June 12, 1934. G. G. POWERS 1,963,054

WIRE SPRING

Filed Aug. 14, 1933 2 Sheets-Sheet 1

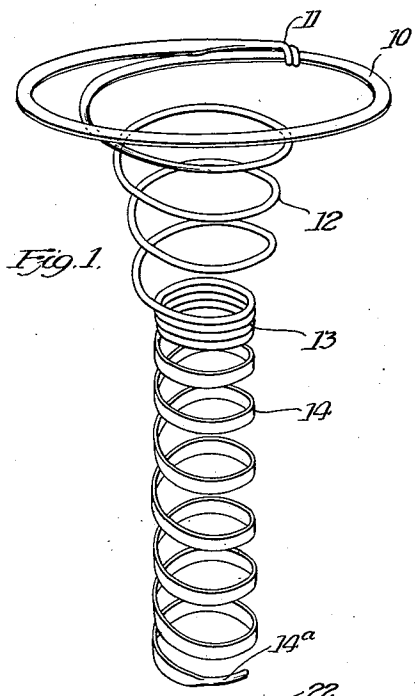

Fig. 1.

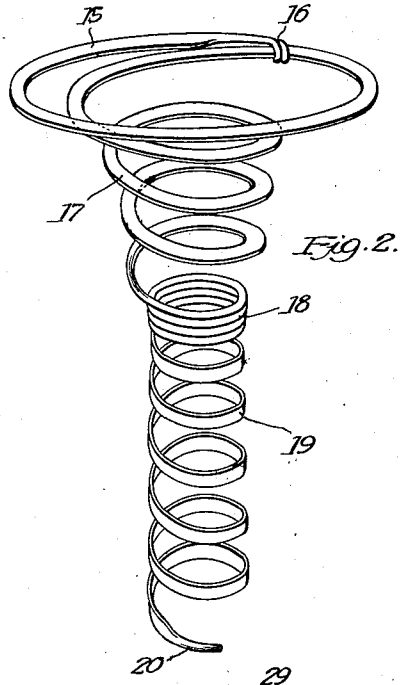

Fig. 2.

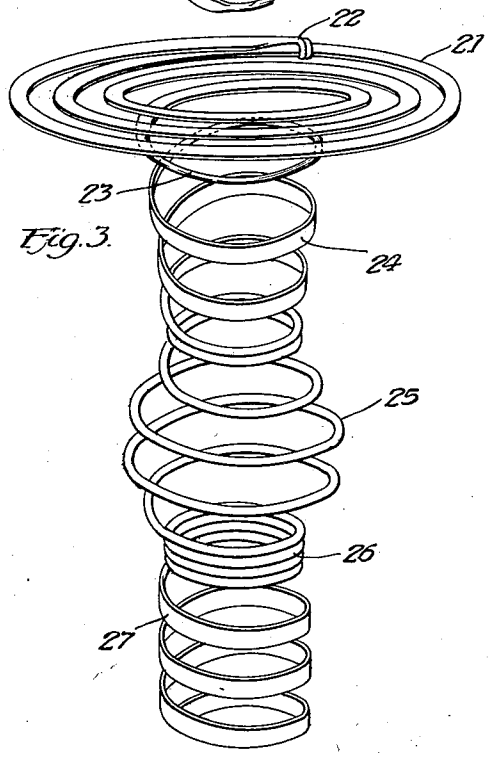

Fig. 3.

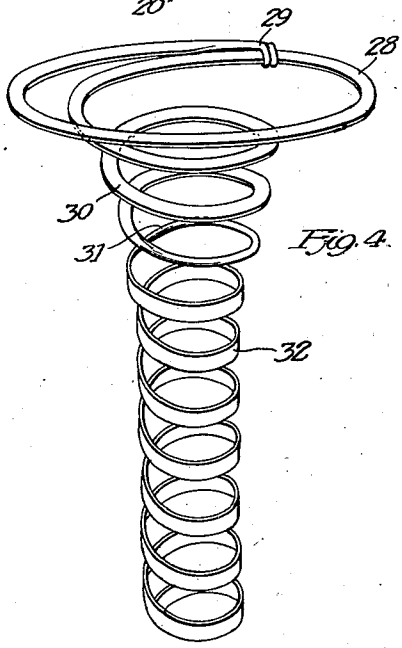

Fig. 4.

Witness:
R. B. Davison.

Inventor:
George G. Powers.
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WIRE SPRING

Filed Aug. 14, 1933 2 Sheets-Sheet 2

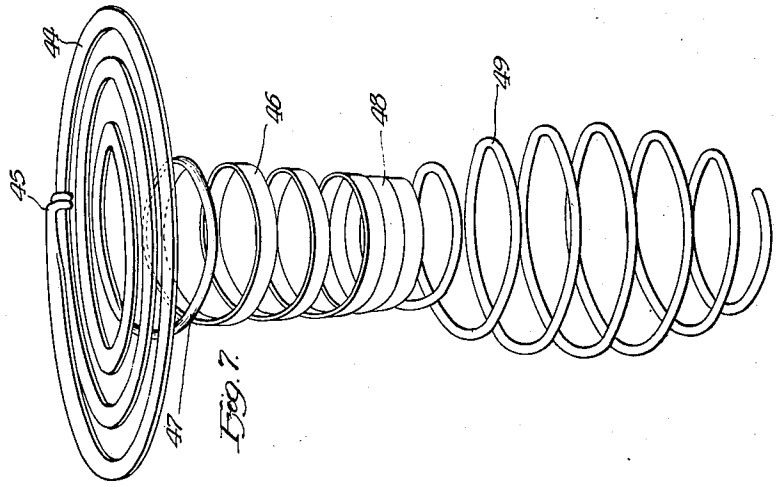

Fig. 7.

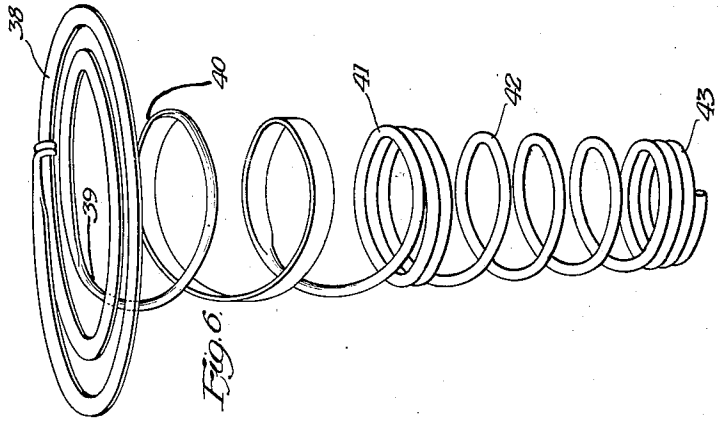

Fig. 6.

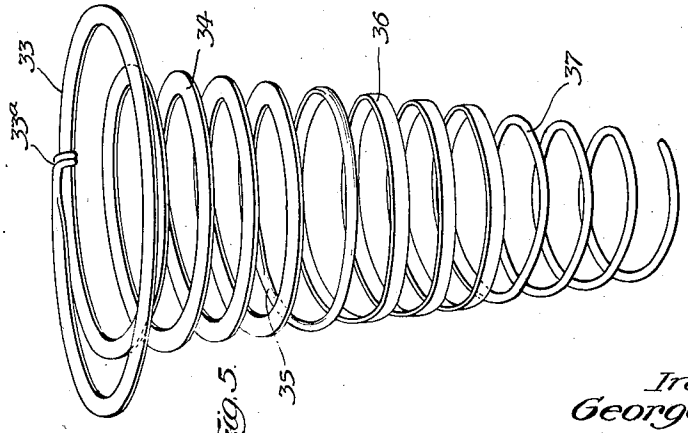

Fig. 5.

Witness:
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By: Attys.

Patented June 12, 1934

1,963,054

UNITED STATES PATENT OFFICE

1,963,054

WIRE SPRING

George G. Powers, Chicago, Ill., assignor to The Powers Spring Corporation, Chicago, Ill., a corporation of Illinois

Application August 14, 1933, Serial No. 685,008

2 Claims. (Cl. 5—256)

My invention relates to springs, and particularly to a spring of the type intended for use in a spring bed or bed spring.

Springs of the character identified, are uniformly constructed to provide an enlarged top or upper end, and a body portion of smaller diameter, the lower end being secured in an approved manner to a supporting element.

In a helical spring the resistance to a vertically imposed load is dependent on several factors (*a*) the size and stiffness of the wire, (*b*) the diameter of the convolutions and (*c*) the pitch of the convolutions. The act of compressing a helically coiled spring results in positioning the respective helices in closer relation and proportionately increasing the diameter thereof. The resistance to increase of diametral enlargement is dependent on the shape of the wire composing the helix. By the use of flat wire arranged in right angularly disposed planes and proportioning the pitch and diameter, both in the top and body of the spring, an exact predetermined result may be secured as to resistance to vertically and laterally imposed loads.

An object of my invention is to provide a spring in which the top is composed of flat spring wire either of the open top or the flat volute top type, in order to provide a relatively resilient upper end with comparatively great resistance to lateral deflection and to provide a flat surface for contact with the spring covering. A spring constructed as described herein is adapted to be produced in a machine such as disclosed in the co-pending application of myself and C. A. Rhinevault, Serial No. 684,092, filed August 7, 1933. A spring of the general type disclosed herein is described and claimed in my co-pending application, Serial No. 644,254, filed November 25, 1932.

The points of contact between an overlying mattress and a bedspring are subject to wear and if the wear is excessive the mattress cover is ultimately worn through rendering it unfit for further use. Excessive wear occurs where springs composed of round wire are used, due to the small area of contact of the round wire with the mattress.

This objection is overcome by the construction of the spring in the manner herein shown, in which the area of contact between a spring top and the spring cover is very greatly increased. While in the use of round wire a line contact only is provided the flattened wire presents an area of contact multiplied very greatly with consequent longer life to the overlying mattress and at the same time greater comfort even where a thinner cover or pad is employed. Furthermore, by flattening the wire constituting the top, with the flat in a horizontal plane, the resiliency of the top is increased, while the resistance to lateral movement of sway is likewise increased.

In the construction of bed springs composed of round spring wire, the manufacturer has been limited in his control of the resiliency or resistance to the vertically imposed load, the capacity for variation depending on the selection of the size and stiffness of the wire used and the pitch and diameter of the coils. In the construction here disclosed, the maker's range of possible resiliency is very greatly increased without change in gauge or stiffness of the wire used. By correct design of the location and arrangement of the flats and rounds of the spring, he is able to produce a spring of any desired resiliency. Furthermore, he may construct a spring that is resilient at its upper end and comparatively stiff at its lower end, or in a double deck spring, a construction in which the upper end is resilient down to the point of cross connection, and either highly resilient or highly resistant at a point below the cross connection; in other words, the maker is able to construct his spring exactly as called for.

The invention will be more readily understood by reference to the accompanying drawings, in which:

Figs. 1 to 7 are perspective views of springs constructed in accordance with my invention, each spring being somewhat different from the others, as will be hereafter described.

In Fig. 1, I have shown a spring of the open top type, the upper end or top coil 10 being of flat wire in a horizontal plane. In the specification and in the appended claims a flat wire with its major axis arranged transverse to the longitudinal axis of the spring will be referred to as flat horizontal, whereas a flat wire arranged with its major axis parallel to the longitudinal axis of the spring will be referred to as flat vertical.

The upper terminal end of the wire is round to provide a tie 11. The flat of the upper end merges into round wire and several turns 12 of round wire intervene between the close turns 13 constituting the point of cross connection for adjacent springs. The wire of the body beneath the point 13 is composed of a plurality of turns 14 of flat vertical, the wire ending in a round portion 14*a* that may be used as a tie or otherwise according to the form of bottom connection. This provides a flat top, a normally resilient upper end down to the cross connection and a relatively stiff bottom.

In the construction of Fig. 2 the upper end or top remains the same, being composed of flat horizontal 15 with a round wire tie 16, the wire remaining flat horizontal for the entire upper end 17 down to the close turns 18 at the cross connection point. As in the case just described, the lower end 19 is composed of flat vertical with a round end 20. This provides for a comparatively very soft upper portion to the point of the cross connection and a stiff lower end.

In the construction of Fig. 3, the upper end consists of a plurality of turns of flat horizontal wire 21 having a round wire tie 22. This provides the flat volute top producing a large flat area for contact with the spring cover. The flat horizontal merges into the round wire 23 and then into the flat vertical turns 24. The next lower portion consists of the flared or double cone arrangement 25 which terminates in cross connection turns 26 all of round wire. This round wire then is changed into flat vertical 27 for the lower end of the spring.

In the construction of Fig. 4, the upper end is of the open top type consisting of a flat horizontal turn 28 having a round wire tie 29. This form of wire continues through the single cone upper end 30 merging into the round wire portion 31 and then into the flat vertical construction 32 for the remainder of the spring. This construction may or may not have a round wire terminal portion. A spring such as just described provides for a soft or resilient upper end and a progressively stiffer lower end.

In Fig. 5, I show a spring constructed in somewhat a different manner, that is, the spring is substantially of single cone construction, the diameter of the successively lower turns being progressively less, the idea being to produce a spring intended for use in upholstery. This spring consists of a flat horizontal upper end 33 having a round wire tie 33*a*. The next successively lower turns 34 are composed also of flat horizontal wire, a connecting section 35 of round wire and a plurality of turns 36 of flat vertical wire, the lower end of the spring being composed of a plurality of turns 37 of round wire. This provides a spring having a high resistance to side sway, the upper end being extremely rigid with that object in view.

In Fig. 6, I show a conventional spring composed of flat horizontal turns 38 arranged in volute form, a section 39 of round wire which merges into two turns 40 of flat vertical ending in close turns 41 of round wire for a cross connection, a succeeding section 42 also of round wire and a series of turns 43 of round wire constituting the bottom. This provides a spring of relatively stiff construction and of the double deck type.

In Fig. 7, the top construction is much the same consisting of flat horizontal turns 44 with a round wire tie 45. The next section is composed of flat vertical turns 46 with an intervening round wire section 47. The cross connection turns 48 are composed of flat vertical wire instead of round wire as in the preceding illustration. The bottom is composed of round wire 49 of double cone formation. The bottom end may be tied or secured in an approved manner to the support.

It will be understood that while I have shown springs of the so called single cone arrangement, the claims should be construed to cover similarly constructed springs of double cone formation.

Other modifications involving the combination of horizontal and vertical flats and rounds will readily suggest themselves to others, and I do not wish to be limited except as indicated in the appended claims.

I claim:

1. A spring having a flat horizontal wire top and a body portion, a portion of which is composed of flat, vertical wire with an intervening section of round wire between the flats.

2. A spring having a top composed of a plurality of turns of flat horizontal wire, each of the turns being in substantially the same plane, the spring having a body, a portion only of which is composed of flat, vertical wire, a length of round wire intervening between the respective flats, and the remainder of the body being composed of round wire.

GEORGE G. POWERS.