Dec. 2, 1958 F. A. BLASHFIELD 2,862,392

ROCKING BED AND CAM CONTROL MECHANISM

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Fig. 1

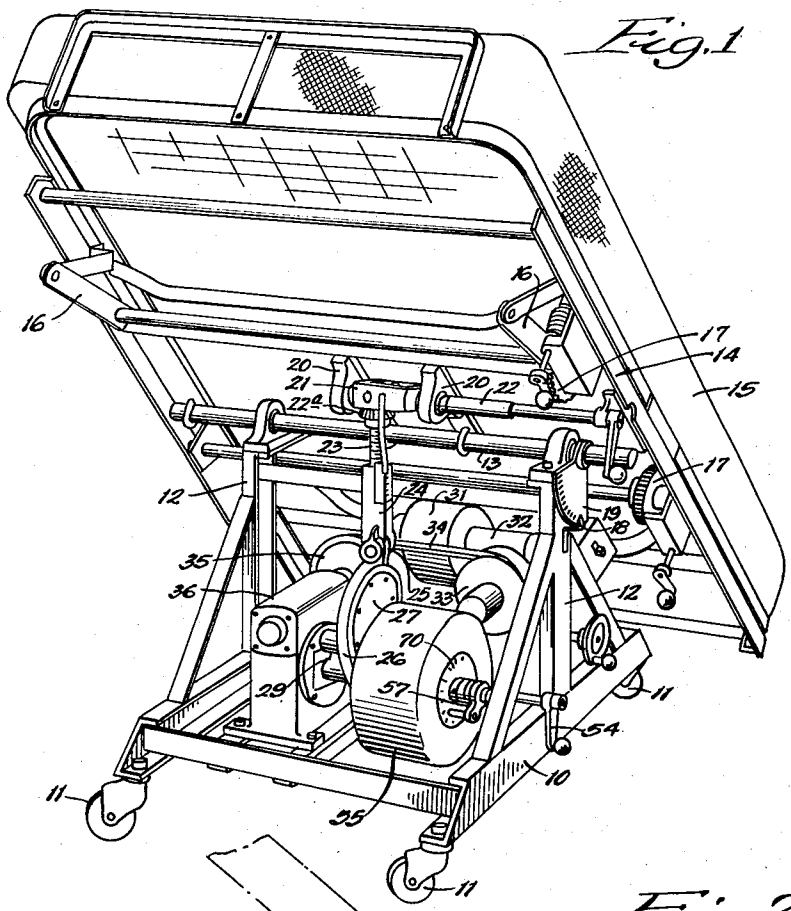

Fig. 2

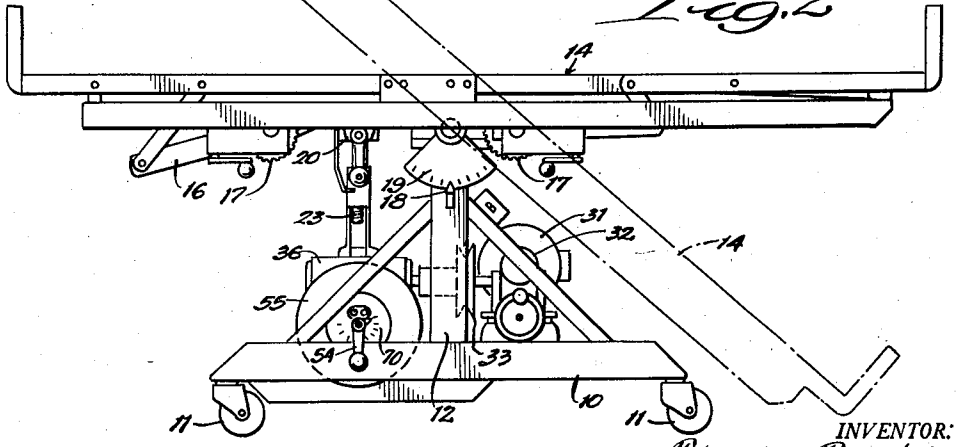

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Fig. 3

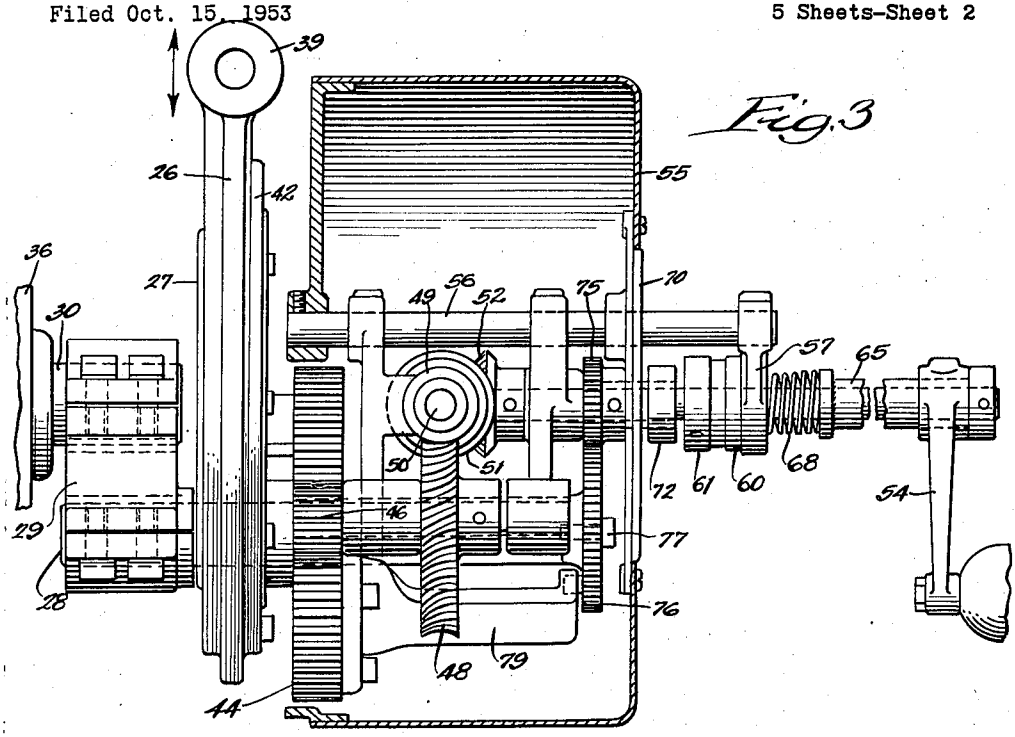
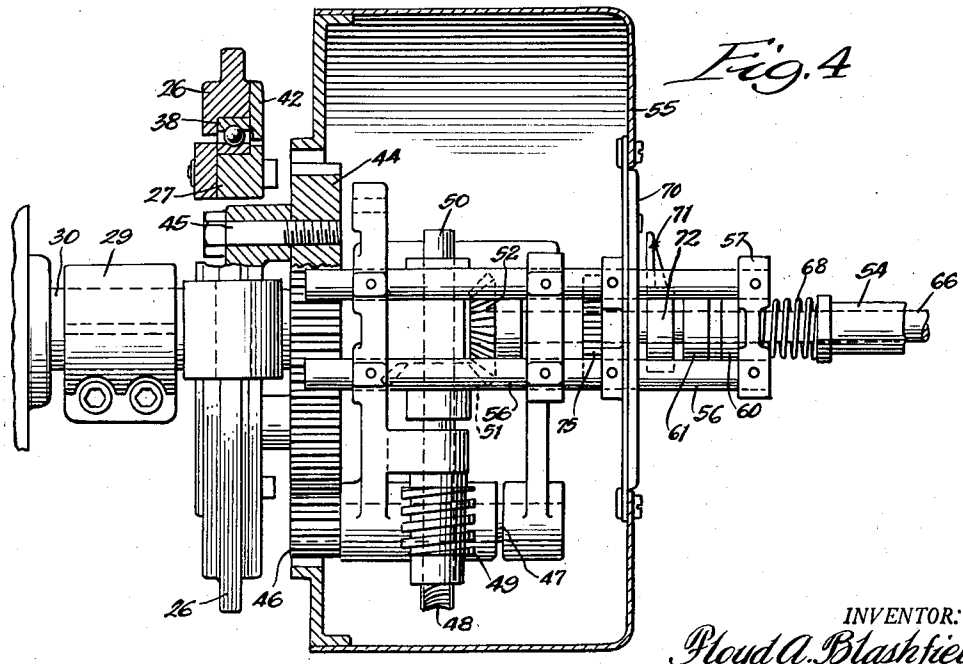


Fig. 4



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ROCKING BED AND CAM CONTROL MECHANISM

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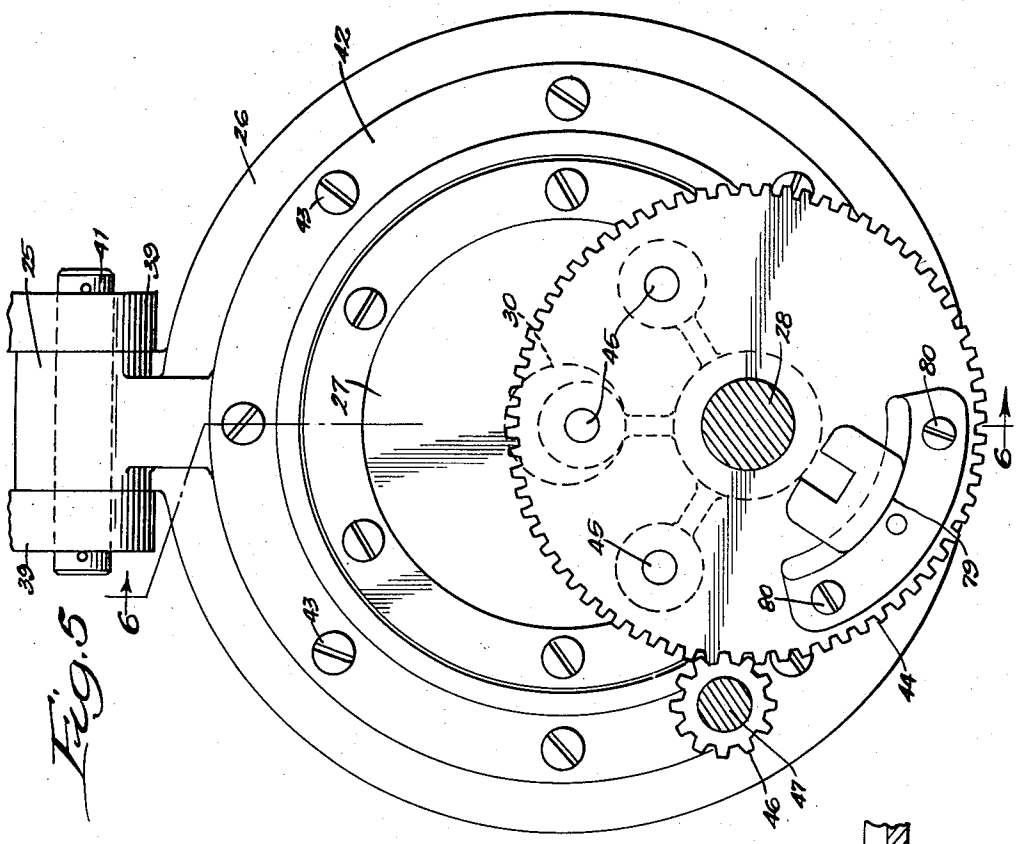

Fig. 5

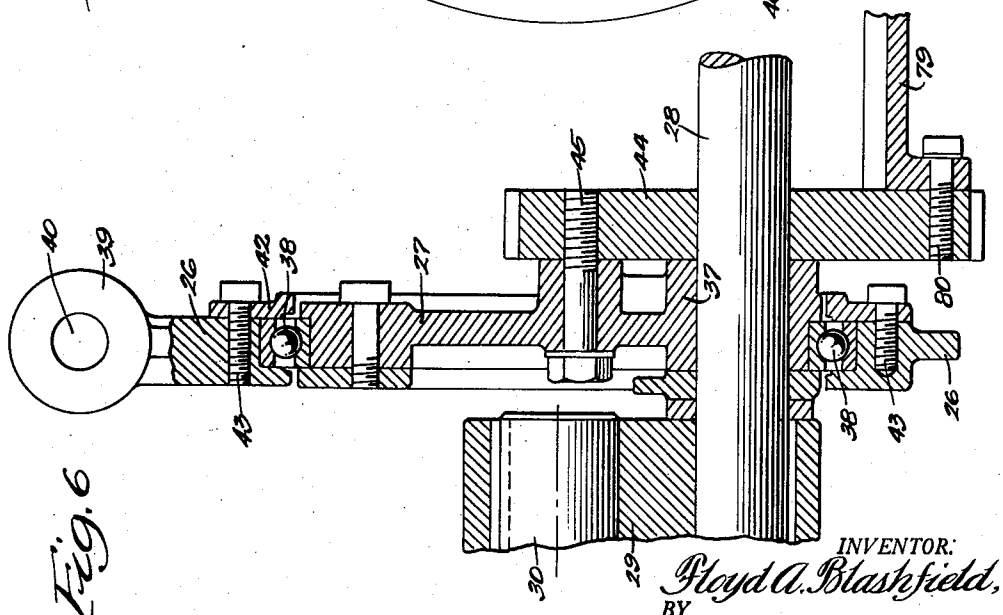

Fig. 6

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ROCKING BED AND CAM CONTROL MECHANISM

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Fig. 7

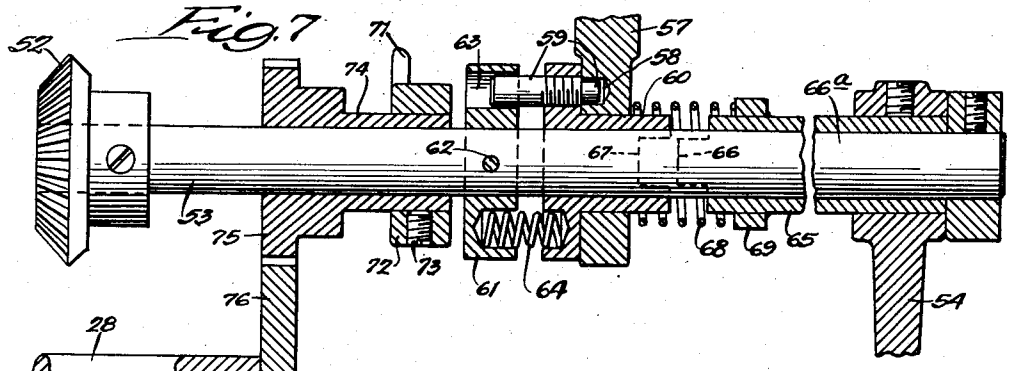

Fig. 8

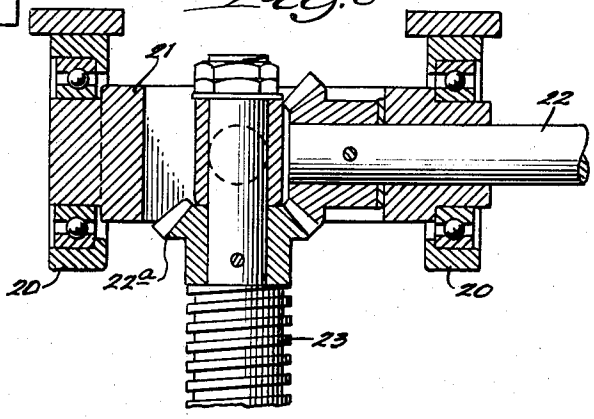

Fig. 9

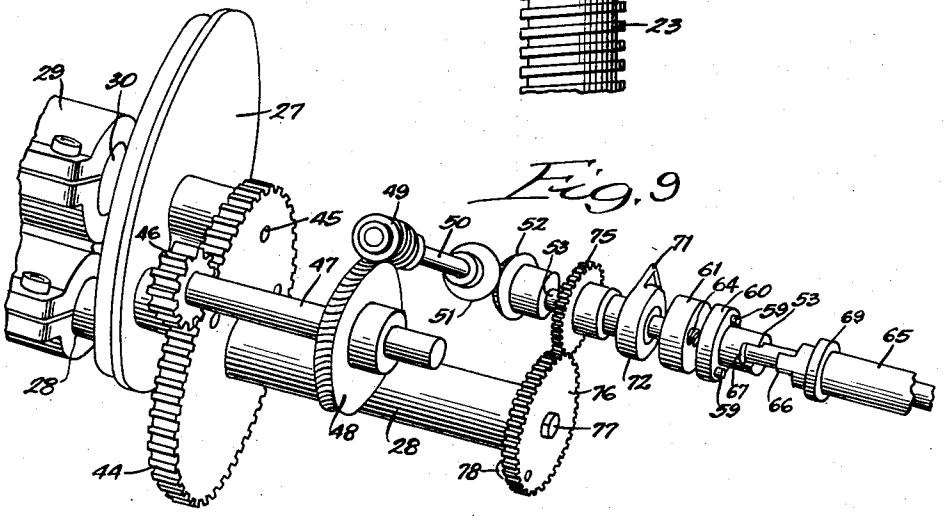

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Fig. 11

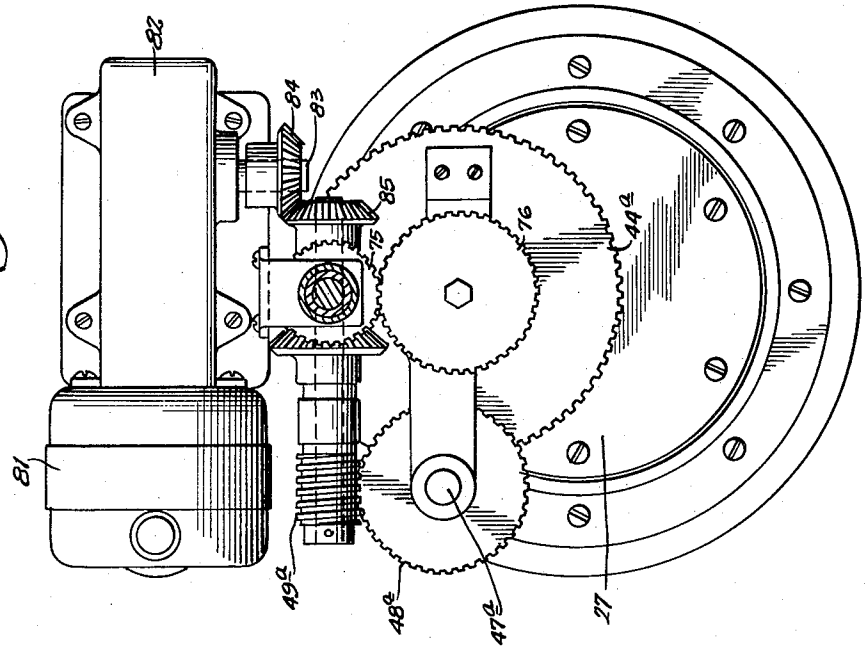
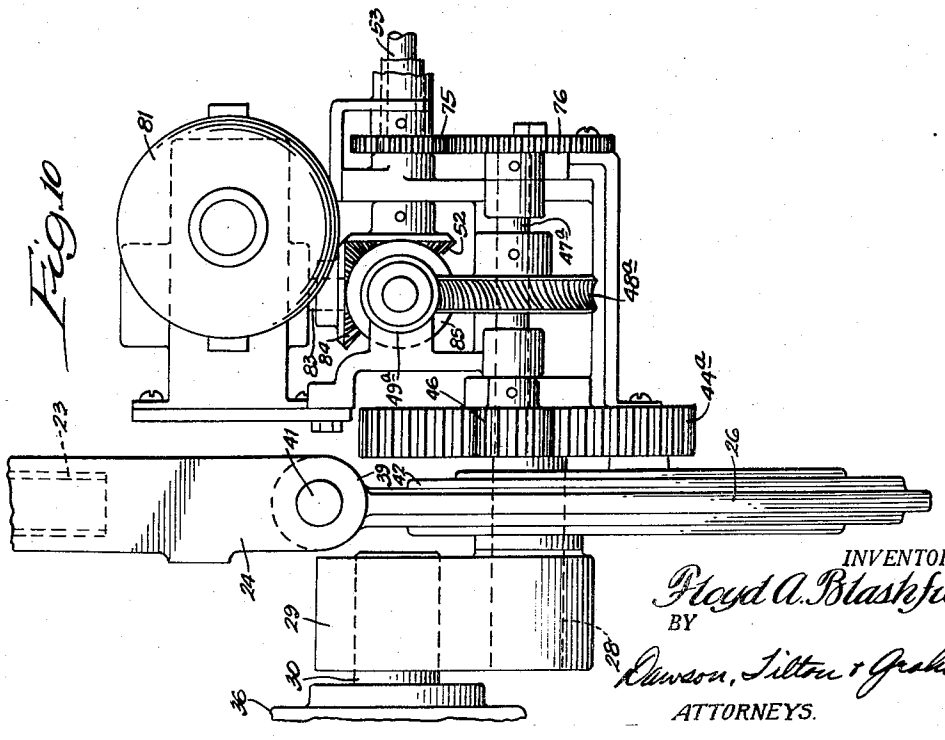


Fig. 10



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2,862,392

ROCKING BED AND CAM CONTROL MECHANISM

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Application October 15, 1953, Serial No. 386,165

4 Claims. (Cl. 74—42)

This invention relates to a rocking bed and cam control mechanism. The cam control mechanism is useful in connection with the control of the rocking movement of the bed, but is also obviously useful in the control of other structures and elements or devices to be moved.

A primary object of the invention is to provide in connection with the moving of a rocking bed or other type of device, means for changing the amplitude of movement of the bed or device during the operation of the rocking or moving mechanism, thus making it unnecessary to stop the motor to effect a change in the amplitude of movement or throw of the cam. A further object is to provide means whereby a device may be actuated by a cam while at the same time providing simple crank or handle means whereby the position of the cam may be changed to alter its throw while the operating mechanism is in full operation. A still further object is to provide a device whereby a crank shaft is utilized for rotating a cam having its peripheral portions encircled by a ring and the ring connected to the device to be moved, while at the same time utilizing the crank shaft for supporting a member secured to the cam, connections being provided for moving said member to swing the cam to different effective positions upon the crank shaft. Yet another object is to provide a rocking bed, or the like, equipped with a driven crank and a cam eccentrically receiving the crank and a ring freely receiving the peripheral portions of the cam and connected to the bed at one side of its rocking center, means being provided for rotating the cam independently of the operation of the crank for changing the position of the cam thereon. A further object is to provide in connection with the foregoing handle mechanism supported in line with the driven shaft of the crank for effecting such change in the position of the cam. Yet another object is to provide motor-driven means for operating the connections with the cam, whereby while the main shaft and crank are being rotated, a motor may be employed for changing the position of the cam independently of such other operating mechanism. Yet another object is to provide in a rocking bed structure, link means for supporting an adjustable bed frame and worm and worm gear and gear connections for moving said link means to selected positions where they are retained in the set position by such worm and worm gear, etc. structures. Other specific objects and advantages will appear as the specification proceeds.

The invention is shown, in illustrative embodiments, by the accompanying drawings, in which—

Figure 1 is a perspective view of a rocking bed equipped with cam control mechanism embodying my invention; Fig. 2, a broken side view in elevation, the bed being shown in a tilted position by dotted lines; Fig. 3, a vertical sectional view, on an enlarged scale, of the crank, cam mechanism, and the control mechanism therefor; Fig. 4, a plan sectional view of the structure shown in Fig. 3; Fig. 5, an enlarged, broken side view in elevation of the cam-operating mechanism; Fig. 6, a broken sectional view, the section being taken as indicated at line 6—6 of

Fig. 5; Fig. 7, a broken, part-sectional view showing the clutching mechanism and locking mechanism employed; Fig. 8, a part-sectional detail view of the worm driven by the handle crank; Fig. 9, a perspective view of the chain of gear connections between the handle crank and the cam member; Fig. 10, a broken, vertical, part-sectional view of a modified form of structure in which a motor is employed for adjusting the position of the cam rather than the manual means shown in Figs. 1 to 9; and Fig. 11, a side view of the structure shown in Fig. 10.

Referring more particularly to Figs. 1 and 2, the general arrangement of the structures will be described, it being understood that while reference is made in particular to the rocking bed shown, such bed is merely illustrative of a number of devices with which the cam control mechanism may be employed. In Figs. 1 and 2, 10 designates the base equipped with casters 11 and providing a support standard or frame 12. Upon the top of the frame 12 is supported a rock shaft 13. A bed frame 14 is supported upon the shaft 13 and carries a mattress 15. If desired, the bed frame 14 may be provided with sectional frames adjustable by means of the links 16. The links 16 are fixed to the large gears 17 mounted on one side of the bed and operated by means of handle driven worm and gear connections. By this means, the bed sections, when moved into the desired position, will remain fixed in such position without further attention because of the worm and gear structure described.

The standard 12 may be provided with a fixed pointer 18 and a scale 19 fixed to the rock shaft 13 and provided with graduations which will thus indicate the degree of tilting of the bed at any moment.

The mechanism for rocking the bed will now be described.

Fixed to the bottom of the bed frame are the bearing members 20. Within the mountings 20 is supported a rock member 21 supporting a control shaft 22 and having a bevel gear engaging the vertical bevel gear 22*a*. The vertical bevel gear 22*a* is carried by a screw 23 which enters a threaded socket member carried by the frame member 24. The frame member 24 extend on opposite sides of an ear 25 carried by a cam ring 26. The cam ring 26 freely receives a cam 27 eccentrically supported upon the crank shaft 28. The crank shaft 28, as will be shown more clearly in Fig. 6, is rigidly carried by a crank arm 29 fixed to a driven shaft 30.

Any suitable means may be provided for driving the shaft 30. In the specific illustration given, there is provided a motor 31 driving through speed-reducing gears 32 a pulley 33, and, by means of the belt 34, another pulley 35. The shaft upon which pulley 35 is mounted drives through reducing gears 36 the drive shaft 30.

The cam and ring mechanism may be of any suitable construction. As shown more clearly in Fig. 6, the cam 27 is in the form of a disc having an eccentric mounting 37 receiving the crank shaft 28. Between the cam 27 and the ring 26 may be interposed antifriction bearings 38. The straps 24 are provided at their lower ends with ears 39 centrally apertured at 40 to receive the locking pin 41. As shown more clearly at the top of Fig. 5, the pin 41 extends through the ears 39 and the central lug 25 carried by the ring 26 so as to secure the ring 26 thus to the straps 24, which in turn are connected by the screw 23 to the rotatable member 21 on bed 14.

The ring 26 is confined about the peripheral portion of the cam 27 and the antifriction bearings 38 carried thereby by means of a locking disc or band 42, the band 42 being held in position by the screws 43, as shown more clearly in Fig. 6.

Assuming that the parts are in the position shown in Fig. 6 with the center of the cam 27 in alignment with the driven shaft 30, no rocking of the bed will

occur when the shaft 30 is driven because the crank shaft 28 will rotate about the true center of the cam 27 and the center of cam 27 will be in line with the axis of shaft 30. However, if the cam be rotated in either direction upon the shaft 28 so as to bring the center of the cam off-center with the driven shaft 30, rocking of the bed will occur and the ring structure 26 will begin to rise and fall. If, therefore, means can be provided for shifting the position of the cam 27 through mechanism that may be operated while the driven shaft 30 is in operation, a change in amplitude of the rocking movement of the bed can be effected without requiring the stopping of the motor. I will now describe the mechanism for changing the position of the cam 27 while the motor is in operation.

The cam control mechanism shown in the drawings employs first a gear 44, which is apertured centrally to freely receive the shaft 28. The gear 44 which thus may operate independently of shaft 28, is bolted directly to the cam 27, employing three bolts 45. Thus, when the gear 44 is rotated, it requires a similar movement of cam 27 and the cam 27 may be thus caused to move in a circular path about the shaft 28 and thus to vary the throw of the cam.

Gear connections are provided for rotating the large gear 44 which has been described as bolted directly to the cam 27. For the purpose of clarity, I have shown such gear connections in Fig. 9. It will be noted that a pinion gear 46 meshes with the large gear 44 and is fixed upon a shaft 47 carrying a worm gear 48. The worm gear 48 meshes with a worm 49 on shaft 50. The shaft 50 carries a bevel gear 51 meshing with another bevel gear 52 carried by shaft 53. The shaft 53, through several clutch connections, is connected to a handle on crank 54. Thus, when the handle 54 is turned with the clutch ends so as to rotate shaft 53, there is a rotation of gears 52, 51, 49, and finally pinion gear 46 meshing with the large gear 44 which is bolted to the cam 27. By this means, the cam 27 may be rotated manually through the rotation of the handle or crank 54 to change the setting of the cam 27 and thus vary its throw. Such change of the cam is effected without requiring the stopping of the motor and while, in fact, the motor is in full operation.

The clutch and locking mechanism is important for the following reason. In the operation of the crank shaft, resulting in movement of the parts, there is found to be some slight creeping of the adjustment parts or gears, and while such change is extremely small, over a substantial period of time there may be a decided change in the amplitude of the movement of the cam away from the desired setting. To avoid this, I provide a locking mechanism and clutch mechanism which will now be described.

As shown more clearly in Fig. 3, I provide within the casing 55 the fixed shaft 56 having a depending fixed support 57. The fixed support 57 is shown with the clutch mechanism parts best in Fig. 7. It will be observed that the fixed part 57 is provided with a recess 58 adapted to receive a locking pin 59 threadably received within the slidable member 60. A ring member 61 is fixed to the shaft 53 by means of pin 62, and is apertured at 63 to receive the outer free end of pin 59. A compression spring 64 is received within opposite recesses in the members 60 and 61 so as to ordinarily urge the member 60 toward the fixed abutment or support 57. It will be observed that the member 60 has a substantial portion projecting outwardly beyond the abutment 57 so as to permit it to be engaged and moved inwardly to retract the pin 59 from the recess 58. The handle or crank 54 is fixed to a sleeve 65, and the sleeve 65, having running shaft 66*a*, is provided at its inner end with a clutch tongue 66 adapted to engage a clutch in shaft 53. A light spring 68 may be employed to maintain the sleeve 65 spaced from the member 60, and in the illustration given, the spring 68 extends between the fixed support 57 and a collar 69 welded to the sleeve 65.

In operating the clutch, the crank handle 54 is moved inwardly to bring the end of the sleeve into engagement with the slidable member 60 and as the member 60 is pressed inwardly, the locking pin 59 is detached from the recess 58, thus permitting the shaft 53 to be freely rotated, and with the squared tongue 66 engaging the squared recess 67, rotation of shaft 53 is readily effected.

It is desired to provide means for indicating the position of the cam after it has been moved and thus to determine the amplitude of movement. To accomplish this, I provide the casing 55 on its outer side with a circular scale 70 and provide a pointer 71 for cooperation therewith. The pointer 71, as shown more clearly in Fig. 7, is mounted upon a disc 72 secured by the set-screw 73 to a hub member 74 freely mounted upon shaft 53. The hub member 74 is equipped at its inner end with a gear 75 which, in turn, meshes with a gear 76 freely mounted by the pin 77 upon the end of the shaft 28.

Fixed to the gear 76 is a roller 78 connected by a strap 79 to the large gear 44 bolted to the cam 27. As shown more clearly in Fig. 6, the bracket 79 is secured by a threaded pin 80 to an inner portion of the gear 44. with this structure, when the gear 44 is rotated, there is produced a corresponding rotation of the gear 76 on shaft 28 and gear 75 on the hub 74, thus producing a rotation of the pointer 71 in line with the graduations on scale 70.

Operation

In the operation of the apparatus, the motor 31 is set in operation, and the driven shaft 30 is rotated by the connections between the motor and the shaft, namely, through reducing gears 32, pulley 33, a belt 34, pulley 35 and reducing gears 36. The shaft 30 is provided with a fixed crank arm 29 and thereby drives the crank shaft 28. The cam disc or wheel 27 mounted eccentrically upon crank shaft 28 rotates to raise and lower the cam 27, depending upon the position of the cam. As the cam 27 rises and falls with the rotation of the crank shaft 28, the sleeve or ring 26 similarly rises and falls, carrying with it the ear 25 and thereby the metal straps 24 and the screw 23, thus transmitting the movement to the bed 14 there-above and rocking the bed.

The shaft 53 is concentric with shaft 30, and as gear 44 gyrates, gear 46, which is in mesh therewith, also gyrates. The casing 55 and everything contained and attached therewith rotates. When the cam is rotated so as to bring the center of the cam in line with the drive shaft 30, as described in column 3, no longitudinal movement of the connecting link 26 is effected and there is no rocking of the bed. However, as the cam is rotated in either direction upon the shaft 28 so as to bring the center of the cam off-center with respect to the driven shaft 30, rocking of the bed occurs and to effect this change, the handle may be operated in either direction.

To change the position of the cam so as to vary its throw, the operator now rotates the handle 54, after pressing it inwardly so as to free the member 60 and the pin 59 from the recess 58 and to bring the clutch parts 66 and 67 into engagement. By this means, shaft 53 is rotated and thence through gears 52 and 51, shaft 50, worm 49, worm gear 48, shaft 47, and pinion 46, the large gear 44 which is bolted to the cam 27 is rotated. This causes the cam 27 to move bodily about the crank shaft 28 to any selected position. Such movement is accomplished during the rotation of the crank shaft 28 and without affecting the regular operation of the motor and the driven shaft 30. Simultaneously, with any shifting of the position of the cam, there is produced through the connector strap 79 a shifting of the

free gear 76 and thereby the gear 75 and hub 74 carrying the pointer disc 72.

While, in the foregoing, I have described a manually-operated control for shifting the position of the cam, it will be understood that other means may be provided for effecting such change. If desired, a motor may be provided for this purpose and instead of the nurse having to bend downwardly to operate the manual crank, the change may be effected by simply throwing a switch button located at a convenient point on the bed and thus operating a motor to increase or decrease the amplitude of the rocking movement. In Figs. 10 and 11, I have shown such motordriven means, and since the parts are to a large degree the same in these figures as those shown in the preceding figures, it will only be necessary to refer to the added parts.

In Figs. 10 and 11, there is shown a motor 81 which drives, through reducing gears within the casing 82, a shaft 83 carrying a bevel gear 84. Meshing with gear 84 is another bevel gear 85, and through the chain of gears shown there is driven the worm 49*a*, worm gear 48*a* mounted on shaft 47*a*, and thereby through a pinion the large gear 44*a* which is bolted to the cam 27*a*.

In the operation of the structure shown in Figs. 10 and 11, the motor drives through the chain of gears shown the large gear 44*a* and operating exactly as the gear 44 heretofore described, produces a rotation of the cam 27 about the crank shaft to change the throw of the cam.

While the structure has been described in connection with a rocking bed, it will be understood that the mechanism is applicable to a great variety of machines in which an oscillating or reciprocating movement is desired or other movements which may be effected by a cam as described, and the cam control mechanism herein described may be effective for the control of such machines. The use of a hospital bed as an illustration of the use of the cam control mechanism is desirable because of the effectiveness of such control in connection with a hospital bed, whereby a patient will not be disturbed in the operation of the mechanism, the change of amplitude of movement being effected without stopping the machine; however, it will be understood that the illustration is not limiting in character but merely sets forth one of the many devices which may be used in connection with a cam control mechanism.

While, in the foregoing specification, I have set forth specific structures in considerable detail for the purpose of illustrating embodiments of the invention, it will be understood that such details of structure may be varied widely by those skilled in the art without departing from the spirit of my invention.

I claim:

1. In element-moving mechanism, a frame, a driven shaft mounted therein, a crankshaft fixed to one end of said driven shaft and having its axis in spaced parallel relation thereto, a cam member having an eccentric mounting receiving said crankshaft and having its center alignable with said driven shaft, a ring freely receiving the peripheral portions of said cam, connecting means between said ring and said element to be moved, control means rotatably supported in general alignment with said driven shaft but longitudinally spaced therefrom, a rotatably mounted handle, said handle and control means being normally unconnected for independent rotation of said control means with reference to the handle, and selectively operable connecting means between said handle and said control means for locking said control means and handle against independent rotation, whereby, said handle may be connected with said control means by said second-mentioned connecting means for rotation of said cam upon said crankshaft without interrupting rotation of said drive shaft.

2. In element-moving mechanism, a frame, a driven shaft mounted thereon, a crankshaft actuated by said driven shaft, a cam member apertured eccentrically to receive said crankshaft and having its center alignable with said driven shaft, a ring freely receiving the peripheral portions of said cam, a gear apertured to receive freely said crankshaft and fixed to said cam, rotatable control means independent of said crankshaft and longitudinally spaced from said driven shaft for rotating said gear to change the position of the cam thereon, and a rotatable handle selectively and axially movable between a normal inoperative position wherein said handle is freely disengaged from said control means and an operative position wherein said handle engages said control means for rotation of said cam upon said crankshaft as said handle is turned, said handle being movable into its operative position for changing the position of said cam while said driven shaft is being rotated.

3. In element-moving mechanism, a frame, a driven shaft member mounted thereon, a crankshaft carried by a crank arm on the driven shaft, a cam member apertured eccentrically to freely receive said crankshaft and having its center alignable with said driven shaft, a ring freely receiving the peripheral portions of said cam, connecting means between said ring and said element to be moved, rotatable control means longitudinally spaced from said driven shaft for turning said cam to change its position upon said crankshaft, and a rotatable handle selectively and axially movable between a normal inoperative position wherein said handle is freely disengaged from said control means and an operative position wherein said handle engages said control means for rotation of said cam upon said crankshaft as said handle is turned, said handle being movable into its operative position for changing the position of said cam while said driven shaft is being rotated.

4. In an element moving mechanism, a frame, a driven shaft mounted thereon, a crank shaft fixedly secured to one end of said driven shaft and having its axis in spaced parallel relation to the axis of said driven shaft, a circular cam member apertured eccentrically to rotatably receive said crank shaft, a ring freely receiving the peripheral portion of said cam member, a gear centrally apertured to receive freely said crank shaft and fixed to said cam member, a control shaft operatively associated with said gear for rotating the same upon said crank shaft, and actuating means normally disengaged from said control shaft but being movable into an engaged position therewith for rotating said control shaft and for thereby rotating said cam member upon said crank shaft, said actuating means being movable between engaged and disengaged positions while said driven shaft is being rotated.

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