suitable means. The innermost ends of the rails **25** and **26** project beyond the spacer member **27** and are respectively fitted with coupling members **28—28** by which the rails are pivotally connected to lugs **29** by a pivot **30** in each case to permit vertical swinging movements of the boom as indicated in dotted lines in Fig. 1.

Each boom carries at its outermost end a passenger carrying gondola, as generally indicated at **31**, and which is shaped to simulate a helicopter. The gondola **31** is provided with a supporting structure which includes a strut member **32** which projects from one side of the helicopter and is pivotally connected at its outermost end by suitable pivot means **33** to the outermost end of the boom. As thus connected, the gondola is pivotally movable about a horizontal axis formed by the pivot means **33**. To control the position or attitude of the gondola and retain it in the same attitude in the raised and lowered positions of the boom, means are provided for automatically shifting the support **32** about the pivot means **33** during changes of position of the boom. This is accomplished by providing an upwardly projecting arm **34** which is rigidly secured at its lowermost end to the strut **32**, and is pivotally connected at its upper end to one end of an elongate rod member **35**, this rod member having its other end pivotally connected at **36** to one of the bracing members **20** of the rotatable upper portion **12** of the central frame. A parallelogram is thus provided which will cause the aircraft to maintain a constant upright nontilted attitude as the boom **24** is raised and lowered.

Each boom is provided with its own power means for effecting raising and lowering movements thereof. For this purpose, a hydraulic cylinder **37** is mounted with one end pivoted at **38** to the uppermost end of the sleeve **16**, or to the upper end of one of the brace members **20**. This cylinder has a power delivery member **39** associated with a piston in the cylinder. The power delivery member is connected to one end of a rod **40**, this rod having its other end pivotally connected at **41** to the boom at a point adjacent its outermost end. The cylinder **37** is of the double acting type so that when fluid is supplied to one end of the cylinder, the power delivery member will be retracted and will act to raise the boom, while supply of fluid to the opposite end of the cylinder **37** will extend the power delivery member **39** and operate to lower the boom. It will thus be apparent that by the provision of suitable control for the cylinder fluid, the boom may be raised and lowered as desired.

The hydraulic cylinders 37 are individually controlled in each case by a suitable valve 42, in this instance a four-way valve. The valve is arranged to be remotely actuated from the gondola at the outermost end of the associated boom 24. For this purpose, there is provided an elongate control stick or handle 43 which is pivotally mounted as at 44 at one side of the gondola for horizontal swinging movement. As thus provided, the handle extends across the front of the gondola and also forms a safety barrier which extends in front of the passenger. The pivoted end of the handle 43 has a right angled arm 45 which is connected to one end of an actuating rod 46 which is connected at its other end with the actuating mechanism of the valve 42. As thus connected, the handle 43 may be selectively moved to three positions to actuate the valve to operating positions corresponding with "up," "neutral" and "down" positions of the boom. Individual control of the gondola is thus permitted by the gondola passenger. The control of the respective gondolas is independent and one passenger may move his gondola to a raised position while another passenger may control his gondola to a lowered position of the boom while others may desire to simply ride in the same plane of elevation.

As a safety feature, and in order that all gondolas will be returned to a lowered position of the boom, when rotational movement of the ride is terminated, an overriding control is provided which will operate irrespective of the position of a valve 42 as determined by the gondola passenger. One problem with amusement rides of this character resides in the desire of the passenger, particularly in the case of children, to stop the gondola in the raised position so that they will not have to disembark and will be forced to be carried for the next ride. With the overriding control, all the gondolas will be lowered at the end of the ride and the individual passengers will be unable to set the control so that they will not have to disembark. The overriding control as will shortly be explained in detail, also serves as a safety feature, since all the gondola booms will be lowered in the event of electric power failure.

Referring now to Figs. 3, 4 and 5, the details of the control will be described.

Each valve 42, in this case of the four-way type, comprises a housing 47 which has a valve spool 48 reciprocably mounted therein and cooperatively associated with cored passageways which are cooperatively associated in conventional manner to control the actuation of the hydraulic cylinder 37. The valve is connected through conduits 49 and 50 with the opposite ends of the cylinder 37, and through conduits 51 and 52 respectively with a pressure manifold 53 and an exhaust manifold 54. All the valves for the power cylinders are connected to the pressure manifold and exhaust manifold which thus serves to provide and circulate a hydraulic fluid from a pressure source. The hydraulic fluid is contained in a reservoir 55 which is connected to the exhaust manifold in such a way that it may supply fluid to the manifold under certain conditions of operation and receive fluid from the manifold under other conditions. Fluid is pumped from the reservoir by means of a suitable pump 56 which has its discharge side connected through a check valve 57 with the pressure manifold, this check valve preventing back flow from the pressure manifold to the pump. The fluid pump is of conventional construction and is driven by suitable electric motor (not shown).

In addition, a control valve 59 is associated with a bypass 58. This control valve comprises a housing containing a valve cavity 60 within which there is mounted a valve disc 61. The cavity on one side of the valve disc communicates through port passages 62 and 63 with the pressure manifold and the exhaust manifold respectively, while the cavity on the other side of the valve communicates with the pressure manifold ahead of the check valve where no pressure exists except when pump is in operation. The valve disc is overbalanced in a closing direction. As thus arranged, when pressure exists in the pressure manifold, the valve disc will be moved so as to close off the port passages 62 and 63 and thus prevent flow through the manifold bypass 58, whereas decrease of pressure in the pressure manifold results in an opening of the port passages 62 and 63 and the establishment of flow through the manifold bypass.

A similar valve 59′ is associated with each of the valves 42. This disc valve differs only in that it is provided on one side with three port passages 64, 65 and 66, respectively, instead of two port passages, and is connected on the other side to the pressure manifold after the check valve. The port passage 64 connects the cavity on one side of the disc 61 with the conduit connection 49 within the control valve housing, while port passages 65 connects the cavity with the conduit 50 and port passage 66 connects the cavity with the exhaust manifold connection.

During normal operation, when pressure is supplied to the pressure manifold by the pump operation, the valves 59 and 59′ will be actuated by the fluid pressure so as to close the bypass 58 and the bypasses through the port passages 64, 65 and 66, so that the valves 42 will operate in conventional manner to control the hydraulic cylinder 37 for each boom in the manner determined by the passenger in the associated gondola. However, in the event of power failure and stoppage of the hydraulic fluid pump 56, the valves 59 and 59′ operate to provide an overriding bleed-down control which will return the booms to down position irrespective of the position of the four-way valve spool as determined by the person in the car or gondola. From an inspection of Fig. 3, it will be appreciated that the weight of the boom, the gondola and passengers will act on the member 39 so as to move it to the left as shown in Figs. 3, 4 or 5. This will set up a back pressure which acts through the system, as will hereinafter be explained, when the fluid pump 56 is shut down. Also, it will be apparent that there is a volume differential existing between the opposite sides of the piston in the cylinder 37 due to the piston rod being secured on one side of the piston only. It therefore becomes necessary in the transfer of fluid from one side of the piston to the other to make up for this volume differential.

For purposes of explanation, the operation of the overriding control will now be considered for the three different positions of the valve spool, namely for the "up," "neutral" and the "down" settings of the valve.

In the "up" position as shown in Fig. 3, fluid will flow from the left side of the piston through conduit 49, directly through the valve body and conduit 51 to the pressure manifold 53, thence through the bypass 58 to the exhaust manifold, from the exhaust manifold through conduit 52, directly through the valve body to conduit 50 and thence to the right side of the piston in the hydraulic cylinder 37. The volume differential during this transfer will be made up by the supply of the additionally required fluid from the reservoir through the exhaust manifold. There will be very little transfer of hydraulic fluid through the port passages 64, 65 and 66 under this condition of operation. This transfer of fluid will permit the boom connected to the hydraulic cylinder 37 to gradually settle to its lowermost position.

In the "neutral" position as shown in Fig. 4, fluid transfer will take place from the left side of the piston, through conduit 49, the port passage 64, port passage 65, and thence through conduit 50 to the right side of the piston. The volume differential will in this case be supplied from the exhaust manifold, through conduit 52, and through port passage 66 to supplement the fluid flow through port passage 65 and conduit 50 to the right side of the piston.

In the "down" position as shown in Fig. 5, the trans-

fer of fluid from the left side of the piston will take place through conduit **49**, the conduit **52**, bypass **58**, conduit **53**, conduit **51** through the valve **42** and thence through conduit **50** to the right side of the piston. Fluid from conduit **49** will also flow through a parallel path through port passage **66**, port passage **65**, and thence to conduit **50** and the right side of the piston. The difference in volume will be supplied from the exhaust manifold.

Various modifications may suggest themselves to those skilled in the art without departing from the spirit of my invention, and hence, I do not wish to be restricted to the specific form shown or uses mentioned, except to the extent indicated in the appended claims.

I claim:

1. The combination, comprising: a boom pivoted at one end for vertical swinging movements; means for actuating said boom including a hydraulic cylinder and piston; a fluid reservoir; an exhaust manifold connected to discharge fluid into said reservoir and receive fluid therefrom; a fluid supply manifold; a fluid pump having an inlet connection with said reservoir and an outlet connection with said supply manifold; a check valve in the outlet connection of said pump; conduits respectively connected with the opposite ends of said hydraulic cylinder; main valve means operable to reversibly connect said exhaust and supply manifolds with said conduits to raise and lower said boom, said valve means further having a "neutral" position; a bypass connection between said manifolds; a bypass connection between said conduits and said exhaust manifold; valves in said bypass connections operable by fluid pressure in said supply manifold to close said bypasses, and upon reduction of fluid pressure in said manifold to open said bypasses, whereby interchange of fluid is permitted from one side of the piston to the other and volume difference of fluid supplied from said reservoir to enable lowering of the boom from a raised position under the action of gravity, irrespective of the position of said main valve means.

2. The combination, comprising: an upstanding framework mounted for rotation about a vertical axis; a plurality of booms, each boom being pivoted at one end on said framework for vertical swinging movements; means for independently actuating said booms including a hydraulic cylinder and piston for each boom; a fluid reservoir; an exhaust manifold connected to discharge fluid into said reservoir and receive fluid therefrom; a fluid supply manifold; a fluid pump having an inlet connection with said reservoir and an outlet connection with said supply manifold; a check valve in the outlet connection of said pump; conduits respectively connected with the opposite ends of each of said hydraulic cylinder; main valves independently operable to reversibly connect said exhaust and supply manifolds with said conduits of the respective hydraulic cylinders to raise and lower the associated boom, said valves further having a "neutral" position; a bypass connected between said manifolds; a bypass connection between said conduits and said exhaust manifold; valves in said bypass connections operable by fluid pressure in said supply manifold to close said bypasses, and upon reduction of fluid pressure in said manifold to open said bypasses, whereby interchange of fluid is permitted from one side of the piston in each cylinder to the other, and volume difference of fluid supplied from said reservoir to enable lowering of all the booms from a raised position under the action of gravity, irrespective of the position of each main valve.

3. In an amusement ride, the combination comprising a framework, a boom carried by said framework and pivoted thereto at its inner end for vertical swinging movement, means comprising a hydraulic cylinder and piston slideable therein operatively connected between said boom and framework to effect said vertical swinging movement, said boom being biased downwardly by gravity against the lifting force of said hydraulic cylinder and piston means, means connectable to a source of pressure fluid and including a manually operable valve for selectively controlling the flow of pressure fluid to and from opposite sides of the piston in said hydraulic cylinder to raise and lower said boom, fluid conducting means to bypass said valve to provide for relative adjustment of the fluid pressure on opposite sides of the piston in said hydraulic cylinder to permit said boom to move downwardly by gravity when said bypass means is open regardless of the position of said valve, and means operable independently of said valve to control the opening and closing of said bypass means, said independently operable means including a valve and means to effect automatic opening of said last named valve in response to removal of pressure from the fluid pressure source.

4. An apparatus as recited in claim 3 including a passenger carrying gondola mounted on the outer end of said boom and means positioned in said gondola for operation by the passenger to control said manually operable valve.

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