

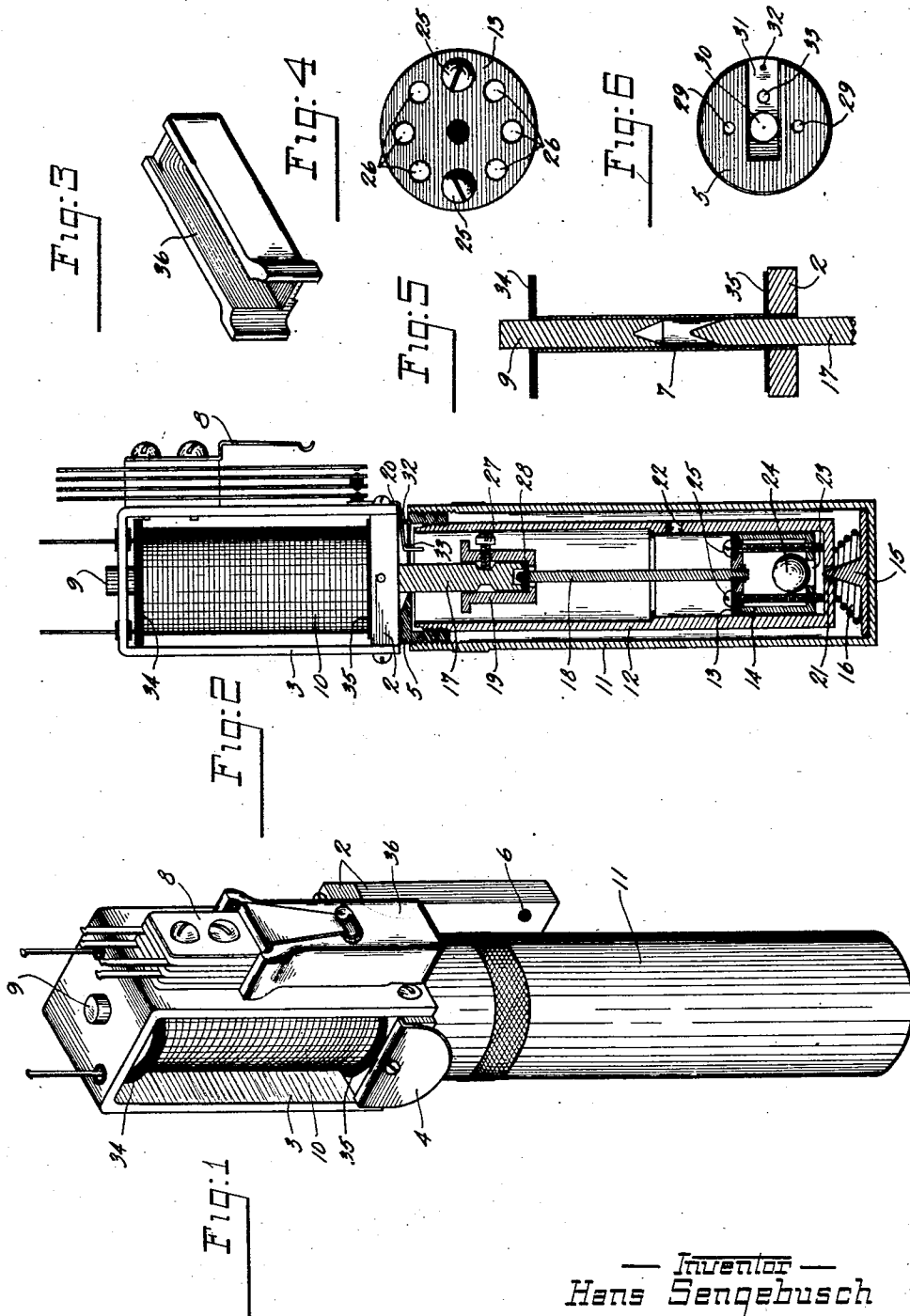
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H. SENGEBUSCH

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DASHPOT RELAY

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— Inventor —  
Hans Sengebusch  
Chas. M. Caudy. Atty.

## UNITED STATES PATENT OFFICE.

HANS SENGEBUSCH, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO  
AUTOMATIC ELECTRIC INC., OF CHICAGO, ILLINOIS, A CORPORATION OF DELA-  
WARE.

## DASHPOT RELAY.

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This invention relates in general to dash-  
pot relays and its object, broadly stated, is to  
provide a new and improved dashpot for a  
relay of this type. More specifically, the  
principal object of the invention is to provide  
a dashpot in which the slow action can be  
regulated from the outside and without  
dismounting or disassembling any of the  
parts.

To accomplish the foregoing and other  
useful ends this invention comprises means  
which will be fully described in the speci-  
fication which is to follow, reference being  
had to the accompanying drawing, in which  
Fig. 1 is a perspective view of the entire  
relay; Fig. 2 is a vertical front view of the  
relay, partly in section, with the dashpot  
tension plate and spring assembly cap or  
cover removed; Fig. 3 is a perspective view  
of the cover for the relay springs; Fig. 4 is  
a top view of the piston; Fig. 5 is a vertical  
cross section of the solenoid spool and its  
associated equipment; and Fig. 6 is a top  
view of the dashpot cap or coupling.

The dashpot relay illustrated comprises  
essentially an operating magnet, a solenoid  
in this case, a set of contact springs adapted  
to be operated by the solenoid plunger rod,  
and a dashpot for delaying or slowing up  
the operation of the plunger when it is at-  
tracted. The release of the plunger, it may  
be stated, is not delayed appreciably by the  
dashpot and takes place, therefore, very  
quickly. Relays of this general type are  
well understood and need not be described  
in detail, except in so far as the new features  
are involved. It may be mentioned, how-  
ever, that a dashpot relay is used in a circuit  
where delayed operation or slow action is  
required, as for example where it is desired  
to operate an alarm or other signal after  
the expiration of a predetermined time  
interval.

The mounting bracket 2, as shown in Figs.  
1 and 2, is cast metal, finished and tapped  
for mounting with screws, the heel piece 3,  
tension plate 4, cap or coupling 5, and for  
being itself mounted in an upright position  
by screws passing through staggered screw  
holes, one of which is shown as 6 in Fig. 1.  
The top or extended portion of the bracket  
has a hole drilled through it to accommodate  
the extension of the solenoid tube or sleeve  
7, as shown in Fig. 5.

The heel piece 3, shown in Figs. 1 and 2, 55  
is a metal strip bent and tapped for mount-  
ing the spring assembly 8. It is drilled to  
accommodate the core 9, and insulating bush-  
ings at its upper end through which are  
taken terminals for making connections. 60  
The outside or clamping member of the  
spring assembly 8 is extended to act as a  
spring to hold the bakelite cover 36 in place  
as shown in Fig. 1. This cover is shown  
more in detail in Fig. 3 and it acts to protect 65  
the springs and contacts from dirt or other  
injury.

The dashpot assembly consists of two  
metal cylinders 11 and 12 with a "needle"  
valve 15 at the bottom and between them, 70  
which is held in place by means of the coil  
spring 16, as best shown in Fig. 2. The  
inner cylinder 12 is drilled out to accommo-  
date the piston numbered 13, 14, etc., and has  
a "needle" valve aperture 21 drilled in the 75  
bottom, and an outlet hole 22 drilled in the  
side. The outer cylinder 11 is drilled out to  
accommodate the inner cylinder 12 and hold  
the oil, or other suitable liquid, which flows  
through the inner cylinder and piston to 80  
control the latter's action.

The cap or coupling 5, shown in Figs. 2 and  
6, has its sides threaded to hold the two  
cylinders, and has its top drilled with holes  
29, 30 and 33 so as to be fastened to mount- 85  
ing plate 2 by means of screws, to permit  
free movement of the plunger rod 17, and to  
accommodate the spring lever 20, respec-  
tively. The cap also has a slot 31 cut in its  
top to accommodate the spring 20, and a pin 90  
32 to help hold said spring.

The plunger rod 17 of the solenoid is con-  
nected to the piston rod 18 by means of a  
combination coupling and spring control  
member 19, the connection being made by a 95  
screw 27 and split washer 28, as shown in  
Fig. 2. The coupling and spring control  
member 19 has a collar at its upper end  
which strikes the lower end of the spring  
lever 20 and causes it to operate and control 100  
the springs in spring assembly 8.

The solenoid spool assembly consists of a  
non-magnetic metal tube or sleeve 7, as best  
shown in Fig. 5, with a rather heavy piece  
of fibre 34 at its upper end and a light fibre 105  
strip 35 at its lower end, resting against the  
mounting bracket 2 to insulate the winding  
therefrom. The sleeve extends through the

mounting bracket to add strength, and to give a uniform, non-magnetic bearing surface for the plunger rod 17. The tight fitting core 9 adds strength to the assembly, closes the tube or sleeve against falling solder or other foreign matter, and increases the magnetic attraction for the plunger rod by shortening the air gap between the plunger rod and the heel piece 3 (Figs. 1 and 2). The air gap is further shortened by the cone-shaped construction of the core and plunger rod.

The piston assembly consists of a vertical cylindrical member 14 with a valve aperture 23 in its base, in front of which the ball valve 24 operates, as shown in Fig. 2. The piston has a cap or cover plate 13, as shown in Figs. 2 and 4, which is held in place by screws 25, and which has six holes 26 for the free passage of oil during either movement of the piston.

Having briefly explained the purpose of the invention and the apparatus involved in carrying it out, its operation may now be explained more in detail. For this purpose it will be assumed that the relay is connected in a circuit of correct voltage and that the dashpot is filled with the proper amount and kind of oil, the amount in this case being such as to always keep the outlet 22 submerged.

When the solenoid 10 is energized, the plunger rod 17 is attracted to raise the piston 13, 14, etc., against the vacuum created in the bottom of the cylinder 12. The needle valve aperture 21 now entirely controls the flow of oil through the cylinder and makes the piston slow to pull up, its speed depending upon the size of the aperture which is regulated by screwing up or unscrewing the outer cylinder 11 which holds the "needle" valve 15. As the piston raises an amount of oil equal to that sucked through the "needle" valve aperture flows back through the relatively large outlet 22. The desired slow operation is completed when the contacts of the springs in the assembly 8 are closed by the spring lever 20 through contact with the collar of the coupling 19 in its upward movement. The piston remains in its pulled up or operated position as long as the solenoid 10 remains energized.

When the solenoid 10 is deenergized, the solenoid plunger rod 17 is released and falls down by gravity, thereby allowing the coupling 19, piston rod 18 and piston 13, 14, etc. to also fall. The coupling 19 in falling releases the spring lever 20, which in turn allows the springs in assembly 8 to return to normal. The piston in falling allows the oil to unseat the ball valve 24 and rush through the rather large aperture 23 and openings 26, thus making it quick to restore.

The principal advantages in a dashpot

constructed in the manner described in the foregoing are, that the adjustment of the slow action valve is controlled from the outside, and that the oil cannot leak out.

Having described my invention, what I consider to be new and desire to have protected by Letters Patent will be pointed out in the appended claims.

What I claim is:

1. The combination, in a dashpot relay, of an inner cylinder containing a piston and having a valve aperture in its base and an outlet hole in its side, with an outer cylinder containing said inner cylinder and a needle valve for regulating said valve aperture, all substantially as set forth.

2. In a dashpot relay, the combination of an inner cylinder having a piston and a valve aperture, with an outer cylinder having a needle valve, said outer cylinder being adjustable, thus causing said needle valve to regulate the size of said valve aperture and control the slow action of said piston, substantially as described.

3. In a dashpot relay, the combination of a cylinder within a cylinder having a slow acting valve between them, with a coupling for joining and spacing said cylinders so as to regulate said valve to the desired slow action, substantially as described.

4. In a dashpot, a piston having a relatively large valve aperture closed when the piston is raised, an inner cylinder having a small valve aperture in its base and an outlet aperture in its side which are always open, a ball valve for closing said large valve aperture, a needle valve for regulating said small valve aperture, and an outer cylinder enclosing all and being capable of adjusting said needle valve.

5. In a dashpot, a container, a pump inside said container and comprising a piston and cylinder, said cylinder having an opening in the bottom thereof, means for regulating the size of said opening to regulate the speed of the piston when the same is raised, and means for adjusting said regulating means from the outside of said container.

6. In a relay, a dash pot, a reservoir for holding fluid for retarding the operation of said relay, a plunger containing a ball valve, said plunger being located within said dash pot and being effective upon energization of said relay to pump said fluid from one part of the dash pot to another, and a needle valve in said dash pot for regulating said pumping action.

7. In combination with a relay using fluid to retard its action, a dash pot mechanism comprising two separate chambers for said fluid including a ball valve cooperating with a needle valve for regulating the action of said relay, said needle valve being located between said chambers and used for control-

ling the flow of fluid from one chamber to the other.

8. In a dash pot type of slow acting relay using fluid to retard its action and comprising two separate chambers for said fluid, an adjustable needle valve cooperating with a ball valve for regulating the effectiveness of the retarding action, said needle valve being located between said chambers and used for controlling the flow of fluid from one chamber to the other.

9. In a dash pot mechanism, a cylinder, a piston within said cylinder provided with a valve effective to retard the movement of the piston in one direction only, a second cylinder, an opening connecting the first cylinder with the second, and means controlled by the second cylinder for regulating the size of the opening to further affect the action of said piston.

10. In a dash pot mechanism, a cylinder, a piston within said cylinder, a second cylinder, an opening connecting the two, the size of the opening directly affecting the speed of operation of said piston, and means operated by the rotation of one of said cylinder for regulating the size of the opening.

11. In a dash pot relay a solenoid spool assembly, a heel piece, a non-magnetic

sleeve, a tight fitting magnetic core within the upper section of said sleeve and having its lower end drilled out to form a hollow cone, and a movable core in the lower section of said sleeve having its upper end shaped into a solid cone to increase the magnetic attraction for the plunger by shortening the air gap between the plunger and the heel piece.

12. In combination with a dash pot slow acting relay, a flanged coupling member fastened to said relay, an outer cylinder threaded to the outside of said member, an inner cylinder threaded to the inside of said member, a piston in said inner cylinder operated by said relay, a ball valve in said piston cooperating with a needle valve arranged between said cylinders, a fluid in said cylinders for retarding the action of said piston, and means turning said outer cylinder on said coupling member for regulating said needle valve to adjust the flow of fluid between said cylinders and regulate the action of said relay.

In witness whereof, I hereunto subscribe my name this 2d day of October, A. D., 1923.

HANS SENGEBUSCH.