Oct. 2, 1934. J. G. MITCHELL 1,975,430

HINGE

Filed May 6, 1933 2 Sheets-Sheet 1

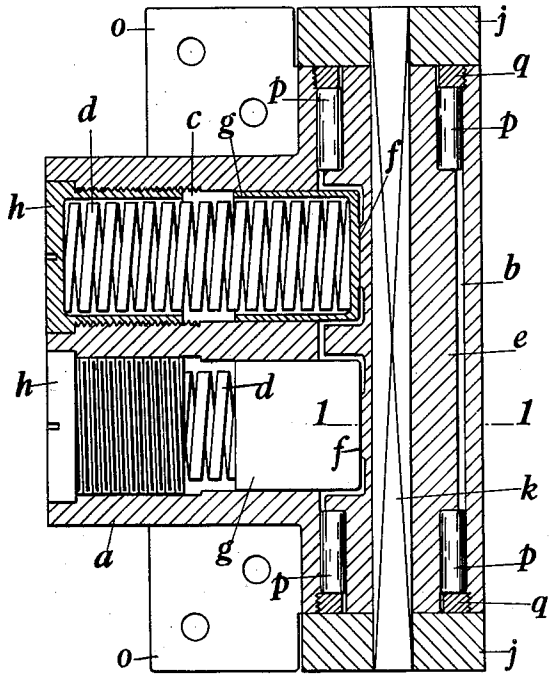


Fig.1

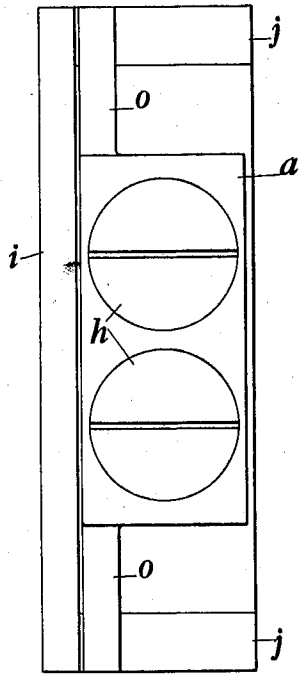


Fig.2

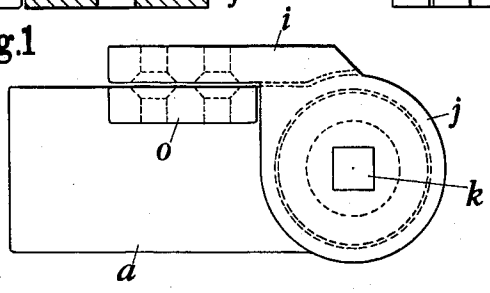


Fig.3

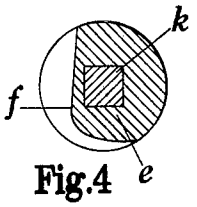


Fig.4

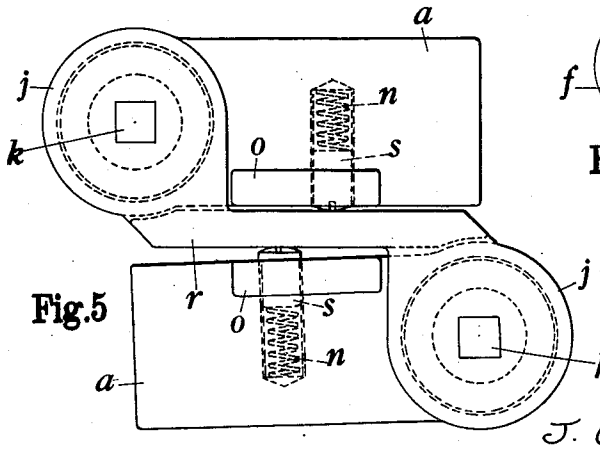


Fig.5

J. G. Mitchell
INVENTOR

By: Marks & Clark
Attys.

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HINGE

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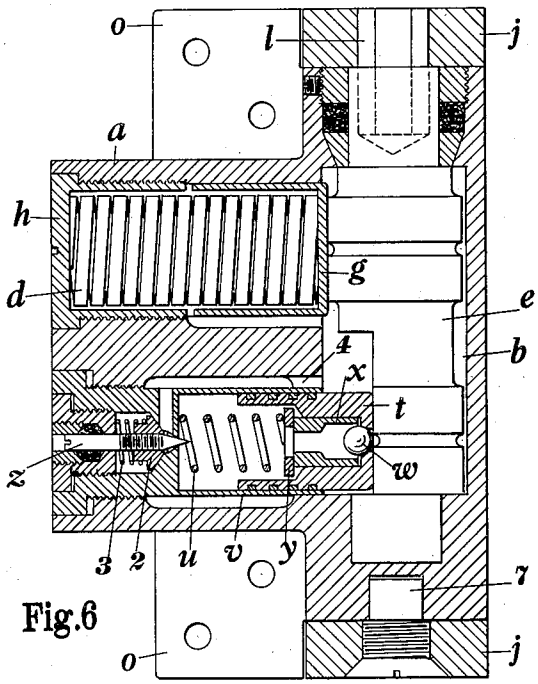


Fig.6

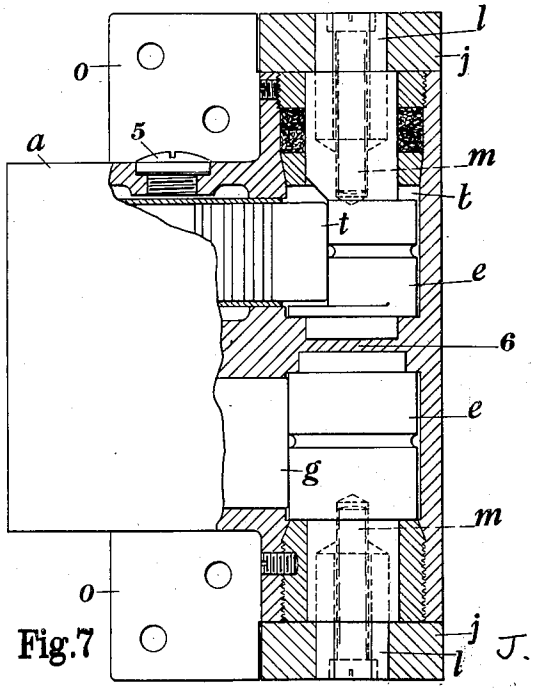


Fig.7

J. G. Mitchell
INVENTOR

By: Marks & Clerk
Attys.

Patented Oct. 2, 1934 1,975,430

UNITED STATES PATENT OFFICE

1,975,430

HINGE

James Garth Mitchell, Chichester Park, Belfast, Northern Ireland, assignor of one-half to Evered & Company, Limited, Smethwick, England

Application May 6, 1933, Serial No. 669,777
In Great Britain May 11, 1932

2 Claims. (Cl. 16—54)

This invention relates to hinges, and particularly door hinges with which are combined controlling springs and/or hydraulic check devices. The object of the invention is to provide improved constructions whereby springs or check devices or both can be combined with the hinges in a simple and convenient manner.

The invention comprises the combination of a hinge member provided with a cylindrical chamber which is coaxial with the pivot axis of the hinge, a complementary hinge member provided with lugs which extend across the ends of the said chamber, a cam like pivot piece or pieces contained within the said chamber, means for interconnecting one or each of the said lugs and the pivot piece or pieces, and a controlling spring or springs, or a hydraulic check device, or both a controlling spring or springs and a hydraulic check device, arranged in association with the said chamber and adapted to co-operate with the pivot piece or pieces.

In the two accompanying sheets of explanatory drawings:—

Figure 1 is a sectional side elevation, Figure 2 an end view and Figure 3 a plan of a single hinge constructed in accordance with this invention.

Figure 4 is a sectional plan of the pivot piece on the line 1—1 Figure 1.

Figure 5 is a plan of a double hinge constructed in accordance with the invention, the main features of this hinge being similar to those used in the hinge shown in Figures 1–3.

Figure 6 is a sectional side elevation of a single hinge provided in accordance with this invention, with a controlling spring and a hydraulic check device. Figure 7 is a similar view to Figure 6 illustrating a modified form of the pivot construction.

Referring to Figures 1–3, one part *a* of the hinge is formed along one side or edge with a cylindrical chamber *b*, and extending from this chamber transversely across the said part is another cylindrical chamber or a pair of cylindrical chambers *c* adapted to contain a controlling spring or springs *d*. In the first mentioned cylindrical chamber *b* there is inserted a cylindrical pivot piece *e*. This pivot piece is formed along one side adjacent to the spring or each spring with a flat or other cam surface *f* with which the controlling spring or springs can co-operate. Preferably a hollow cylindrical thimble *g* is placed over the end of the spring or each spring adjacent to the pivot piece for the purpose of transmitting the spring pressure to the cam. At the other end of the spring is arranged a hollow screwed plug *h* which engages the cylindrical chamber *c* containing the spring, the outer end of the plug being exposed so as to be conveniently accessible for adjustment or replacement of the spring without taking the door off its hinges.

The other, or complementary part, of the hinge *i* is formed with a pair of lugs *j* which fit over the ends of the chamber *b*. Connection between one or each of the lugs and the pivot piece *e* can be effected in a variety of ways. In the example shown in Figures 1–3, a square or other non-circular pin *k* fitting a correspondingly shaped hole in the pivot piece and both lugs is used. Alternatively, as shown in Figure 7, a short hexagonal or other non-circular pin *l* is inserted through each lug into a socket in the adjacent end of the pivot piece and secured by a screw *m*. Or as shown in Figure 6 a short hexagonal or other non-circular pin *l* is inserted through one lug only into engagement with a socket in the adjacent end of the pivot piece. At the other end a short screw pin 7 is inserted through the lug into engagement with the adjacent solid end of the chamber *b*.

Reverting to the example shown in Figures 1–3, the part *a* is attached to the door by means of screws inserted through lugs *o*, the door edge being suitably cut away to accommodate the cylindrical parts *b* and *c*. The part *i* of the hinge is secured to the frame of the door by screws inserted through suitably disposed holes. The opposite ends of the pivot piece may advantageously be supported in the cylindrical chamber *b* by bearing rollers *p* which are held in position by rings *q*.

In a double acting hinge I employ three main parts, two of which are adapted for attachment to the door and its frame respectively whilst the other lies between them. It will be understood that a double acting hinge is one which allows the door to be swung to either side of its closed position, whereas a single acting hinge (as shown in Figures 1–3) is one which allows movement of the door in one direction only. In the example of double acting hinge shown in Figure 5, there are employed a pair of parts *a* each provided with cylinders *b*, *c* as above described, and these are interconnected by a plate *r* having formed at each of its opposite edges a pair of lugs *j* for co-operating with the ends of the chambers *b*. To permit of convenient adjustment after the hinge has been fixed in position, so that the door hangs correctly when closed, one or each of the parts *a* is provided with an adjustable screw abutment *s* the outer end of which can act as a stop for the

plate *r*. Accidental rotation of the screw is prevented by arranging at its inner end a compression spring *n*. The three parts of the hinge can readily be brought into the required relationship for the purpose of bringing the door to the correct position when closed, by suitably adjusting the extent to which the outer end of either screw abutment projects.

The example shown in Figure 5, illustrates a hinge in which the parts containing the springs are situated on opposite sides of a central plate. If desired the springs may be combined with the central part, in which case the outer parts consist of flat plates formed with end lugs which fit over the ends of the intermediate part.

When a hydraulic check device is combined with the hinge, a construction such as is exemplified in either of Figures 6 or 7 may be used. Each of these is essentially similar to the hinge shown in Figures 1–3, but one of the springs is replaced by a check device, and the vertical plane passing through the axis of the pivot piece and through the peak of the cam face acting on the spring is at right angles to the vertical plane passing through the axis of the pivot piece and through the peak of the cam face acting on the check device.

The check device comprises a hollow piston *t* adapted to co-operate at one end with the adjacent cam of the pivot piece, a spring *u* being arranged to act upon that part of the piston which lies within the containing cylinder *v*. Within the outer or closed end of the piston is arranged a nonreturn valve in the form of a ball *w* which is preferably carried in a tubular cage *x*, the cage being held in position by means of the piston spring acting through the medium of a washer *y*. At the closed end of the cylinder there is arranged an adjustable valve *z* whereby the rate of displacement of oil or other fluid from the cylinder by means of the piston can be regulated, this valve being accessible at the side of the hinge which is remote from the pivot piece. The regulating valve is carried by a relief valve 2 which is held on a seating by means of a spring 3. So long as the fluid pressures set up are not excessive, this valve 2 always remains in contact with its seating, but in the event of an excessive fluid pressure being set up the valve moves and carries the regulating valve with it so allowing a free displacement of fluid from the cylinder. At the exterior of the cylinder *v* an annular passage 4 is provided for the flow of displaced fluid, this passage communicating with the chamber containing the pivot piece *e*. Charging of the device with oil or other liquid is effected through the hole which is closed by the screwed plug *h*.

During the opening of the door, the portion of the pivot piece *e* acting on the controlling spring *d* compresses the spring, and meanwhile the check piston moves outwards under the action of its spring *u*. When the door is released it is urged towards its closed position by the spring *d* and this movement is controlled by the resistance of the fluid displaced by the piston *t* through the valve *z*.

The example shown in Figure 7 differs mainly from that shown in Figure 6, in that two pivot pieces *e* are used, one for co-operating with the spring and the other for co-operating with the check. The chamber *b* containing the pivot pieces is divided into two compartments by a partition 6. Also the positions of the spring and piston are interchanged, the piston *t* being arranged above the spring actuated part *g*. This construction may be preferred when it is desired to avoid access of oil to the portion containing the controlling spring. Filling of the chamber containing the piston *t* is effected through a plug 5.

From the foregoing it will be seen that an essential feature of my invention consists in the employment of a pivot piece or pieces which is or are for the greater part enclosed in a cylindrical chamber, the connection between the pivot piece and the corresponding hinge part being effected at one or each end of the pivot piece. By the use of such pivot pieces I am able to provide the required cams in a very simple and convenient manner and also to obtain a compact arrangement of the controlling spring or check device.

The invention is not limited to the examples above described as subordinate details of construction or arrangement can be varied to meet different requirements.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:—

1. A hinge comprising the combination of a hinge member provided with a main cylindrical chamber which is coaxial with the pivot axis of the hinge, a pair of auxiliary cylindrical chambers communicating with and extending from the main chamber transversely across the said member, a complementary hinge member provided with lugs which extend across the ends of the main chamber, cam like pivot means contained in the main chamber and connected to the said complementary hinge member, a pair of pressure surfaces formed in spaced angular relationship on the said pivot means, a spring arranged in one of the auxiliary chambers and co-operating with one of the said surfaces, a hydraulic check device arranged in the other auxiliary chamber and co-operating with the other of the said surfaces, and a removable plug closing each auxiliary chamber at the end remote from the main chamber, substantially as described.

2. A hinge as claimed in claim 1, in which the hydraulic check device comprises the combination of a piston, a non-return valve in one end of the piston, a cylinder containing the piston, a spring acting on the piston, an adjustable regulating valve for controlling the flow of fluid from the cylinder, a release valve carrying the regulating valve and mounted in the removable plug of the corresponding auxiliary chamber, and a spring acting on the release valve, substantially as described.

JAMES GARTH MITCHELL.