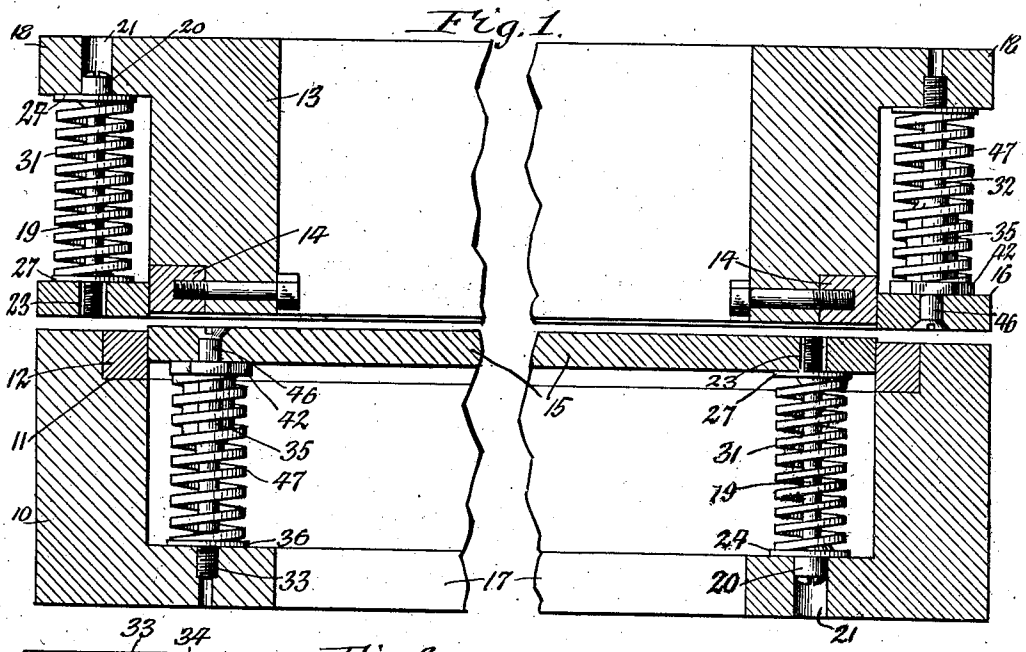
June 30, 1931. G. F. WALES 1,811,987

SPRING MOUNTING FOR PRESSES AND THE LIKE

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Fig. 1.



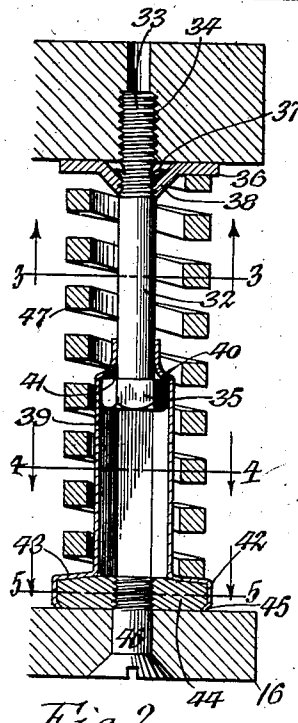


Fig. 2.

Fig. 3.

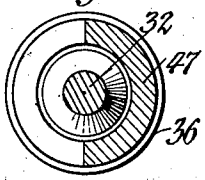


Fig. 4.

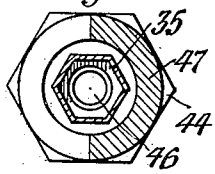
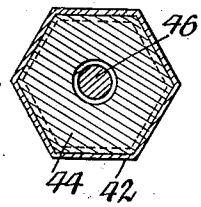


Fig. 5.



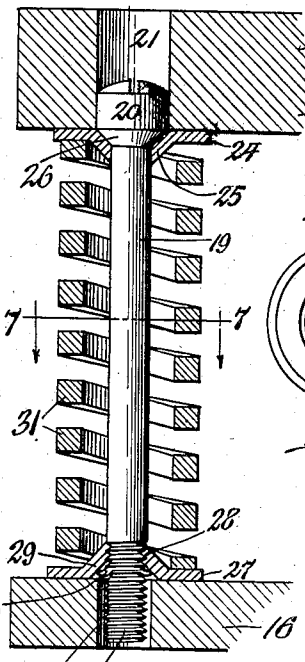


Fig. 6.

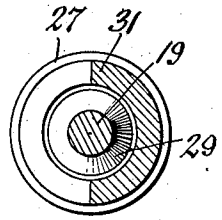


Fig. 7.

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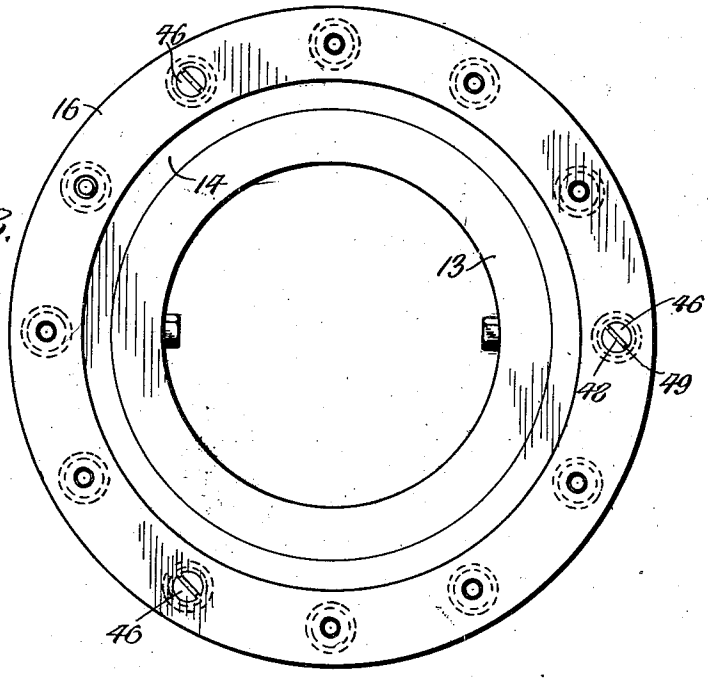
Attorneys

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Fig. 8.



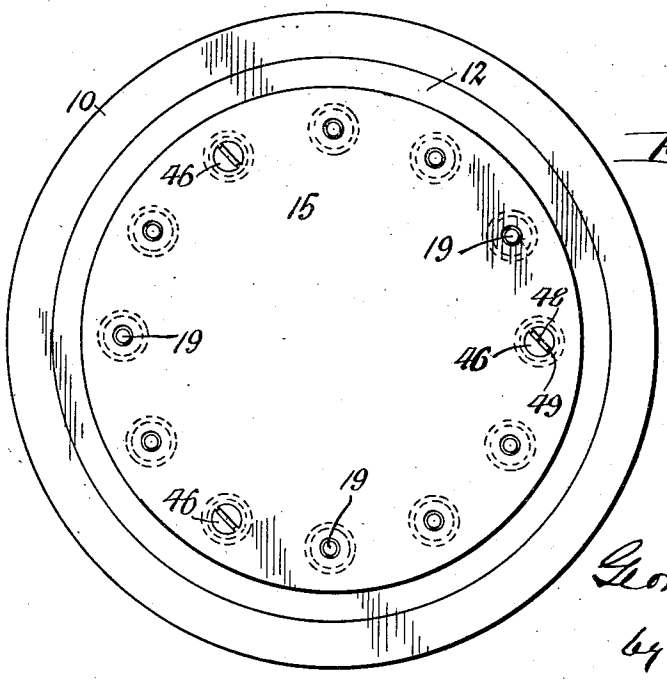


Fig. 9.

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Patented June 30, 1931 1,811,987

UNITED STATES PATENT OFFICE

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SPRING MOUNTING FOR PRESSES AND THE LIKE

Application filed March 14, 1928. Serial No. 261,500.

This invention relates to a spring mounting which is more particularly intended for use in connection with the stripping mechanism of stamping or similar presses although the same may also be employed advantageously in other installations.

In the stripping mechanism of stamping presses as heretofore constructed the springs of the stripping members have been so mounted that the same constantly exert considerable pressure on the strippers of the die and the punch at all times, thus necessitating a thick stripper member. The amount of pressure exerted by the springs has always been a matter of guessing whether the springs are of a proper capacity for the particular work they are to do. It has, therefore, been necessary heretofore, when the springs were too light or too heavy, or when they were broken in service, to take the die or punch out of the press and change the springs for others of a different capacity or for new ones, which dismembering and reassembling operation involved the loss of considerable time and entailed undue expense, especially when the die and punch had to be repeatedly dismounted and remounted and refitted with springs until the required spring load was obtained for properly stripping the stamped work from the punch and die of the press.

It is the object to provide a spring mounting for the stripping members of stamping presses and the like in which a spring resistance of a predetermined strength is built up as a unit so that the spring element is under an initial load when the same is assembled with a retaining means, which unit can be easily and quickly applied to and removed from the punch and die together with the stripping members without taking the die and punch out of the press and, therefore, renders it possible to readily and conveniently change from one spring pressure to another to suit any particular requirements or to repair broken springs without undue expense and loss of time.

In the accompanying drawings:

Figure 1 is a fragmentary vertical section of a stamping press showing the stripping members of the punch and die equipped with an approved form of spring mounting embodying my invention.

Figure 2 is a vertical section, on an enlarged scale, of one of the spring units shown in Figure 1 and containing a satisfactory form of my improvement, which serves both as a spring resistance of a predetermined strength and also as a connector between the stripping member and the press member with which the same is associated.

Figures 3, 4 and 5 are horizontal sections taken on the correspondingly numbered lines in Figure 2.

Figure 6 is a vertical section, on an enlarged scale, of one of the spring units shown in Figure 1, which serves only as a spring resistance for returning the stripping member to its normal or ejecting position after the same has been retracted by the work piece during the stamping operation.

Figure 7 is a cross section on line 7—7, Figure 6.

Figure 8 is a bottom plan view of one form of punch equipped with my improved spring mounting in connection with its stripper.

Figure 9 is a top plan view of the die corresponding to the punch shown in Figure 8 and provided with a similar spring mounting contained in my invention.

In the following description the reference characters indicate like parts in the several figures of the drawings.

Although this invention is capable of use in various installations the same is shown in the present case in the drawings as used in connection with the stripping mechanism of a stamping press of the kind commonly used for blanking, piercing trimming, punching and notching sheet metal, although the same obviously may be used in machines of this character which employ pressure pads in connection with the dies whereby forming, bending and drawing operations are performed.

Those parts of the press shown in the drawings, as an example of one use of my invention, comprise a lower hollow die holder 10 which is provided at the upper, inner edge with a rabbet 11, in which is seated a die 12, and an upper punch holder 13 which is movable toward and from the die and die holder

and provided at its outer lower corner with a punch 14 adapted to cooperate with the die 12 for stamping or cutting a sheet of metal which is placed between the die and punch in a manner which is well known in this art. This die holder may be supported in the frame of a press and the punch holder may be moved toward and from the die holder by means similar to those now commonly employed for this purpose.

Within the die is arranged a vertical movable stripper or stripping member 15 which in the present case has the form of a disc or plate and is mounted on the die holder by means of a spring support so that normally when the press is open the upper edge of this die stripper is flush with the top of the die, or substantially so, but is capable of yielding under the pressure of the punch and punch holder during the operation of stamping or otherwise operating upon a sheet of metal and thereafter again raising the stamped, cut or displaced part of the sheet of metal from within the die so that the same can be easily removed from the press.

Around the periphery of the press is arranged an upper stripper or stripping member 16 which is adapted to strip from the punch any part of the sheet metal which has been subjected to the stamping, pressing or forming operation of the die and punch, for which purpose this stripping member is resiliently mounted on the punch holder so as to be normally held in a position in which the lower side or face of this punch stripper is arranged either flush with the under side of the punch or substantially so when the punch is in its normal or retracted position, but the punch stripper is capable of yielding when the same engages with the sheet of metal which is operated upon by the punch and die and thereafter operates to strip the metal from the punch as the latter recedes from the die.

Associated with each of these holders and its stripping member is a spring mounting mounting which embodies the present improvements. Each of these mountings includes a pluraiity of units, some of which are organized to serve merely as a spring resistance which is interposed between the holder and the stripper while others are so organized that they perform the additional function of connecting the stripper with or supporting the same on the respective holder in such position that when the press is open and the punch and die are separated the respective stripper will be held in its normal or projected position. In order to receive these mountings each of the holders is provided with a flange or base which is arranged in line with the companion stripper, the flange or base 17 for the die holder being preferably arranged at the lower end thereof and projecting inwardly while the supporting flange or base 18 of the punch holder projects laterally outward from the upper end of this punch holder, as shown in Figure 1.

Each of the spring units which operate to resiliently resist movement of a stripper out of its normal position, relative to the respective die or punch, without, however, forming a connection between the stripper and the die or punch may be variously constructed and still embody the essence of this invention.

An approved form of this character of spring unit is shown in Figures 6 and 7 and also at the upper left hand corner and the lower right hand corner of Figure 1 and as there shown this non-connecting spring unit is constructed as follows:

The numeral 19 represents an upright tie member or rod forming part of a bolt which has a head 20 at one end adapted to move longitudinally in an opening 21 in the adjacent part of the flange or base on one of the holders while the opposite end of this rod is provided with an external screw thread 22 adapted to be arranged in an upright opening 23 in the adjacent part of the stripper. Mounted on the rod or body 19 of the bolt is a supporting disc 24 which bears against the adjacent surface of the respective base and is provided with an inwardly dished circular part 25 which is adapted to be engaged by the inwardly tapering or conical shoulder 26 on the inner side of the head 20 on the tie bolt for the purpose of maintaining these parts in a centered position relative to each other.

Around the threaded part of this bolt is arranged a supporting disc 27 which bears with its outer side against the adjacent surface of the respective stripper and is provided with a central internally screw threaded opening 28 which receives the thread of this bolt. The central part 29 of this last mentioned supporting disc is dished inwardly and the same is screwed onto the threaded end of the tie bolt until the same engages with the shoulder on this bolt formed by the innermost thread thereof and thereby limits the inward movement of this disc on the bolt. After the disc 27 has been thus screwed onto the tie bolt, unscrewing of the same is prevented by any suitable means, for example, by means of one or more burs 30 formed on the threaded part of this bolt and engaging with the concave side of the respective supporting disc, as shown in Figure 6.

Surrounding the body or rod 19 of the tie bolt is a helical spring 31 which bears at its opposite ends against the inner sides of the supporting discs 24 and 27 around the inwardly dished conical central parts thereof which latter serve to maintain this spring in its centered position relative to these discs and the tie bolt.

In assembling the various elements of one

of these spring units the spring may first be placed under an initial tension, the resilience or strength of which has been previously determined and then this spring is held in this loaded or compressed position by means of the retaining means consisting of the tie bolt and the end supporting discs. After the retainer and spring resistance of the unit have been thus assembled accidental or deliberate interference with the particular tension imposed upon the spring of this unit is prevented by reason of the disc 27 or equivalent element being held in a definite position on the tie rod or bolt by engagement of the inner side of this disc with the shoulder formed by the inner end of the screw thread 22 and the mutilation or burring of this screw thread in order to form a shoulder thereon which engages the outer side of this disc, as shown in Fig. 6.

Upon mounting a spring unit of this character between one of the strippers and a base flange of one of the holders, the head of the bolt engages with an opening in the holder base and the thread of the tie rod engages with an opening of the stripper and the two supporting discs engage respectively with the holder base and the stripper, as shown in Fig. 6.

This spring can yield under the pressure which is expanded end-wise against the same as the punch and die close and each respective stripper and its holder will move vertically, one relatively to the other during which operation the head 20 of the tie bolt moves vertically within the opening 21 of the respective base flange of the companion holder, but when the press is opened and the die and punch are separated the expansion of the spring is limited by the retaining means consisting of the bolt and the supporting discs so that this spring merely operates to move the stripper into its fully ejected position for removing the sheet of metal from the respective tool or bit and thereafter the stripper is no longer subjected to any spring pressure inasmuch as the limit of this spring pressure is determined by the spring retainer which is associated with the resilient spring element of this unit.

When the die and punch are of a size which requires a comparatively large number of spring units embodying this invention the larger number of the same are preferably of the nonconnecting type as shown in Figs. 6 and 7, inasmuch as they perform the sole function of resisting movement of the stripper out of its normal or projected position and only a few of the spring units may be so organized that they also serve as a connector between the respective bit or tool holder and the companion stripper.

The preferred form of spring unit containing this invention which also serves as a connector between the bit holder and the companion stripper is shown in Figs. 2, 3, 4 and 5 and at the upper right hand corner and lower left hand corner of Fig. 1, and as there shown the same is constructed as follows:

The numeral 32 represents an upright bolt which, in this instance, forms the upper section of the retainer and connector of one of the spring units connected with one of the tool or bit carrying holders and its companion stripper, this bolt having its rod or body provided at its upper end with an external screw thread 33 which engages with an internally threaded opening 34 in the flange of the respective tool holder, while the head 35 of this bolt is arranged at the lower end thereof and is preferably of hexagonal or other flat sided form.

A supporting disc 36 is mounted on the threaded part of this bolt and engages with the inner side of the adjacent holder flange and is held in a definite position on this bolt by engaging its inner side with the innermost thread 33 of this bolt and providing said bolt with one or more burs 37 or other suitable means which are displaced from the threaded part thereof so as to engage the outer side of said supporting disc. The central part 38 of this supporting disc is preferably dished inwardly into conical form so as to make room for the burs 37 and also to serve as a means for centering the spring element thereon as will appear later on.

The lower section of this retainer and connector consists of a tubular member or sleeve 39 which surrounds the head 35 of the upper retainer section and is of corresponding hexagonal or flat sided form so that these two sections of the retainer are compelled to turn together about the vertical axis of the bolt and sleeve, but one of the sections is free to slide lengthwise relatively to the other. At its upper or inner end the tubular or sleeve section 39 is contracted so as to form an internal outwardly facing shoulder 40 which is adapted to be engaged by the shoulder 41 formed by the inner side of the head 35 on the bolt body 32 for the purpose of limiting the separation of these sections.

At its lower or outer end the sleeve section 39 is provided with an enlargement 42 forming an outwardly opening pocket 43 in which a screw nut 44 is secured by riveting or turning the lower edge of this pocket inwardly under the marginal part of the nut 44, as shown at 45 in Fig. 2, or by other suitable means. Thus nut is held against turning in the pocket 43 by making the periphery of the nut of hexagonal or other flat sided form, as shown in Fig. 5 and also contracting the walls of this pocket of corresponding form, as shown in Fig. 5, whereby these elements are interlocked and compelled to turn together. The tubular section of this connector is secured to the adjacent stripper by a screw

46 arranged in the stripper and seated with the head at its outer end in a counter-sunk opening in this stripper while its inner threaded end engages with the internally threaded opening of the nut 44, as shown in Fig. 2. By using a headless screw instead of the headed screw 46 a non-connecting nut is obtained which functions similar to the construction shown in Figs. 6 and 7.

Surrounding the retainer and connector sections 32 and 39 is a spring resistance having preferably the form of a helical spring 47 which bears at its opposite ends against the inner side of the supporting disc 36 and the inner side of the enlargement 42 which forms the pocket 43.

In assembling this spring unit the spring 47 is first placed around the bolt and tube sections of the retainer thereof and the ends of this spring engaged with the outer enlargement of shoulder of the tubular section and the supporting disc 36 on the bolt section and this disc is then screwed onto the bolt until it engages with the innermost end of the thread which latter serves as a stop to limit this inward movement of the disc on the bolt, thereby contracting the spring so as to impose an initial load or compression thereon which may be predetermined by calibration so that all units similarly constructed and assembled will have a known spring resistance. Thereafter the thread 33 of the bolt 32 is provided with burs 37 so as to prevent the supporting disc 36 from backing off from this bolt. These units may be made adjustable by having the screw thread longer and soldering the disc 36 to the bolt 32. The solder could be melted off when necessary and an adjustment made when a broken spring is replaced.

The thread of the bolt is now screwed into the threaded opening 34 in the base flange of the respective tool or bit holder, the turning of the bolt at this time being effected through the medium of the tubular retainer section 39 to the hexagonal enlargement 42 of which a wrench may be applied for causing the tubular section 39 and bolt 32 to turn together. Thereafter the stripper member is engaged with the outer side of the screw nut 44 and secured thereto by means of the screw 46 passing through the stripper from the outer side thereof, this nut at this time being held against turning by reason of the same being interlocked with the flat sided pocket of the tube section which receives the same.

If, now during the operation of the press in which these parts are mounted the stripper is moved inwardly relatively to the respective tool or bit and its holder, the bolt and tube section of the retainer will slide lengthwise one upon the other and thereby increase the compression upon the spring while the stripper is in engagement with the sheet of metal which is being operated upon. As the press opens and the punch moves away from the die each of the strippers will be projected by the springs of the assembled spring units interposed between this stripper and its companion tool holder including each of the springs 47 which latter are free to expand until the tube section 39 has moved outwardly on the bolt section 32, an extent sufficient to engage the tube section 39 with the shoulder 41 of the bolt. Thereafter further expansion of each of the springs 47 is prevented, and no distortion to the stripper can be caused by the spring pressure.

In Figure 8 is shown a round punch which is adapted to engage with a round die shown in Figure 9 and in this instance each of the stripper members is held yieldingly in its normal or ejected position by twelve spring units embodying the present invention which units are arranged in an annular row and spaced apart from each other substantially equal distances, although the number of such units may be increased or decreased depending upon the size and character of the tools and the work which is to be done. When each bit holder and its companion stripper are thus equipped with twelve spring units it has been found satisfactory to employ three spring units of the character shown in Figures 2–5 which perform the additional function of connector between the tool holder and the stripper and nine spring units which serve merely as spring resistance units, said connecting units being spaced an equal distance around the holder and stripper, and the non-connecting units being arranged at suitably spaced points in between these connecting units.

The mounting of the strippers on the tool holders can be effected in the manner above described without requiring any springs to be compressed in order to secure the stripper in its proper place inasmuch as it is only necessary to engage the stripper with the outer ends of the several retainers which are supported at their inner ends on the companion holder and then connect the stripper with the outer ends of the connecting units by means of the screws 46. Removal of the strippers from the holders can also be effected without interference from the load of the springs in the spring units inasmuch as this operation merely requires the removal of the screws 46 which can be done without the stripper at this time being subjected to any spring pressure and no liability at this time exists of the spring jumping out or suddenly throwing the stripper and possibly injuring the attendant the instant the fastening screws or other connections are removed.

It is, therefore, possible to not only conveniently mount the strippers and their associated spring mechanisms on the tool holders when making the punch and die but it is also equally convenient to remove the

strippers and replace the spring units with others of heavier or lighter tension to suit the character of the work or to replace units having broken springs, without the necessity of taking the tool holders out of the press as has been necessary in the case of stripping mechanisms as heretofore constructed, thereby effecting a substantial saving in time and enabling the press to be run with less interruption.

In order to prevent the screws 46 from becoming loose during the operation of the press small parts of the outer side of the respective stripper may be peened inwardly into the notch 48 of each of these screws, as shown at 49, and thereby prevent the same from unscrewing. These peened parts 49 can be easily removed with a suitable instrument whenever it is desired to remove the screws 46 in case it is necessary to make repairs or change the tension of the spring resistance to suit any particular piece of work.

By the use of the spring units constructed in accordance with this invention it is possible in a shop to have on hand spring units of varying spring capacities which will enable the operator to select any desired spring resistance which may be suited for a certain piece of work and also to readily change the spring resistance if this is found necessary without involving any substantial loss of time or encountering any of the difficulties usually attending such change according to the methods heretofore known. This invention, therefore, effects a substantial saving in time and labor and, therefore, permits of doing work of this character at less cost and with greater ease and convenience.

In the foregoing description reference has been made in some instances to Figures 2–7 which show the relative arrangement of the spring units when used in connection with the holder of the punch and the stripper associated therewith, but this description is intended to apply with equal force and effect to the spring units which are associated with the holder and stripper of the die, inasmuch as the construction is substantially the same in the case of the units which are used for the die and its stripper, the only difference being that the same are reversed in their position as compared with the position which the spring units occupy when used in connection with the punch holder and stripper.

I claim as my invention:

1. A spring unit for use between two relatively movable members, comprising a retainer including a bolt having a thread at one end adapted to engage one of said members and a head at its other end a disk on the threaded end of said bolt, a sleeve enclosing said head and having its bore of angular form to fit the head of the bolt and thereby compel this sleeve and bolt to turn together but permitting the same to move lengthwise relatively to one another and provided on its inner end with an internal shoulder adapted to engage the underside of said head and at its outer end with an enlarged pocket, a screw nut secured in said pocket, a screw adapted to connect said nut with the other member, and a spring surrounding said bolt and sleeve and bearing at its opposite ends against said disk and pocket.

2. A spring unit for use between two relatively movable members, comprising a retainer including a bolt having a thread at one end adapted to engage one of said members and a head at its other end a disk on the threaded end of said bolt, a sleeve enclosing said head and having its bore of angular form to fit the head of the bolt and thereby compel this sleeve and bolt to turn together but permitting the same to move lengthwise relatively to one another and provided on its inner end with an internal shoulder adapted to engage the underside of said head and at its outer end with an enlarged pocket, a screw nut secured in said pocket, a screw adapted to connect said nut with the other member, and a spring surrounding said bolt and sleeve and bearing at its opposite ends against said disk and pocket, said disk being dished inwardly and stopped against the innermost thread of said bolt and said bolt having its threaded end provided with a bur which engages the concave side of said disk.

In testimony whereof I, hereby affix my signature.

GEORGE F. WALES.