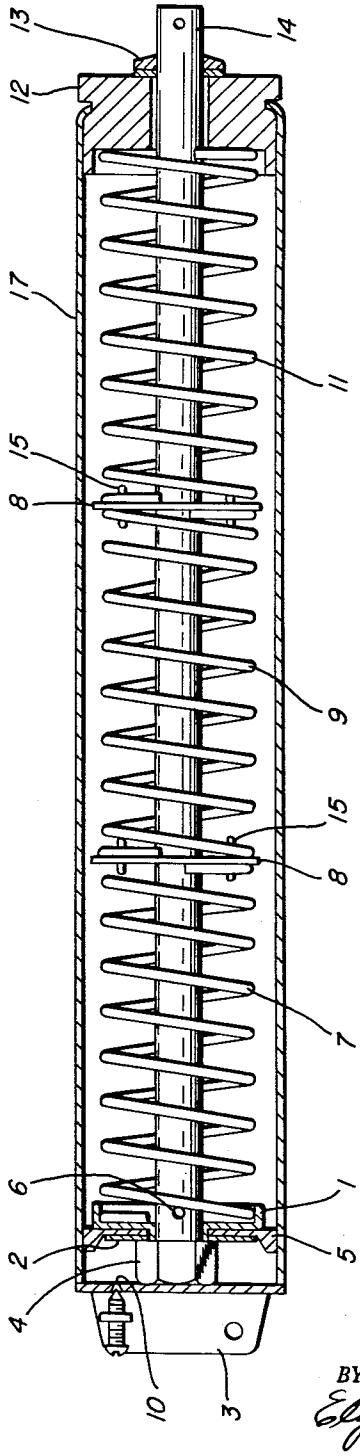
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DOOR CLOSER

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INVENTOR.
AVRUM S. KATZ

BY Ely, Pearne & Gordon
ATTORNEY

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DOOR CLOSER

Avrum S. Katz, Cleveland, Ohio, assignor to Sterling Industries, Inc., Cleveland, Ohio, a corporation of Ohio

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This invention relates to door closers of the type intended for use with screen doors and storm doors and the like and particularly to door closers which employ a compression spring which is loaded by opening of a door with which the device is associated and which also includes a fluid metering device which smoothly accommodates and controls return of the spring to its relatively uncompressed condition.

As used herein the term "compression spring door closer" means a door closer of the above type and of contemporary refined design in which the spring has those characteristics which are consistent with applicable design criteria, including necessary operating characteristics, exterior dimension limitations, and spring design considerations. More specifically, the term "compression spring door closer" pertains to door closers having a ratio of overall free length to mean spring diameter of from 12 to 20 and having a spring rate of 2 to 5 pounds per inch of deflection and having a desired optimum load (at a compressed length of from 6 to 10 inches) of from 10 to 25 pounds. This load is referred to as the latching load and is that load which obtains just prior to completion of expansion of the spring within the door closer housing, as upon closing of an associated door latch.

The latching loads of compression spring door closers of the prior art vary considerably in successive operations of each individual closer. An object of the present invention is to provide a door closer having improved constancy of latching load. The desired optimum latching load of a compression spring door closer may be chosen within fairly wide limits as indicated in the preceding paragraph, depending on the door dimensions and interrelation of the door closer and the door. However once the optimum latching load is chosen according to the above considerations, then it is important that such chosen latching load be achieved as constantly as possible in successive operations of each individual door closer. The more constant the latching load, the wider the variation in installation conditions which can be successfully met by the door closer. The installation conditions may include cases where the door closer and its accompanying door are installed as a screen door or the like where there is substantially no latch resistance and no air entrapment and therefore no cushioning during final closing of the door. On the other hand, the door may be installed with weather stripping in a door frame with a second interior or "permanent" door so that when the door in question is closed a considerable cushioning effect is encountered as the air trapped behind the door becomes slightly pressurized over the wide area of the door's expanse. This resistance may be augmented by a stiff latch. Obviously there are extremes in either direction beyond which the door closer cannot be expected to function satisfactorily, but the effect of increasing the constancy of the latching load of the door closer is to separate these extremes, and the door closer of the invention will therefore cover a wider range of conditions than previous door closers.

I have discovered that the constancy of latching load in compression spring door closers may be significantly improved by dividing the door closer spring into not less than three sections. While it would not appear that devices in which the spring load varied from say 20 pounds at latch loading condition up to say 36 pounds at door open condition could be significantly improved as to constancy by rendering the spring less uniform, this is nevertheless the result achieved by the present invention in the case of door closer springs having the characteristics expressly connoted by the term "compression spring door closers" as defined above. It may be noted that in such cases the provision of a double spring section effects no substantial improvement over a single spring and may actually result in inferior operation. It is the triple spring section that accomplishes the improved results.

The drawing is a sectional view of a door closer embodying the invention.

The drawing shows a door closer which in some respects is similar to conventional closers. When the associated door is opened, the shaft **14** is extended and the plunger comprising the elements **1** and **5** is moved in the rightward direction as the parts are viewed in the figure. When the door is released, the spring means **7, 9, 11** returns the door to the closed position, the plunger **1, 5** acting to limit the return movement or expansion of the spring so that the closing action will be smooth. The latching force exerted by the spring is that force exerted just before the spring fully expands to the condition illustrated in the drawing. Limiting of the speed of movement of the plunger **1, 5** is accomplished through metering of air or hydraulic liquid. Where air metering is used, it may be accomplished through an appropriate exterior metering orifice, such as the adjustable orifice **10**, which limits the ejection of air from the chamber on the left-hand side of the plunger **1, 5** to the exterior atmosphere. Where liquid metering is employed, a metering arrangement is provided to allow liquid to flow freely from the right to the left of the plunger **1, 5** but to limit liquid flow in the reverse direction. Since many conventional means are provided for these purposes, a further specific description of suitable conventional metering means is not believed necessary.

The three sections **7, 9** and **11** of the door closer spring may be spaced from the door closer rod or shaft **14** by means of washers **8** which have positioning tabs **15** struck therefrom or they may be positioned by other equivalent means. In the drawing, the positioning tabs on each washer appear to be at two positions 180 degrees apart. For more positive centering, it would be preferable to have tabs at three positions 120 degrees apart or four positions 90 degrees apart. The two-position arrangement is shown merely so that the spring ends may be more clearly seen in the drawing. The spring sections may have "flattened" or "squared" ends as indicated. The plunger **1, 5** includes a spring retainer element **1** and the rubber washer **5**, together with a retaining washer **2** which is held in place by a nut **4** threaded on the end of the shaft **14**. The plunger assembly just described may be tightened down against a steel pin **6** extending from the shaft **14**. Between the end body portions **3** and **12** of the door closer assembly extends the housing tube **17**. A lock or detent **13** may be provided on the shaft **14**, as shown. The shaft **14** may be pivotally attached at its end to a bracket which is mounted on the door to move with the door. The flange **3** may be pivotally attached to a stationary bracket mounted on the frame surrounding the door.

The drawing shows on a reduced scale, but in proper porportion, the elements of a "compression spring door

closer" as this term is above defined in terms of the design criteria and spring characteristics called for in devices of this type.

The above description of the invention should make it apparent that some details of the apparatus embodying the invention may be varied without departing from the teaching of the invention. For example, more than three spring sections may be provided, although this is not preferred because of higher costs. Accordingly, the scope of the invention is not to be limited to precise details of the specifically described embodiments but is to be defined by the following claims.

What is claimed is:

1. A compression spring door closer comprising a housing having a first closed end and a second end, a plunger disposed within said housing and adapted to shift between said ends and defining a fluid chamber adjacent said first end, fluid metering means communicating with said chamber for venting fluid therefrom when the plunger approaches said first end, spring means extending between said plunger and said second end to bias said plunger toward said first end, said spring means having a ratio of overall free length to mean spring diameter of from 12 to 20 and having a spring rate of 2 to 5 pounds per inch of deflection and having a load of from 10 to 25 pounds at a compressed length of from 6 to 10 inches, a rod extending from said plunger through said spring means and out said second end, said spring means being divided into three sections, and means mounted on said rod between each adjacent pair of said sections for holding the associated ends of said pairs in centered relationship around said rod.

2. A compression spring door closer comprising a housing having a first closed end and a second end, a plunger disposed within said housing and adapted to shift between said ends and defining a fluid chamber adjacent said first end, fluid metering means communicating with said chamber for venting fluid therefrom when the plunger approaches said first end, spring means extending between said plunger and said second end to bias said plunger toward said first end, said spring means having a ratio of overall free length to mean spring diameter of from 12 to 20 and having a spring rate of 2 to 5 pounds per inch of deflection and having a load of from 10 to 25 pounds at a compressed length of from 6 to 10 inches, a rod extending from said plunger through said spring means and out said second end, said spring means being divided into at least three sections, and means mounted on said rod between each adjacent pair of said sections for holding the associated ends of said pairs in centered relationship around said rod.

References Cited in the file of this patent

UNITED STATES PATENTS

1,743,360	Lang	Jan. 14, 1930
2,033,035	Koons	Mar. 3, 1936
2,482,114	Nixon	Sept. 20, 1949