

Low Cost Automatic Door Closure

J. S. Kushawaha

Department of Mechanical Engineering, Indus Institute of Technology and Management,
Kakwan Road, Bilhaur, Kanpur 209202 UP India
k.jitendrasingh@yahoo.com

Abstract -- This paper presents the development of a low cost automatic door closing system. The pulley mechanism has been utilised for the closing mechanism. Interesting feature of this mechanism when compared to those existing in the market is that it's almost maintenance free, if at all required, in extreme case it can be performed by the user. Even the installation can be carried out by the common users.

Keywords: Automatic door closure, Pulley mechanism

I. INTRODUCTION

Automatic door closures (ADC) often under-perform and fail. Here, a low cost contraption is proposed.

II. BACKGROUND

Author's experience and understanding of maintenance of aircraft and its many control mechanisms. was applied to arrange the pulleys so that a weight suspended to a cable passing over the pulleys could result in the closing movement of the door.

III. MATERIAL REQUIREMENTS AND ARRANGEMENT

The required material was procured from the market and some of the work was carried out in the college workshop. The size specifications are not provided here as these are not of much importance. Figures 1-5 present arrangement of different parts and their views to provide guidance in the installation process. The details are as under:

A. Bearings

Two bearings were procured from the market and these are commonly available in the electrical shop dealing with the repair and maintenance of the domestic water pumps.

B. Bushes, pulleys and bolts

Two bushes and pulleys with matching size of the bearings were designed and machined in the college workshop.

C. Bracket

Two T-shaped brackets were fabricated in welding shop, with four holes on the base, for mounting the bracket on the door frames and a hole in the web for mounting the pulleys.

D. Bolts, nuts, washer, wire cable and screws

Commercially available bolt and nut were used to attach the bush, bearing and pulley on the bracket. The bracket was attached to the door frames by four screws. The wire cable was passed over the pulleys and one end connected to the door while other was connected to the weight.

E. Stopper plates

L-shaped stopper plates may be used to prevent the derailing of the wire cable from the pulleys.

F. Weight

A weight of approximately two kg is required to automatically close a door and this was made by machining a metallic bar in the workshop.

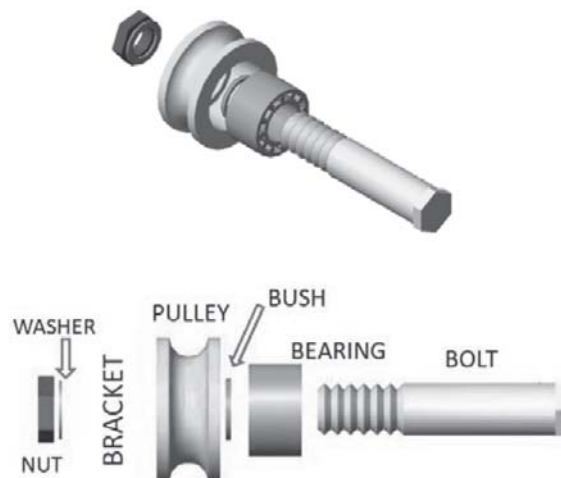


Figure 1. Isometric and front views of the arrangement.



Figure 2. View of stopper plate.



Figure 3. View of T-shaped bracket.



Figure 4. View of pulley.

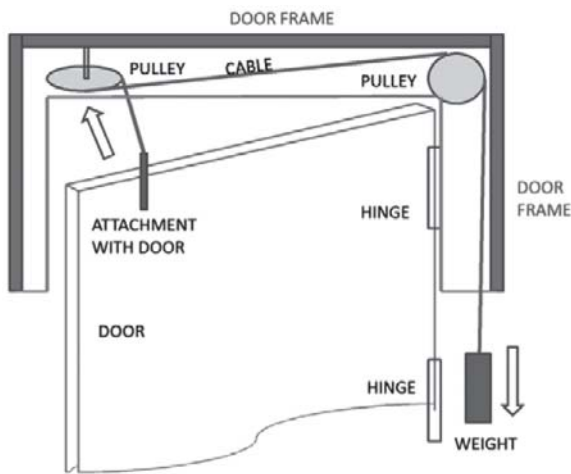


Figure 5. Schematic arrangement of different parts.

IV. INSTALLATION PROCEDURE

The ADC can be installed by any person with little technical knowledge in following manner:

1. Insert the bearing, bush, pulley, stopper plate, T-shaped bracket, and washer. The stopper plate should be inserted so as to prevent the derailing of the wire cable. Then engage the bolt and tighten it.
2. Now adjust for the place of this assembly on the door frames so that one pulley towards the hinge is in the vertical plane and the other is in the horizontal plane.

Figure 5 presents the schematic arrangement of the mechanism.

3. Fix them in the position using the screws.
4. Now pass the wire cable through the pulleys and attach the wire cable ends to the door and weight.

V. AESTHETIC IMPROVEMENT

The different arrangements are possible to improve the aesthetics of this ADC such as:

1. The hanging weight may be enclosed in a hollow tube/casing,
2. A pre-twisted spring, inside an enclosure, can be used on the upper door frame, replacing the need of the weight.

VI. ADVANTAGES

The following features make this design of ADC more advantageous:

1. It is cheap.
2. It can be installed by users.
3. It can be even developed at the user end with little support from the local machining workshop.
4. Maintenance is very easy, only few drops of lubricating oil will suffice the free movement of the doors.
5. The parts involved are such that the chances of their failure are virtually impossible, until some baby hangs on, taking it to be a swing, etc.

VII. ACKNOWLEDGMENT

The author is thankful to Mr. K. K. Srivastava for his efforts in making the ADC mechanism to come to reality from the conception.



Jeetender Singh Kushawaha is an Assistant Professor in the Department of Mechanical Engineering, Indus Institute of Technology and Management, Kanpur. He completed his AMIE from the Institution of Engineers, Kolkata and M. Tech. (Honors) from Harcourt Butler Technological Institute, Kanpur.

He has twenty years experience of aviation maintenance in Indian Air Force and four years of experience in teaching. He has several research papers to his credit.