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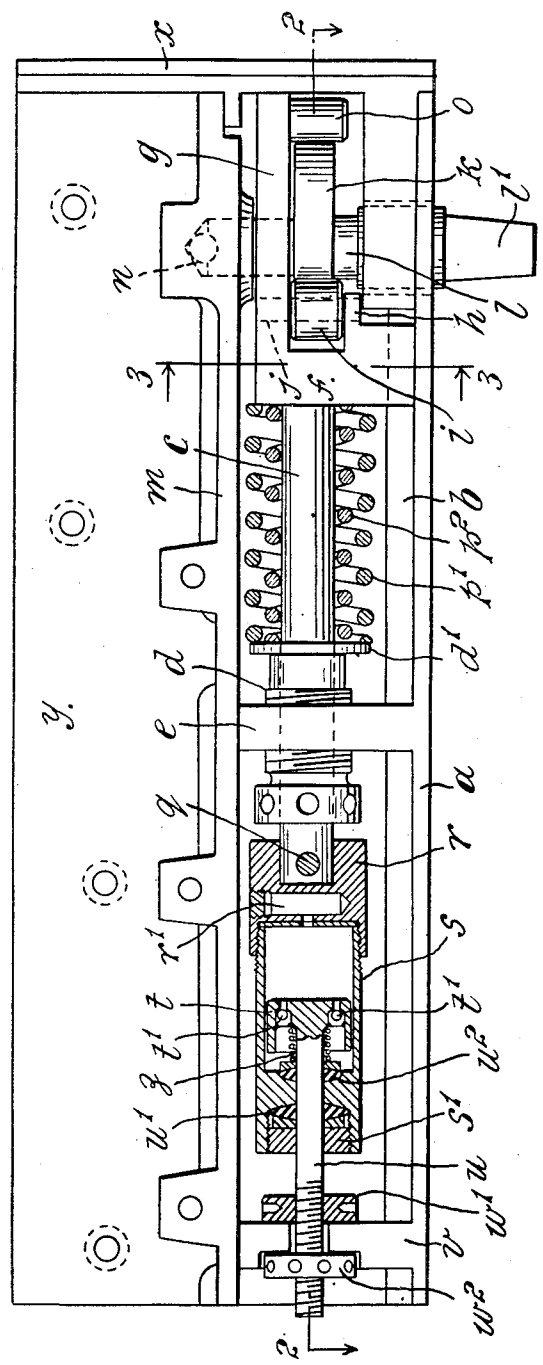
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DOOR CLOSING SPRING AND CHECK

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Fig. 1.



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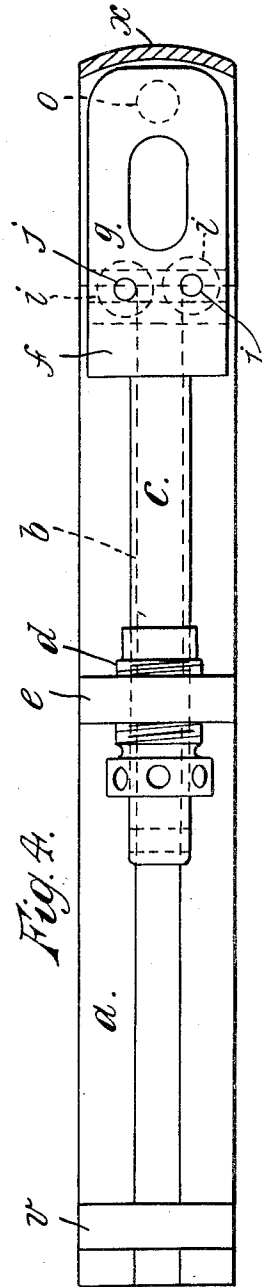
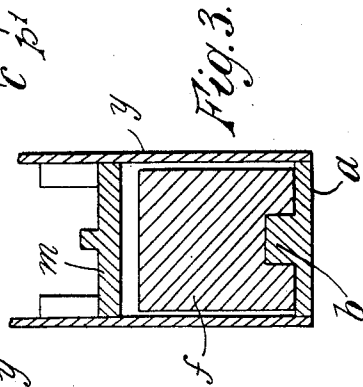
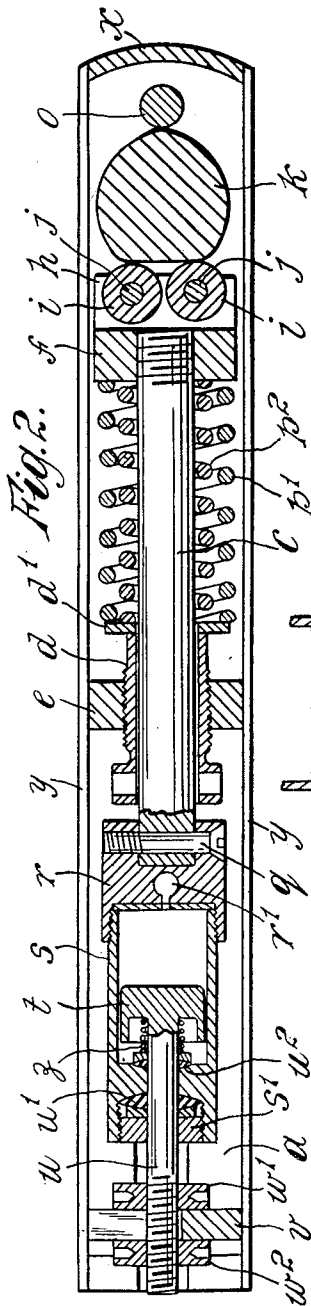
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DOOR CLOSING SPRING AND CHECK

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2 Sheets-Sheet 2



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DOOR CLOSING SPRING AND CHECK

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4 Claims. (Cl. 16—55)

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This invention relates to a door-closing spring and check of the kind which is mounted in a shoe at the heel of a door, as distinguished from being mounted in a casing sunk in the floor, and which comprises a squared-ended spindle held against rotation by engagement in a square socket sunk in the floor, and having a cam thereon constantly in contact with rollers and with a cam follower, on the head of a stem extending through a helical spring, which is compressed when the door is opened, to a dash pot which checks the closing of the door.

Hitherto, the stem of such a door spring has been guided by sliding along the cheek plates of the casing which encloses the spring and check, and which are flush with the side faces of the door. The cheek plates have to be massive in order to be sufficiently strong to resist the lateral thrust of the head of the stem caused by the opposition of the extremely powerful pressure of the spring in being compressed, on opening the door. Such necessarily massive cheek plates together with the allowance of a sufficient width of space in the casing to accommodate the necessarily massive spring and check mechanism, cause the overall width of the casing to be greater than is desirable especially when the casing forms the heel of a pressed steel door.

The object of the invention is to provide a combined door shoe door spring and check where-in the head of the stem is effectively guided by robust means other than the cheek plates of the enclosing casing, which checks therefore need not be massive, thus enabling the casing to be of minimum width.

According to the invention, in a door shoe door spring and check having a spindle held against rotation and having a cam thereon constantly in contact with rollers and with a cam follower, on the head of a stem extending through a helical spring, which is compressed when the door is opened, to a dash pot which checks the closing of the door, the head of the stem and the base plate of the casing of the door spring and check are interengaged by a feather and keyway connection extending longitudinally along the base plate. For instance and preferably, the underside of the head of the stem is formed with a keyway notch which is engaged on a feather rib on and extending longitudinally along the base plate of the casing of the door spring and check.

The nose of the substantially heart-shaped cam is directed away from the helical spring and towards the heel of the door and the two rollers on the head of the stem and against one

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of which the respective rise of the cam bears when the door is opened, are mounted between the cam and the base of the head which bears against the helical spring.

A door shoe door spring and check constructed according to the invention is shown, by way of example, in the accompanying drawings, in which—

Fig. 1 is a side elevation, partly in section, of the door shoe door spring and check, with the nearer cheek plate removed.

Fig. 2 is a horizontal section on the line 2—2 of Fig. 1.

Fig. 3 is a transverse section on the line 3—3 of Fig. 1.

Fig. 4 is a plan of the base plate with only the stem and its head mounted thereon.

a is the base plate of a casing of a door shoe door spring and check.

The base plate *a* is formed with a longitudinally extending feather rib *b* at its midwidth.

c is a stem sliding in a capstan-headed screw-threaded sleeve *d* adjustably screwed in a partition *e* on the base plate *a*.

The stem *c* has a head *f* formed with a keyway notch which fits over the feather rib *b* of the base plate *a*. From the head *f* two lugs *g*, *h* extend, between which two rollers *i* are mounted on spindles *j* extending between the lugs *g*, *h*. The upper lug *g* extends over a heart-shaped cam *k* fast on a spindle *l*, journaled in the base plate *a* and in a cover plate *m*, in the journal socket of which it bears against a ball *n*. The lower end *l*¹ of the cam spindle *l* is squared to fit in a square floor socket (not shown). A cam follower pin *o* projects downwards from the upper lug *g* of the head of the stem *c*. The heart-shaped cam *k* is constantly in contact with the cam follower pin *o* and with one or the other of the rollers *i*, so that as the door is opened swinging the base plate *a* around the axis of the cam spindle *l*, one or the other of the lateral rises of the cam *k* presses one or the other of the rollers *i* and thereby displaces the stem *c* away from the cam spindle *l*.

*p*¹, *p*² are concentric helical springs through which the stem *c* extends and which by one end abut against the base of the head *f* of the stem *c* and by the other against the respective end of the capstan-headed screw-threaded sleeve *d*, with an interposed washer *d*¹. Displacement of the stem *c* by the rollers *i* bearing against the shoulders of the cam *k* on opening the door, compresses the springs *p*¹, *p*² by pressing the base of the head *f* thereagainst.

By its guidance in the sleeve *d* which extends

through the partition *e*, the stem *c* is prevented from canting and thereby binding on the feather rib *b*.

Beyond the capstan-headed sleeve *d*, the end of the stem *c* is secured, by a transverse screw pin *q*, in a socket in a block *r* screwing on and closing a dash pot cylinder *s*. This dash pot cylinder *s* contains a piston *t* the rod *u* of which extends through the base of the dash pot cylinder *s* and through a notch in a partition *v* on the base plate *a*, where it is adjustably held by two capstan nuts *w*¹, *w*², one on each side of the partition *v*.

The dash pot cylinder *s* is partially filled with oil through a screw plug closed port *r*¹ in its closure block *r*.

On opening the door and consequent thrust by the cam *k* of the stem *c* towards the left of Fig. 1, the dash pot cylinder *s* is freely displaced over the piston *t*, as the oil in the cylinder *s* can then flow through ports in the piston *t* containing non-return ball valves *t*¹. On the closure of the door by the springs *p*¹, *p*² pressing against the base of the head *f* of the stem *c*, the non-return ball valves *t*¹ close under the pressure of the oil trapped between the returning base of the cylinder *s* and the piston *t*. The oil can then slowly return only by leaking past the piston *t*.

The door in closing is prevented from over-running the dash pot *s*, by the constant engagement of the cam follower pin *o* with the cam *k*.

The end of the base plate *a* adjacent to the cam *k* is closed by an upstanding flange *x*, to which and to the partitions *e* and *v*, the cover plate *m* and the side cheek plates *y* of the casing are secured.

The piston rod *u* is packed on one side by a washer *u*¹ pressed by a gland *s*¹ screwing in the base of the cylinder *s* and on the other side by a washer *u*² pressed by a spring *z*.

The non-return ball valves *t*¹ are held in their ports by the mouths of such ports being contracted by being burred inwards.

The dash pot *s* is not completely filled with oil so as to allow for the increasing volume of piston rod *u* within the closed dash pot cylinder *s* whilst the cylinder *s* progressively engulfs the piston *t* and furthermore additional space for air is provided, the pocket of air left therein becoming compressed as the piston rod *u* is engulfed.

I claim:

1. In a door shoe door spring and check, a base plate, a cover plate, a squared-ended spindle journaled in said base plate and cover plate, a cam on said spindle, a sliding stem having a head, a feather and keyway connection of said head to said base plate extending longitudinally along said base plate, rollers and a cam follower pin on said head contacting with said cam, a partition on said base plate through which said stem extends, a helical spring through which said stem extends and bearing against said head thereof and said partition, a dash pot cylinder connected to said stem, a piston in said cylinder, a piston rod connected to said piston, a second partition on said base plate, and means on said base plate adjustably holding said piston rod against longitudinal displacement.

2. In a door shoe door spring and check, a base plate, a feather rib extending longitudinally along said base plate, a cover plate, a squared-ended spindle journaled in said base plate and cover plate, a cam on said spindle, a sliding stem having a head formed with a keyway notch engaging said feather rib, rollers and a cam follower pin on said head contacting with said cam, a partition on said base plate through which said stem extends, a helical spring through which said stem extends and bearing against said head thereof and said partition, a dash pot cylinder connected to said stem, a piston in said cylinder, a piston rod connected to said piston, a second partition on said base plate, and means on said base plate adjustably holding said piston rod against longitudinal displacement.

3. In a door shoe door spring and check, a base plate, a cover plate, a squared-ended spindle journaled in said base plate and cover plate, a cam on said spindle, a sliding stem having a head, a feather and keyway connection of said head to said base plate extending longitudinally along said base plate, rollers and a cam follower pin on said head contacting with said cam, a partition on said base plate through which said stem extends, a helical spring through which said stem extends and bearing against said head thereof and said partition, a dash pot cylinder connected to said stem, a piston in said cylinder, a piston rod connected to said piston, a second partition on said base plate and having a notch through which said piston rod extends, and a nut on said piston rod on each side of said second partition.

4. In a door shoe door spring and check, a base plate, a feather rib extending longitudinally along said base plate, a cover plate, a squared-ended spindle journaled in said base plate and cover plate, a cam on said spindle, a sliding stem having a head formed with a keyway notch engaging said feather rib, rollers and a cam follower pin on said head contacting with said cam, a partition on said base plate through which said stem extends, a helical spring through which said stem extends and bearing against said head thereof and said partition, a dash pot cylinder connected to said stem, a piston in said cylinder, a piston rod connected to said piston, a second partition on said base plate and having a notch through which said piston rod extends, and a nut on said piston rod on each side of said second partition.

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