Feb. 11, 1969 T. R. LASIER ETAL 3,426,382

HOUSING FOR DOOR CLOSING AND CHECKING MECHANISM

Filed Sept. 27, 1967 Sheet 1 of 2

Fig. 1.

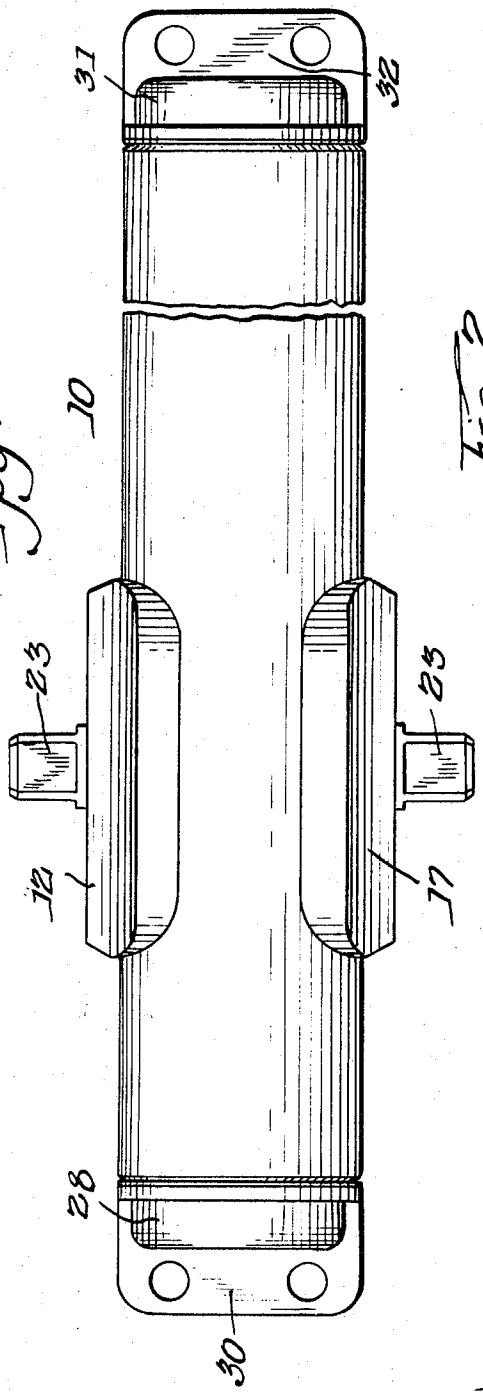
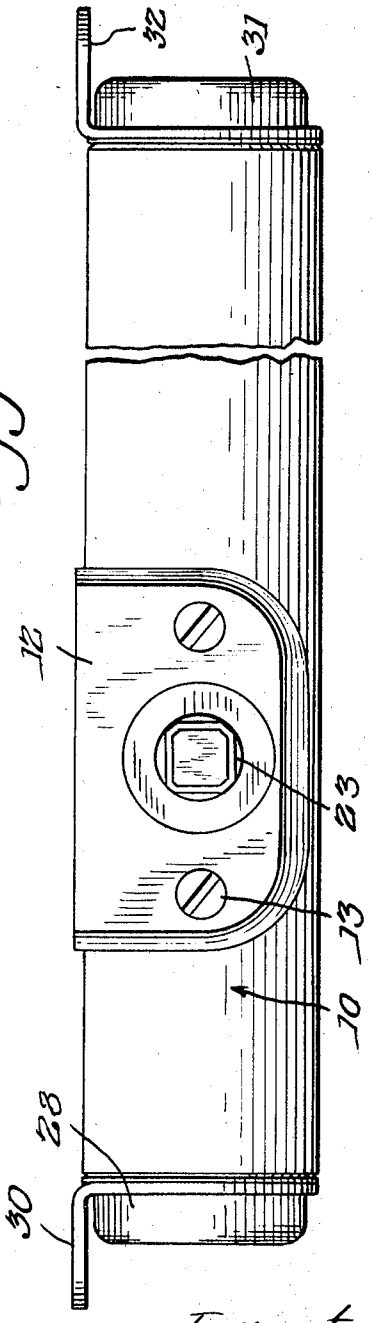


Fig. 2.



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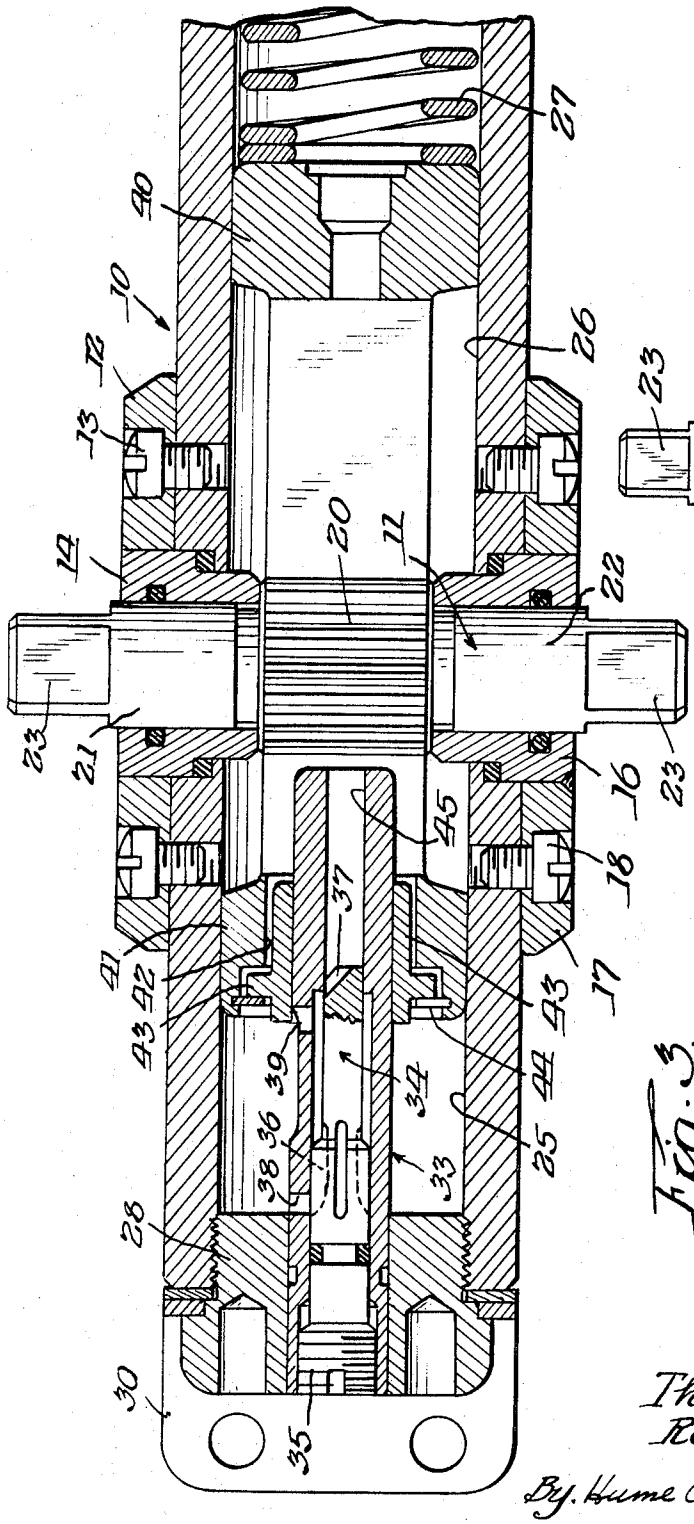


Fig. 3.

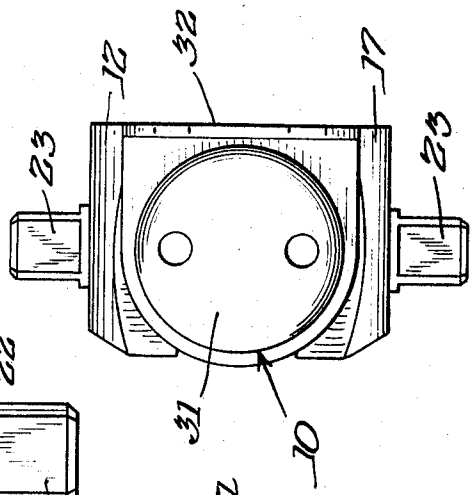


Fig. 4

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HOUSING FOR DOOR CLOSING AND CHECKING MECHANISM

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Continuation-in-part of application Ser. No. 654,306, June 28, 1967. This application Sept. 27, 1967, Ser. No. 670,865
U.S. Cl. 16—49 5 Claims
Int. Cl. E05f 3/00, 3/04

ABSTRACT OF THE DISCLOSURE

The invention provides housing structure for door checking mechanism wherein a piston reciprocates within the housing and one end of the piston carries improved valving means which has movement in telescoping relation on a fixed valve body as the piston reciprocates. The housing includes a metal tube to which journalling plates are secured exteriorly and which is closed at respective ends by closing plugs.

The invention relates to door closing and checking devices and has reference in particular to improved housing structure for such devices.

This application is a continuation-in-part of our copending application Ser. No. 654,306, filed June 28, 1967, and entitled, Door Closer Mechanism.

In hydraulic door closing and checking devices as heretofore manufactured, the body portion of the device was formed by a cast unit which provided journalling means for the pinion shaft and also the aligned chambers for the reciprocating piston. The porosity of the casting and the extensive machining operations required of the same presented serious problems to those companies manufacturing such door closers. In an endeavor to overcome these problems so as to materially reduce manufacturing costs and in a further endeavor to improve and streamline the door closing devices, the present invention contemplates a housing unit essentially consisting of metal tubing having attached journalling means for the pinion shaft.

Accordingly one of the objects of the invention is to provide a housing for door closing and checking devices which will be economical to manufacture since machining costs will be substantially reduced although a high standard as regrads strength and ruggedness will be obtained.

Another object of the invention is to provide a housing unit for hydraulic door closers which will essentially consist of metal tubing.

A further object resides in the provision of a housing unit for devices of the character described wherein a metal tube is employed with end closing plugs and exterior journalling plates being releasably secured to the metal tubing to complete the structure.

With these and various other objects in view, the invention may consist of certain novel features of construction and operation, as will be more fully described and particularly pointed out in the specification, drawings and claims appended thereto.

In the drawings which illustrate an embodiment of the device and wherein like reference characters are used to designate like parts.

FIGURE 1 is a front elevational view of housing structure for a door closing and checking device which has been selected for illustrating the invention;

FIGURE 2 is a top plan view of the unitary housing structure shown in FIGURE 1;

FIGURE 3 is a fragmentary longitudinal sectional view taken through the door closing and checking device of

FIGURE 1 and showing the various elements of the mechanism in a door opening position; and

FIGURE 4 is an end elevational view looking towards the left of the unitary housing structure as shown in FIGURE 2.

The housing of the invention is shown in the drawings as essentially comprising a metal tube **10** although a tube of other suitable material may be used. Steel tubing having the required outside and inside diameters and having the required wall thickness is preferred for the housing, and such tubing can be purchased in long sections, and then cut to the lengths desired. The tubing **10** is provided with journalling means for the pinion shaft **11** as clearly shown in FIGURE 3. The top journalling means including the plate **12** is releasably secured to the tube **10** by the screws **13** and said plate retains the top journalling element in the form of a bearing ring **14** for the pinion shaft. The said plate has a substantially flat top surface although the undersurface of the plate is arcuate so as to fit the curvature of the tubing **10**. The bottom journalling element in the form of a bearing ring **16** is retained by the bottom plate **17** which is similar in shape to plate **12**, being releasably secured to the tube **10** by the securing screws **18**. The pinion shaft **11** provides the pinion **20** and the said shaft has spaced bearing portions **21** and **22** located in the bearing rings **14** and **16**, respectively, which forms the actual journalling elements for the pinion shaft. Each end of the pinion shaft is squared as at **23** for receiving an arm for connecting the door with the door closer device. The particular end of the pinion shaft to which the arm is connected depends on whether the door is hinged on the left or on the right.

The cylinder formed by the tube **10** provides a pair of aligned chambers **25** and **26**, FIGURE 3, which have location on opposite sides of the pinion shaft. Chamber **26** on the right hand side is longer than chamber **25** and this feature in the design of the housing unit has been selected so that the power spring **27** can be located in chamber **26**. The closing plug **28** is threadedly secured to the end of chamber **25** for sealing this end, the said plug clamping one leg of the right angled bracket **30** to the metal tube **10**, thus fixedly securing the bracket to the housing unit. The bracket **30** provides one of the mounting elements for mounting the door closing device. In a similar manner the end of chamber **26** is closed and sealed by the plug **31** and the right-angled bracket **32** is clamped by said plug to thus fixedly secure the other mounting element to the housing. As best shown in FIGURES 2 and 4 the journalling plates **12** and **17** are shaped to provide a flat rear surface on approximately the same plane as the brackets **30** and **32** for engagement with the same mounting surface, thus improving the mounting stability of the device.

Since the restricted passages and valve means as heretofore located in the cast body portions of door closers have been eliminated in the present housing unit, it is necessary to relocate the regulating valve unit and provide for direct coaction with the reciprocating piston. A preferred arrangement of such relocated door checking mechanism is disclosed and claimed in the parent copending application previously identified. However, to assure full appreciation of the many advantages to be obtained by the cylindrical tubing of the present housing unit, the said door checking mechanism will be briefly described.

The hollow stem **33** is fixed to the plug **28** and the stem carries a regulating screw **34** which is threadedly secured at **35** within the stem. The stem accordingly functions as a valve body and the combination of stem and regulating screw provides restricted passages such as **36** and **37** with respect to the openings **38** and **39**. A double ended piston member is located within the tubing **10** and the piston

member is reciprocated by rotation of the pinion shaft in the closing and opening actions of the door. The hydraulic fluid within the housing is thus forced back and forth between the chambers **25** and **26**. The coil spring **27** is confined between the rear piston head **40** and the plug **31**. The coil spring is compressed on the opening action of the door and the energy stored in the spring functions to move the piston in a direction towards the left, FIGURE 3, for closing the door. The forward piston head **41** is centrally bored to provide an opening **42** of special shape for accommodating the floating check valve **43**. The check valve is carried by the piston head **41** so as to ride on the valve body **33** as the piston reciprocates. The check valve is retained in place within the piston head by the split retaining washer **44**.

FIGURE 3 shows the position which the parts assume in the opening of the door as the piston member moves towards the end of its reciproacting stroke in a direction towards the right. The check valve **43** is open to permit flow of the hydraulic fluid through the piston head **41** from chamber **26** to chamber **25**. When the door closes under spring pressure exerted by the coil spring **27** the piston member will move in a direction towards the left and the check valve **43** will automatically close. The hydraulic fluid trapped in the chamber **25** is forced to flow through the openings **38** and **39** and through the restricted passages **36** and **37** to be discharged from the central bore **45** of the stem **33**. When the piston head **41** has moved a sufficient distance beyond the rear opening **39** the hydraulic fluid will exit from this opening. Thus continued movement of the piston head **41** in a door closing direction is checked only by the restricted passage **36**. The restricted passages **36** and **37** can be varied as to size by rotative and longitudinal adjustments of the regulating screw **34** which is threaded at **35** for this purpose. Accordingly, the checking of the closing action of the door can be adjusted to the speed desired.

The housing for the door checking mechanism as shown in FIGURE 3 is formed primarly by cylindrical metal tubing which requires a minimum of machining operations for rendering the same useful. The journalling plates **12** and **17** can be readily attached to the exterior of the metal tubing and the ends of the tubing are closed and sealed by the threaded plugs **28** and **31**. The said plugs perform a dual function since they also secure the mounting brackets to the cylindrical tubing.

The invention is not to be limited to or by details of construction of the particular embodiment thereof illustrated by the drawings as various other forms of the device will, of course, be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claims.

What is claimed is:

1. In a housing for door closing and checking mechanism, in combination, a body portion formed by a length of cylindrical tubing having the desired inside and outside diameters and having the desired wall thickness, plugs having an inserted relation and being secured to the cylindrical tubing at each end thereof for closing and sealing said ends, a pair of journalling plates fixedly secured to the exterior of the tubing in substantially diametrically opposed relation and being located approximately centrally of the length of the tubing, each journalling plate having a length less than approximately one-half of the length of the body portion, each journal-journalling element in the form of a bearing ring, and ling plate having an opening therein for receiving a a mounting bracket fixedly secured to the tubing at each end.

2. A housing for door closing and checking mechanism as defined by claim **1**, wherein the body portion is formed by a length of metal tubing.

3. A housing for door closing and checking mechanism as defined by claim **1**, wherein the journalling plates each have a substantially flat exterior surface and an undersurface which is arcuate so as to conform to the curvature of the tubing.

4. In a housing for door closing and checking mechanism, in combination, a body portion formed by a length of tubing having the desired outside and inside diameters and having the desired wall thickness, plugs threaded to the tubing at each end thereof for closing and sealing said ends, a mounting bracket fixedly secured to the tubing at each end by being confined between the end of the tubing and the plug at said end, and journalling plates fixedly secured to the exterior of the tubing at a location off center and towards one end of the tubing.

5. A housing for door closing and checking mechanism as defined by claim **4**, wherein the body portion is formed by a length of metal tubing, and wherein the journalling plates include a top and a bottom plate each having a substantially flat exterior surface and an undersurface which is arcuate so as to conform to the curvature of the tubing.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,426,382 February 11, 1969

Thomas R. Lasier

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, line 18, "reciproacting" should read -- reciprocating --. Column 4, lines 13 to 16, "journalling element in the form of a bearing ring, and ling plate having an opening therein for receiving a a mounting bracket fixedly secured to the tubing at each end." should read -- ling plate having an opening therein for receiving a journalling element in the form of a bearing ring, and a mounting bracket fixedly secured to the tubing at each end. --.

Signed and sealed this 24th day of March 1970.

(SEAL)

Attest:

Edward M. Fletcher, Jr.

Attesting Officer

WILLIAM E. SCHUYLER, JR.

Commissioner of Patents