May 8, 1934. W. J. AUSTIN 1,957,989

GEARING

Original Filed Sept. 5, 1929 2 Sheets-Sheet 1

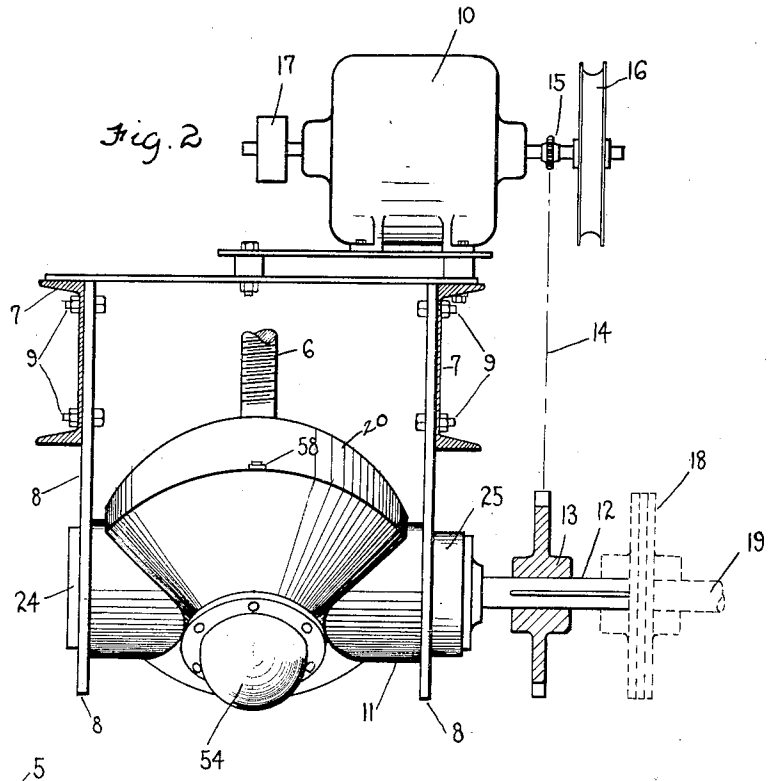

Fig. 2

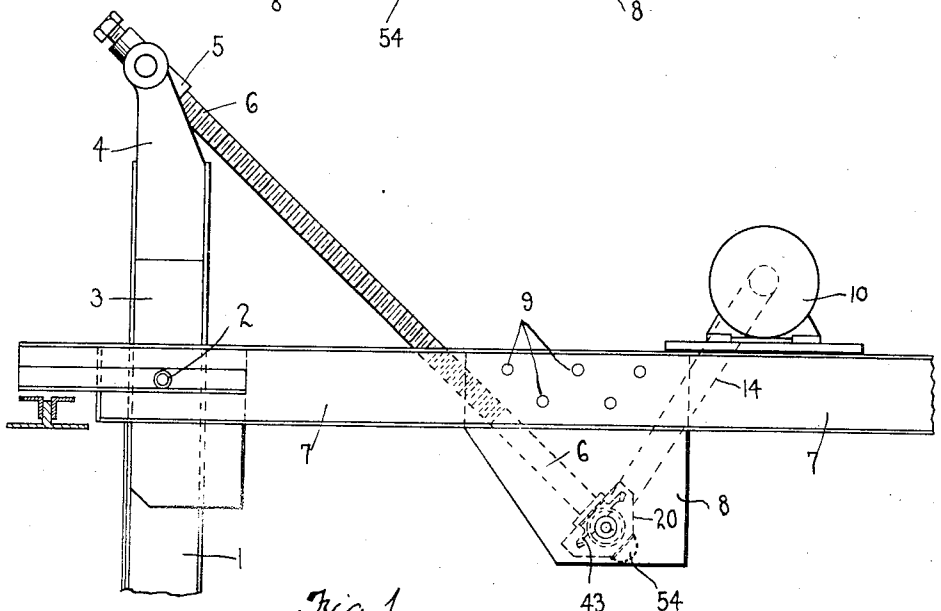

Fig. 1

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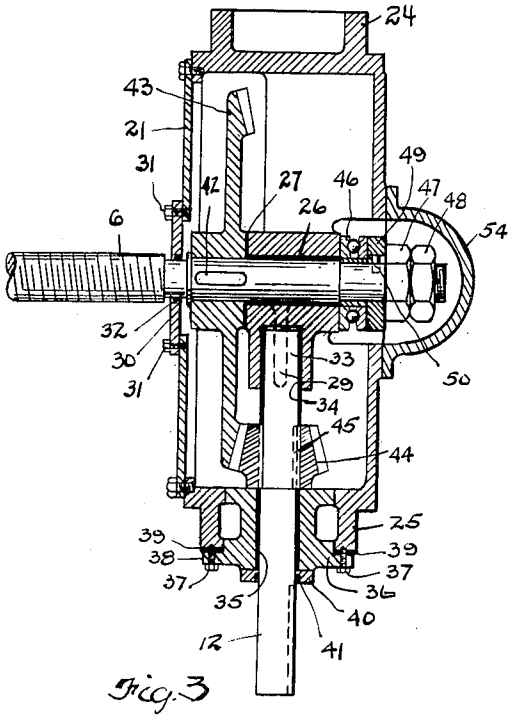

Fig. 3

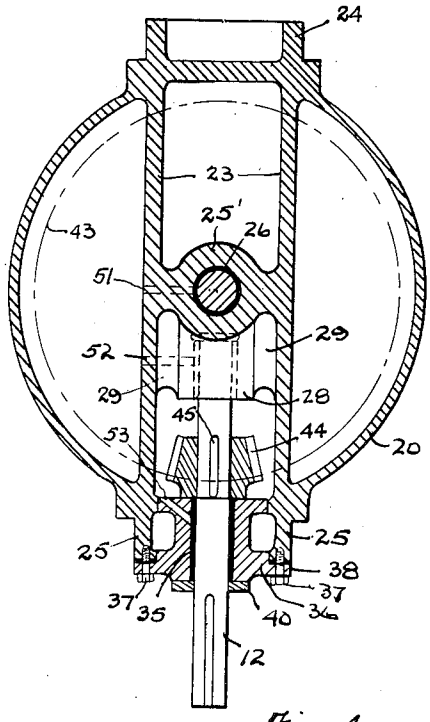

Fig. 4

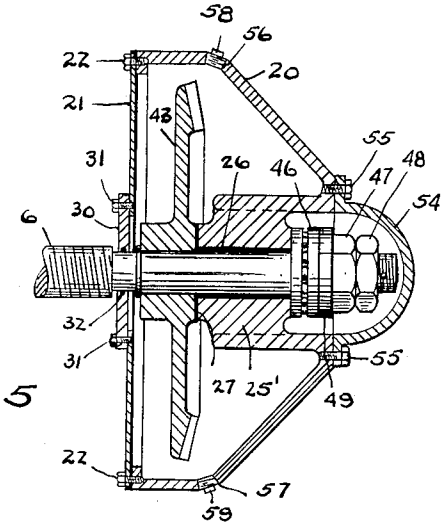

Fig. 5

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UNITED STATES PATENT OFFICE

1,957,989

GEARING

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Original application September 5, 1929, Serial No. 390,541. Divided and this application April 19, 1930, Serial No. 445,784. Renewed July 27, 1932

7 Claims. (Cl. 74—40)

This invention, as indicated, relates to gearing, and has specific reference to the gearing or operating mechanism by which the doors for hangars and the like, forming the subject-matter of my co-pending application Serial No. 390,541, filed September 5, 1929, are actuated.

In structural steel construction, such as is common in structures of the type above referred to, considerable difficulty is experienced in the installation of the mechanism by which the doors and the like are operated, due to the fact that accuracy with which the various structural shapes are assembled is not close enough to accommodate the minute adjustments necessary for the proper functioning of the intermeshing gears comprising the actuating mechanism. But even if it were practicable to erect a structural steel structure of the required accuracy, the deflections to which such structural steel shapes are necessarily subject would throw the gearing comprising the actuating mechanism out of adjustment as soon as an appreciable load was placed on any part of the structural steel structure. It, therefore, becomes necessary to provide some means whereby the gearing comprising the door actuating mechanism may be so supported in the structural steel framework that misalignment does not occur, regardless of the stresses to which the structural frame may be subjected.

A further difficulty which has been experienced in the installation of gearing in steel structures is the fact that the workmen who fabricate such steel structures are unaccustomed to the minute adjustments necessary for the proper functioning of the gearing and consequently considerable time is wasted in securing the proper adjustment and an inferior result is usually attained.

It is an object of my invention to provide a means whereby the gearing comprising the door actuating mechanism can be assembled as a single unit and installed as such in the steel structure, thereby obviating the possibility of any misalignment of parts, which depend upon minute adjustment for efficient operation, as such parts are installed by relatively unskilled workmen. It is another object of my invention to provide a means for transmitting the stresses necessarily carried by the shaft which operates the door to the framework of the structure without in any way altering the adjustment between the gearing by which such shaft is driven. A further object of my invention is to provide a means whereby the frictional losses in the door actuating mechanism are appreciably curtailed and the whole structure made more readily operable as well as readily adjustable in case of wear which is necessarily incident to such operating mechanism.

Other objects of my invention will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, said invention, then consists of the means hereinafter fully described and particularly pointed out in the claims; the annexed drawings and the following description setting forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:—

Fig. 1 is a fragmentary elevation of the door actuating mechanism shown installed in connection with a door such as described in my aforesaid co-pending application; Fig. 2 is a fragmentary enlarged view of the mechanism illustrated in Fig. 1; Figs. 3, 4 and 5 are fragmentary section views showing in detail the gear housing and its associated parts.

Referring more specifically to the drawings and more especially to Fig. 1, the arrangement here illustrated consists of a door 1 which is pivotally supported at 2 and which has an upwardly projecting element 3 to which are secured the arms 4 and between which arms is trunnioned the nut 5 which receives the screw shaft 6 for operating the door. The frame member 7, from which the door 1 is pivotally supported at 2, has rearwardly of such support depending members 8 which are rigidly united thereto by means of the bolts 9. The members 7 rigidly support a motor or like prime mover 10, which is employed to drive the door actuating mechanism. The members 8 pivotally support the gearing housing 11 from which projects the actuating shaft 12 and to which is rigidly secured the sprocket 13 adapted to receive the chain 14 which passes around a sprocket 15 on the shaft of the motor 10 by which the shaft 12 is driven.

The shaft of the motor has rigidly secured thereto a sheave 16 adapted to receive an endless chain by which the doors may be actuated should the electric current fail and the motor 10 become inoperative. On the opposite end of the motor shaft is secured a magnetically controlled brake 17, the function of which has been explained in my said co-pending application.

The shaft 12 is adapted to receive a preferably flexible connecting element 18 by which a shaft 19 may be connected if it is desired to transmit power from the motor 10 to more than one door actuating mechanism.

The gearing housing 11 which is shown in detail in Figs. 3, 4 and 5, consists of a bowl-shaped body 20, which has its substantially flat face 21 removably secured thereto by means of the bolts 22. Positioned within the bowl-shaped body 20 of the gear housing and integrally united therewith are a plurality of webs 23 which reinforce the housing and provide beam-like supports for the door actuating mechanism contained in the housing and serve to transmit the stresses from such actuating mechanism to the frame by which the housing is carried. The housing 11 has integrally united therewith gudgeons or trunnions 24 and 25 which occur adjacent the ends of the webs 23, these gudgeons being adapted to transmit the stresses from the webs to the supports in which the gudgeons are pivoted without subjecting the main body of the housing to any of such stresses.

Positioned intermediately of the webs 23 and integrally united therewith is a bearing support 25', the axis of which intersects the axis of the gudgeons 24 and 25 and extends at right angles thereto. The bearing support 25' is adapted to secure a bushing 26 which has a circumferential flange 27 formed on one end thereof, which flange rests against the terminal portion of the bearing support 25'. The bearing support 25' has integrally formed therewith another bearing support 28, the axis of which is coincidental to the axis of the gudgeons 24 and 25. The bearing support 28 is laterally supported from the webs 23 by webs 29 which serve to materially strengthen the construction.

Revolubly supported in the bushing 26 is the screw shaft 6 by which the door is actuated. Where the screw shaft 6 passes through the closure member 21 of the housing a grease retaining and dust excluding element 30 is provided which is secured to such closure member 21 by means of bolts 31 and which has a grease retaining ring 32 secured therein, which closely hugs the screw shaft 6. Revolubly supported at its terminal portion 33 in the bushing 34, which is positioned in the bearing support 28, is the shaft 12. The shaft 12 is revolubly supported in the bushing 35 secured in the cylindrical member 36 which is coaxially mounted in the gudgeon 25 and secured thereto by means of the bolts 37. Positioned intermediately of the outwardly directed circumferential flange 38 of the member 36 and the terminal portion of the gudgeon 25 are a plurality of shims 39 by which axial adjustment of the member 36 may be effected. Secured to the member 36 is a collar 40 which contains a grease retaining and dust excluding packing ring 41, which snugly fits to the shaft 12. The screw shaft 6 has rigidly secured thereto by means of the key 42 a bevel gear 43 which intermeshes with a bevel pinion 44 which is rigidly secured to the shaft 12 by means of the key 45. Where the screw shaft 6 projects through the bearing 26 it is encompassed by a thrust bearing 46 which is preferably of the anti-friction type. Secured to the terminal portion of the screw shaft 6 are the lock nuts 47 and 48, and positioned intermediately of the thrust bearing 46 and the lock nut 47 is a collar 49 which is secured to the shaft 6 by means of the dowel or key 50, which prevents the thrust bearing from loosening the lock nuts during the rotation of the screw shaft 6.

The bearings 26, 34 and 35 have lubricant ducts 51, 52 and 53 respectively connecting the bearing surfaces with the interior of the housing for the purpose of permitting free access of the lubricant contained in the housing to these bearing surfaces. The housing has a cap 54 rigidly secured thereto by means of the bolts 55, which cap, being readily removable, permits of access to the lock nuts 47 and 48 for adjustment of the screw shaft 6 as it may require adjustment due to the wear or other circumstances during the course of the life of the mechanism. The closure member 21, with its associated gland member 30, is made of sufficient strength so that should the lock nuts 47 or 48 become disengaged from the shaft 6, or the shaft 6 to the right of the bevel gear 43 fail for any reason whatsoever, these closure members will be of sufficient strength so that the gear 43 will not be pulled from the housing, thereby preventing the possibility of any accidental dropping of the doors which are connected to the screw shaft 6. The housing 10 is provided with suitable apertures 56 and 57 which are normally closed by means of the screw plugs 58 and 59, respectively, these apertures forming means whereby the grease or lubricant contained within the housing may be replenished or drawn off, as the occasion may demand, during the operation of the mechanism.

It will be seen that I have provided a means whereby the positive alignment of the gears comprising the door actuating mechanism is insured and with the use of my device it is possible to assemble the gearing in a machine shop where the close adjustments necessary are readily attainable, and then shipping such assembled unit to the point of installation, materially assists in the ready installation of such unit and absolutely insures the proper adjustment of the various parts, even though installed by workmen unskilled in this particular art.

With the construction of the mechanism as above set forth, such mechanism requires practically no attention during the life of its use other than the mere supplying of lubricant thereto at relatively long intervals. This feature is particularly advantageous in that mechanisms of this character are usually installed in places not readily accessible and, therefore, are frequently subject to neglect and improper care.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:

1. In a door actuating mechanism, the combination of a revoluble screw, means disposed radially of said screw for causing rotation thereof, a housing revolubly supporting said screw and said radially disposed means, a support for said housing, said housing having substantially aligned trunnions journalled on said support, a shaft journalled on said housing and extending thereinto, and means in the housing operably connecting said shaft with said screw.

2. In a door actuating mechanism, the combination of a revoluble screw, means disposed radially of said screw for causing rotation thereof, a member having a plurality of spaced webs, means intermediate said webs for revolubly supporting said screw and said radially disposed driving means, a support, and gudgeons on said member substantially at the ends of said webs and journalled on said support.

3. In a mechanism of the character described, the combination of a housing, a revoluble screw shaft, means disposed radially of said screw shaft

for causing rotation thereof, a plurality of webs in said housing, means intermediate of said webs for revolubly supporting said screw shaft and said radially disposed means, a support, and gudgeons on said housing adjacent the ends of said webs and journalled on said support.

4. In a mechanism of the character described, the combination of a housing, a plurality of webs in said housing, a revoluble screw shaft, means intermediate said webs for revolubly supporting said screw shaft, a second shaft revolubly supported in said last named means and extending radially from the axis of said first named screw shaft, means interconnecting said shafts for transmitting rotation from one to the other, and gudgeons on said housing adjacent the ends of said webs, one of said gudgeons adapted to coaxially support said second shaft.

5. In a mechanism of the character described, the combination of a housing, a plurality of webs in said housing, a revoluble screw shaft, means intermediate said webs for revolubly supporting said screw shaft, means for axially adjusting said screw shaft, a second shaft, means intermediate said webs for revolubly supporting said second shaft, gudgeons on said housing adjacent the ends of said webs, one of said gudgeons adapted to coaxially support said second shaft, and means associated with said last named gudgeon for axially adjusting said second shaft.

6. In an actuating mechanism for doors, the combination of a screw block oscillatably mounted on such door, a screw shaft engaged by said screw block for actuating said door, a housing revolubly and axially supporting said screw shaft, a support for said housing, gudgeons on said housing and journalled on said support, and means for transmitting rotation to said screw shaft comprising a gear in said housing on said screw shaft, a pinion in said housing cooperating with said gear, and a shaft extending into the housing for driving said pinion.

7. In an actuating mechanism for doors, the combination of a screw block oscillatably mounted on said door, a screw shaft engaged by said screw block for actuating said door, a housing revolubly and axially supporting said screw shaft, a support, gudgeons on said housing and journalled in said support, and cooperating gear means interiorly of said housing for transmitting rotation to said shaft.

WILBERT J. AUSTIN.