Jan. 24, 1928. 1,657,174

J. P. MORSE

PRESS BUTTON FASTENING

Filed Aug. 30, 1924 3 Sheets-Sheet 1

Fig.1.

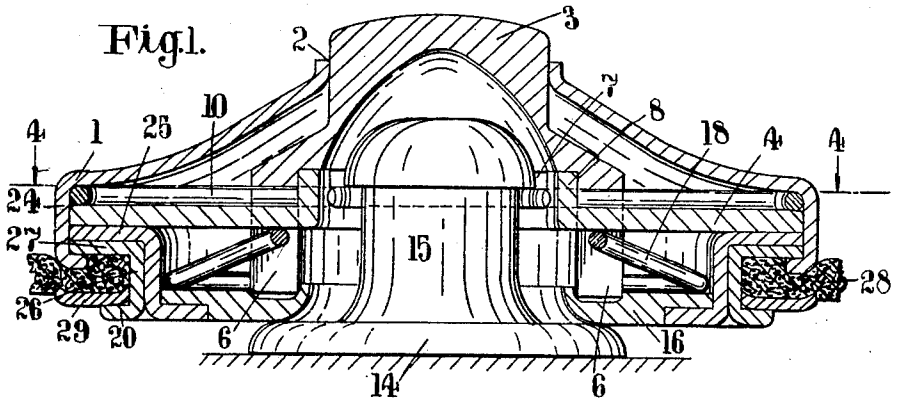


Fig.2.

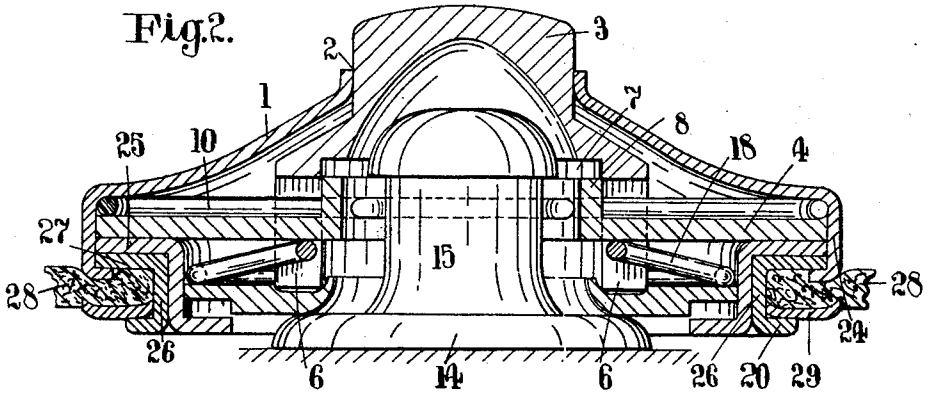
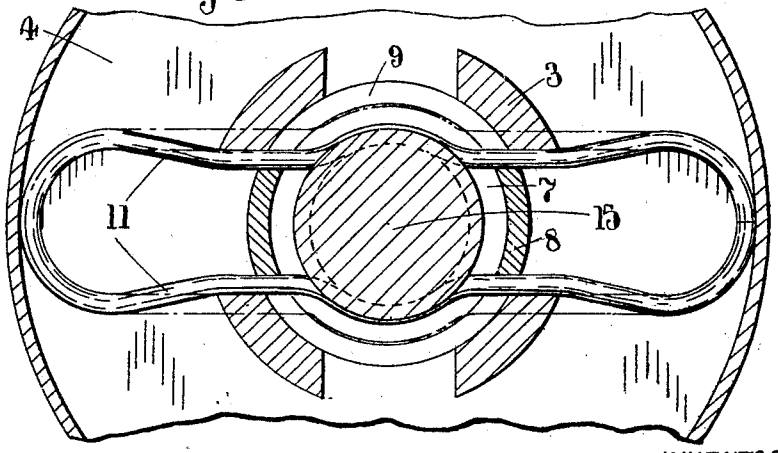


Fig.4



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Fig.3.

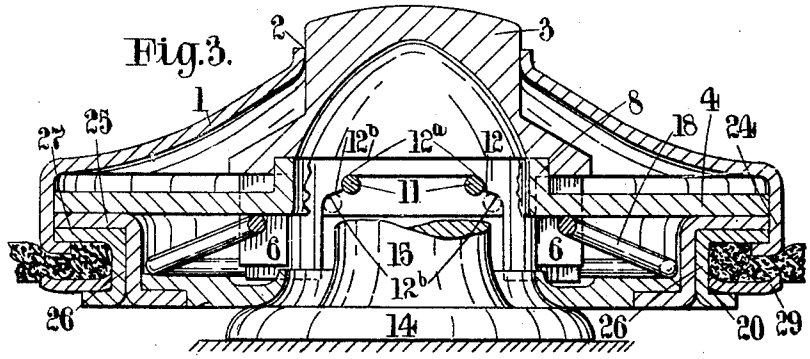


Fig. 5.

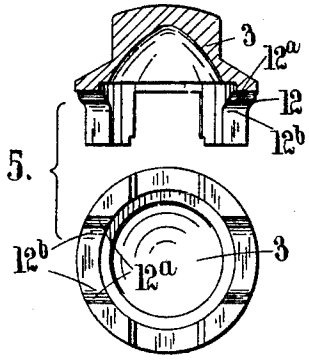


Fig.6.

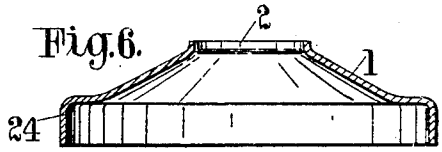
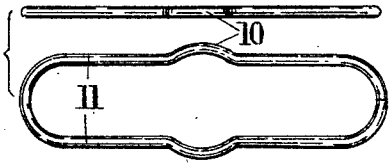


Fig.7.



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Fig.8.

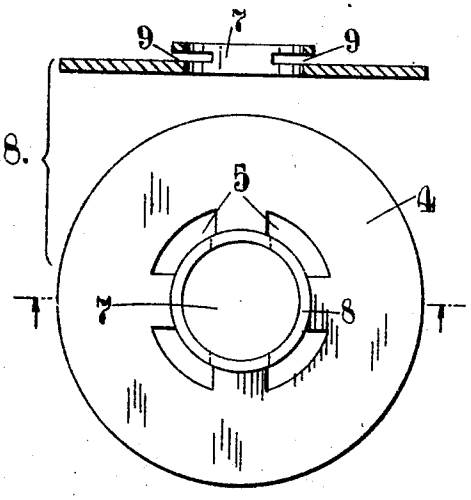


Fig.9.

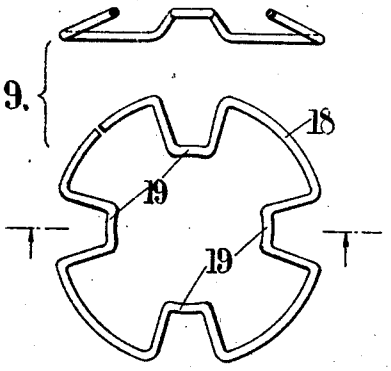


Fig.10.

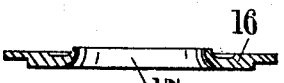


Fig.11.

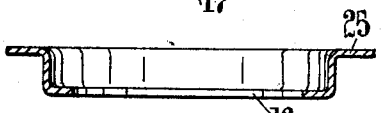
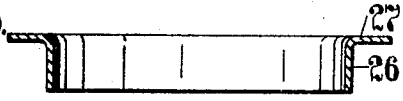


Fig.12.



Fig.13.



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UNITED STATES PATENT OFFICE.

JOHN PHILIP MORSE, OF KENLEY, ENGLAND.

PRESS-BUTTON FASTENING.

Application filed August 30, 1924, Serial No. 735,216, and in Great Britain July 2, 1924.

This invention relates to stud and eye fastenings of the type in which the female member is provided with locking and unlocking means for engaging beneath the head of the stud.

There has recently been developed a stud and eye fastening of the above kind in which the female member is formed of three separate parts, two parts being so arranged that on relative movement in one direction the fastening is opened and on relative movement in the other direction the fastening is closed, the third part serving as an abutment adapted to engage with a part of the stud, such as the base, or with the cloth or wall on which the stud is mounted so that the relative movement above described can be conveniently effected in one case by depressing one of the two said parts against the said third part, the second part being held up during said movement by spring means engaging between it and the said third part.

The present invention relates particularly to fastenings of the above type in which the female element comprises three relatively movable parts and has for its object to provide an improved fastening which will be secure in action and remain effective after repeated use. It will be appreciated that in such fastenings resilient devices are usually employed. For instance spring fingers formed of sheet metal have been proposed which move resiliently under movement of the parts; but in practice it is found with such strip springs to be difficult to get the desired strength within the permissible small range of movement and further that there is considerable risk of failure on repeated use. As an alternative, helical wire springs have been proposed, but these suffer from the disadvantage that they add considerably to the overall height of the fastening which is a very serious objection as regards fastenings applied to motorcar hoods, bags, gloves and the like where anything in the nature of a projection is liable to be accidentally caught or knocked and carried away.

The object of the present invention is to provide a fastening in which the above objections are very largely obviated and the invention consists primarily in the use of non-spiral wire springs.

The invention further consists in an improved wire spring of special construction which I have devised for use with female fastenings of the three-part type which effectually provides the necessary force to control the operation of the fastening and is effective with a very slight range of axial movement.

The invention further consists in the detailed forms of construction and combinations of parts which will be more fully described in the following description and set forth in the claims.

The invention is illustrated in the accompanying drawings in which

Fig. 1 represents a sectional view of the fastening when locked, and

Fig. 2 represents a sectional view of the fastening at the moment it is operated to effect the unlocking.

Fig. 3 is a transverse section at an oblique angle to Fig. 1, the section plane being carried back as regards the stud-engaging spring.

Fig. 4 is a sectional plan on the line 4—4 of Fig. 1, the above Figs. being shown to a large scale.

Figs. 5 to 13 are detail views of component parts on a reduced scale.

Referring now to the drawings, the fastening illustrated comprises a casing or body 1 formed of two sheet metal stampings 24, 25 and adapted to be secured to a fabric. The body has an upper central opening 2 adapted to receive an axially-sliding member or push-piece 3 and is fitted with a flat plate 4 extending across its interior intermediate its height. The plate 4 is provided with a series of holes 5, Fig. 8, through which downwardly-depending fingers or prongs 6 on the push-piece 3 are adapted to pass, and in which they take bearings, and a central hole 7 within the aforesaid series 5 through which the stud is adapted to pass from below. The wall of the hole 7 is formed as a small upstanding rim or bead 8 which is slotted as shown at 9 to receive the arms of a spring 10 as will hereinafter appear. A flat spring 10 in the form of an elongated wire loop, Fig. 7, having two operative arms 11 centrally bowed outwards so as to be capable of engaging satisfactorily around the shank of the male member beneath the head thereof is mounted flatwise on the plate 4, the arms of the spring extending across the central hole within the slots 9 and also passing over the holes 5. The spring approximates generally to the shape of a hair-pin, the free ends being bent inwards as

shown so as to meet when set up and augment the spring action. The prongs of the push-piece are four in number in the case illustrated and are cut from a cylindrical collar as shown in Fig. 5; and the arms 11 of the spring 10 pass between two pairs of prongs and are urged outwardly against them by the bowed extremities of the spring. The end faces of the prongs engaging the arms 11 are formed with lugs 12 as clearly shown in Fig. 5, the lugs having sloping opposed faces 12^a, 12^b the lower faces 12^b being carried back or recessed further than the faces 12^a so as to provide a wider opening between them.

The body 1 is formed in two parts the upper part comprising a casing 24, Fig. 6, the lower part 25, Fig. 11, comprising a dished disk having a wide orifice 13 the diameter of which is larger than the diameter of the base-plate 14 carrying the stud 15. Normally, the orifice 13 is partly closed by a washer 16, shown separately in Fig. 10, the opening 17 of which is less than the diameter of the base-plate 14. The washer 16 is urged downwardly by means of a spring 18, Fig. 9, interposed between the washer and the plate 4. The spring 18 is specially formed of a single piece of wire bent approximately to form a circle formed with inwardly-directed radial fingers 19 which are inclined slightly out of the plane of the circle, and its construction forms an important part of the present invention. Its axial thrust is stronger than the resistance opposed to the axial movement of the push-piece 3 by the spring arms 11 engaging the inclined faces of the lugs 12.

It will be appreciated that a fastening of this kind has to be made strong enough to be secure against considerable force and continued vibration and hitherto it has been one of the most difficult problems to find spring controlling means which would give the necessary strength without risk of failure on repeated use, and without adding considerably to the overall height of the device which would be a further grave objection involving a projection on a flat surface which would be continually liable to accidental damage by knocks or by catching in heavier moving objects. For example, spring fingers have been used as the stud engaging members, and spring tongues have been used as resilient controlling means; but they have both been found to be unsuitable owing to the difficulty of obtaining sufficient strength and durability within the limited space available. Helically coiled wire springs could be devised to give the necessary strength and durability and they possess the advantage that the spring force is exercised throughout the whole length of the wire: they, however, possess the disadvantage that too much overall height and range of movement are necessary to give the desired force and that they are an impracticable feature within a fastening of the present character intended for use with motorcar hoods, gloves and the like, and required in practice to lie substantially flat like a button.

The spring now illustrated, however, fulfills most nearly all three requirements. It is so shaped that a pressure applied to the tips of the fingers is resisted by strain extending through the whole length of the wire and is therefore strong, and the inclination of the fingers can be made as slight as the necessity for producing a fastening of small height permits. Suitable strength and durability can readily be obtained by choosing wire of suitable thickness and temper without adding materially to the dimensions of the fastening, and I find that a practicable fastening suitable for an automobile hood can be produced with a spring of this character, in which the relative axial movement of casing and washer is no more than $\frac{1}{32}$ of an inch.

The fastening is assembled in the following manner:—The push-piece 3 is inserted within the upper part of the casing 24 as shown in Fig. 1, and the plate 4 with the arms of the spring extending across its face through the slots 9 is set up in position so that the prongs 6 of the push-piece 3 pass through the holes 5, care being taken that the arms 11 of the spring are engaged within the appropriate openings formed between adjacent lugs 12. The arms 11 of the spring may at this time be rectilinear, the central bowed portion being subsequently formed by forcing the head of the stud between them. The washer 16 is then placed on the internal flange of the lower part 25 of the casing, the spring 18 being set up above it and the part 25 is then inserted in the upper part 24 of the casing.

At the same time a sleeve 26, Fig. 13, having an upper horizontal flange 27 is arranged to encircle the lower depending circular base portion of the part 25 and the lower edge of the vertical wall of the upper part 24 is then turned in as shown in Fig. 1 so that the plate 4, part 25 and sleeve 26 are firmly held in position in the casing top with the movable parts properly set up. The vertical wall of the sleeve 26 is normally of slightly greater vertical height than the vertical wall of the base portion 25 and is inserted within an opening cut in the fabric 28, a washer 29 being thereafter placed below the fabric, and the lower end of the sleeve is then bent outwardly to form a holding flange 20 firmly securing the device on the fabric as will readily be understood.

The operation of the device is as follows:—The female member is placed over the stud and the central push-piece 3 is there-

upon pressed down. The lower inclined faces 12b of the lugs 12 engage with the arms 11 of the spring 10, and owing to the resilience of the latter force is transmitted to the plate 4 which tends to depress the body 1 further over the stud. Owing, however, to the engagement of the washer 16 with the base 14 of the stud and to the fact that the spring 18 is stronger than the spring 10 the body 1 is prevented from being so depressed and the fingers or prongs 6 of the push-piece slide through the holes 5, the faces 12b riding over the arms of the spring 10 so that the latter are forced inwardly and engage beneath the flange at the head of the stud so as to lock the fastening. The arms 11 of the spring 10 are now positioned above the lugs 12 in the recesses 12a and the push-piece is thus held in position with a lock that is secure against vibration.

When it is desired to unlock the fastening, the body 1 is depressed and the spring washer 16 engages with the base plate 14 and on further movement of the body 1 is forced upwardly relatively thereto, the base plate entering within the lower opening 13 of the member 25. On such movement the washer 16 positively engages the lower ends of the prongs 6 and forces the push-piece upwards relatively to the body forcing the lugs 12 past the arms 11 of the spring so that the latter are free to move outwardly against the recessed faces 12b of the prongs and so release the head of the stud. It will be appreciated that the lateral movment of the spring arms 11 is very slight (usually less than .5 m. m. in each case) and that sufficient clearance has to be allowed between the top of the lugs 12 and the wall of the stud to allow the arms to pass freely therebetween, and further that the prongs of the push-piece are of sufficient length as to seat themselves in close proximity to the upper face of the washer when the fastening is locked.

The use of a wire spring 10 comprising a closed loop affords the additional advantage that if the push-piece has been depressed before the fastening is assembled so that the arms of the spring are engaged by the surfaces 12a, the head of the stud can nevertheless be inserted between the arms 11 owing to the resilience of the central portions of the latter and the small amount of widening movement necessary to permit such insertion. Thus the fastening can be engaged as an ordinary snap fastening.

I claim:—

1. In a female member of a stud and eye fastening, a body, a push piece axially slidable within the top of said body, an annular member axially slidable within the bottom of said body, a wire spring approximating to a closed loop extending transversely of the body, means on the push piece whereby when it is depressed into said body the arms of the wire spring are caused to move in one transverse direction and means whereby when the body is depressed on the annular member the arms of the wire spring are caused to move in the opposite transverse direction.

2. In a stud and eye fastening, a body, a push-piece axially slidable in said body, prongs on said push-piece, lugs on said prongs having inclined faces, one face of each lug being recessed further than the other face, a transverse plate on said body, having a central hole, and a symmetrically spaced series of holes to receive said prongs, a stud engaging hair-pin spring having arms movable transversely across said central hole, a hole in the bottom of said body, a washer in said hole, a spring betweeen said washer and said plate, said spring being stronger than said hair-pin spring, a stud having a base plate less than the hole of said bottom but larger than the hole of said washer the prongs of the push-piece being adapted to be engaged by said washer whereby depression of said push-piece locks the fastening, and depression of said body raises said push-piece and unlocks the fastening.

3. A female member of a stud and eye fastener, a pair of separate parts capable of relative axial movement, means comprising on one part a spring member formed with two arms adapted in one relative position to engage beneath and in another relative position to be free of the head of the stud, a tapered lug having sloping faces arranged on the other part, the said arms being forced by the resiliency of said spring member into contact with one of the sloping faces of said lug, means whereby relative axial movement of said parts in either direction is required to force said arms over said lug against the pressure of the spring member, one face of the lug being more deeply recessed than the other face so that the arms are adapted to occupy either an engaging or releasing position according to their engagement with the more deeply or less deeply recessed face of the lug, the two parts being stable in either setting.

4. In a female member of a stud and eye fastener, a casing, a push piece slidable within the casing, means mounted in said casing and comprising a spring member formed with two arms adapted in one relative position to engage beneath and in another relative position to be free of the head of the stud, a tapered lug having sloping faces arranged on said push piece, the said arms being urged by the resiliency of the spring member to contact with one of the sloping faces of said lug, means whereby relative axial movement of said parts in either direction is required to force said arms over said lug against the resiliency of the spring member, one face of the lug being more deeply recesed than the other face,

whereby the arms are adapted to occupy either an engaging or releasing position according as they engage the more deeply or less deeply recessed face, the two parts being stable in either setting.

5. In a female member of a stud and eye fastening, a pair of separate parts capable of relative axial movement, means adapted to engage beneath the head of a stud, comprising a pair of transversely arranged spring arms mounted in one part, two pairs of spaced lugs arranged in the other part with each pair of lugs cooperating with one of the spring arms, said lugs having sloping faces with one of such faces recessed more deeply than the other, said spring arms on relative movements of the two said parts being controlled by the sloping faces to position the spring arms in a locking or non-locking relation.

6. In a female member of a stud and eye fastener, a pair of separate parts capable of relative axial movement, means on one part comprising a resilient member to engage beneath the head of the stud in one position and to release said stud in another position, a tapered lug having sloping faces arranged on the other part, the said resilient member being forced by its resiliency into contact with the sloping faces of said lug, means whereby relative axial movement of said parts in either direction is required to force said resilient member over said lug, one face of the lug being more deeply recessed than the other face, so that said resilient member is adapted to occupy either an engaging or releasing position according to its engagement with the more deeply or less deeply recessed face of the lug, the two parts being stable in either setting.

In testimony whereof I affix my signature.

JOHN PHILIP MORSE.