S. G. SMITH.

SPRING CONSTRUCTION.

APPLICATION FILED APR. 22, 1919.

1,363,538. Patented Dec. 28, 1920.

2 SHEETS—SHEET 1.

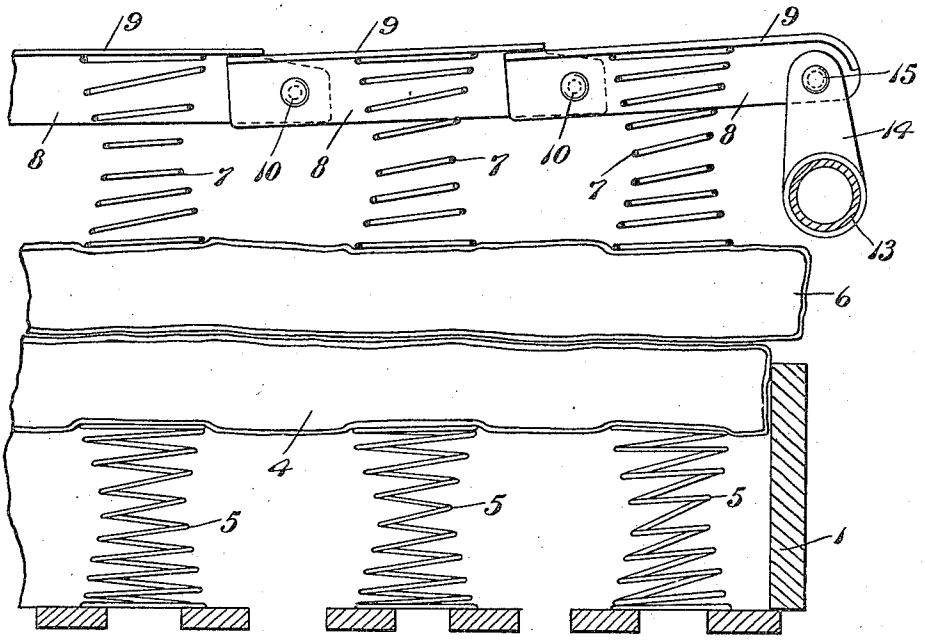


Fig. 1.

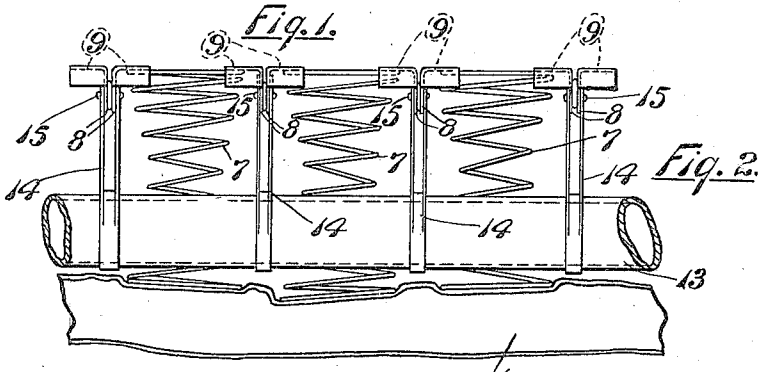


Fig. 2.

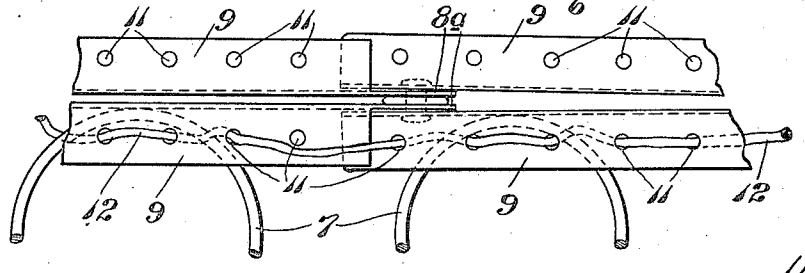


Fig. 3.

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2 SHEETS—SHEET 2.

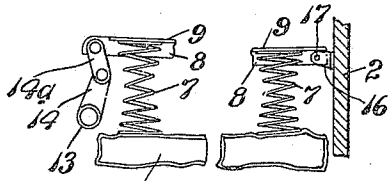


Fig. 4.

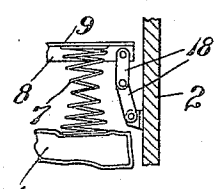


Fig. 5.

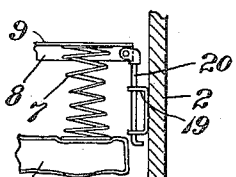


Fig. 6.

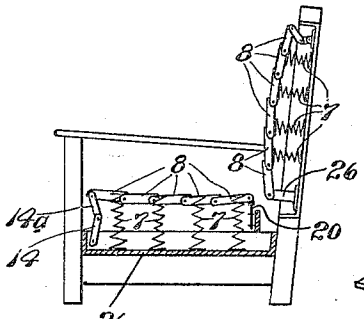


Fig. 7.

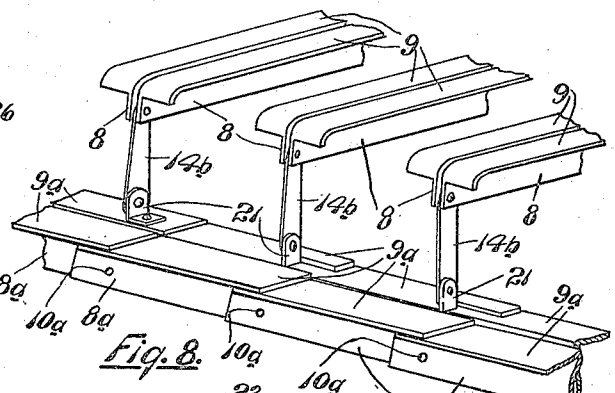


Fig. 8.

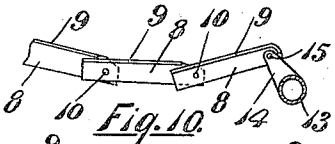


Fig. 10.

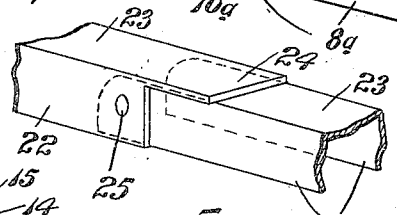


Fig. 9.

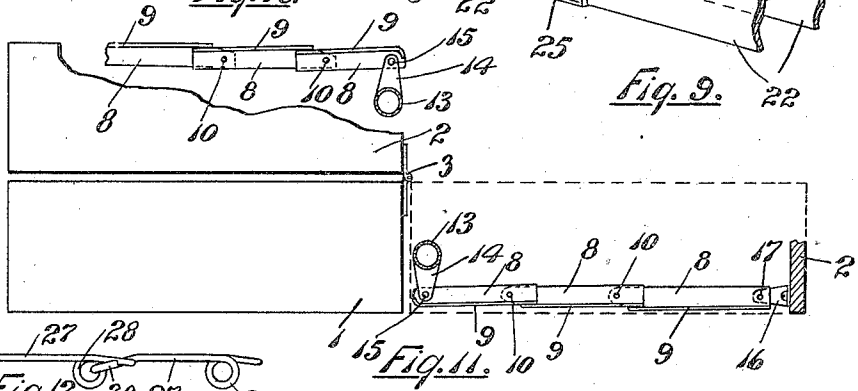


Fig. 11.

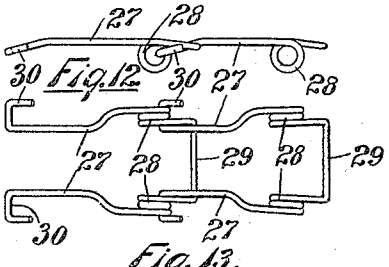


Fig. 12.

Fig. 13.

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UNITED STATES PATENT OFFICE.

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SPRING CONSTRUCTION.

1,363,538. Specification of Letters Patent. Patented Dec. 28, 1920.

Application filed April 22, 1919. Serial No. 291,958.

To all whom it may concern:

Be it known that I, STANLEY G. SMITH, a citizen of the United States of America, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in Spring Construction; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a spring construction adapted for use in articles of furniture such as davenports, chairs and the like, or in motor vehicle seats or other vehicle seats and backs therefor; and it is an object and purpose of the invention to provide a spring construction of novel formation and design by means of which a greater degree of flexibility of action is obtained than heretofore, and which, when turned over as it is in davenports, has a greater rigidity than when in the other and directly reversed position. The invention consists of various novel constructions and arrangements of parts for attaining this end, as well as many others not at this time specifically outlined, but which will appear fully and in detail as understanding of the invention is had from the following description taken in connection with the accompanying drawings, in which,

Figure 1 is a fragmentary transverse sectional view through a davenport construction equipped with my invention.

Fig. 2 is a fragmentary front elevation of the upper section thereof.

Fig. 3 is a fragmentary plan view of one of the flexible composite bars to which the springs are attached.

Fig. 4 is a side elevation and section with parts broken away illustrating the support for the composite flexible bars and with a slight modification in the front support therefor.

Figs. 5 and 6 are similar views showing modifications in the form of rear support for said bars.

Fig. 7 is a vertical section through a chair equipped with the invention both for seat and back.

Fig. 8 is a fragmentary perspective view illustrating a modification in support for the front ends of the flexible spring bars, including a composite flexible bar of a type similar to the spring carrying bars.

Fig. 9 is a fragmentary perspective view of a modified form of supporting bar of flexible form.

Fig. 10 is a fragmentary side view illustrating the action and the position taken by the flexible bars when a weight is applied thereto.

Fig. 11 is a side view, with parts omitted and broken away to show the action of the spring construction in a davenport in the two positions thereof, and

Figs. 12 and 13 are, respectively, a side view and plan of a modified form of flexible composite bar construction the parts of which are formed of wire.

Like reference characters refer to like parts in the different views of the drawings.

One place where my invention is of particular value is in a davenport, the same being comprised of lower and upper frames 1 and 2 hinged or otherwise connected together at their front edges so that the same may be opened up for use as a bed, as shown in Fig. 11. Any suitable hinged connection 3 may be used. Within the lower frame 1 a mattress 4 is placed and carried by springs 5 which may be of any suitable form and of usual and well known construction. The upper frame likewise has a mattress or pad 6 which in the folded position of the davenport comes against the mattress 4, and above which a plurality of springs 7 are located in rows transverse to the length of the davenport and mattresses and which, at their upper ends are connected to transverse flexible bars, that is, bars which are flexible in one direction but rigid in the opposite direction.

These bars are made up in sections, each including two angle iron members having vertical legs 8 and horizontal legs 9. At their front ends the legs 8 extend beyond the ends of legs 9, as indicated at 8^a, which extensions 8^a pass between the legs 8 of the angle iron sections next ahead and are pivotally connected thereto at 10. It will be noted that the legs 9 of the angle iron sections overlap the legs 9 of the sections next ahead, this allowing the composite bars to move about the pivots in one direction but not in the other direction. And when the davenport is closed as indi-

cated at the left in Fig. 11, any weight applied to the upper section causes the flexible bars to yield as far as springs 7 will permit and occupy substantially the position shown in Fig. 10. But when the davenport is opened, the flexible bars are reversed and form a rigid support for the springs 7, any yielding being only that of the springs 7. This is a feature of great value in davenports, the springs acting practically the same as any davenport when it is opened but the spring supporting construction described permitting much greater yielding and flexibility when it is closed and used as a couch or the like.

At the front of the davenport frame 2 a horizontal rod 13 is located which is connected to the seat frame of the davenport and to which a plurality of arms 14 are attached, one for each of the flexible bars, said arms being pivotally connected at 15 at their upper ends to the front sections of the bars. The rear sections of the bars are likewise pivotally connected to brackets 16 fixed to the rear member of the frame 2, as indicated at 17. As the bars give under the application of weight, the arms 14 take different positions, swinging to the rear as shown in Fig. 10. Each arm 14 may be rotatably mounted on the rod 14 so that its rearward movement can take place independent of the others.

In the legs 9 a plurality of spaced apart holes 11 are made and the adjacent ends of springs 7 connected to the bars by flexible connections 12 threaded through the openings, this making a secure but yielding connection between the bars and springs. Each spring is interposed between the flanges or legs 9 of two parallel angles of two of the transverse flexible bars. Any well known and conventional form of connection for the opposite ends of the springs against which the mattress 6 bears may be used, no illustration thereof being made.

Many modifications in the manner of support of the flexible bars may be used. For instance a link 14^a may be interposed between each arm 14 and the front section of the bar with which said arm is associated as shown in Fig. 4. The rear ends, instead of being carried on the fixed bracket 16 may be carried by a pair of pivotally connected links 18 as shown in Fig. 5. Again, a U-shaped bracket 19 may be attached to the rear side of the frame 2 and a rod 20 passed loosely through the upper and lower legs thereof, said rod having attachment at its upper end to the rear section of each flexible bar. One preferred form or modification in the front support is shown in Fig. 8 wherein the rod 13 is replaced by a flexible sectional bar made of connected sections similar in all respects to the flexible bars to which the springs are attached, the angles having horizontal legs 9^a, vertical legs 8^a pivotally connected at 10^a and flexible in one direction but not in the other. Ears 21 may be struck up from the upper legs 9^a or be made separate and attached thereto to which the lower ends of arms 14^b are pivotally connected, serving the same purpose as the arms 14. This construction at the front of the davenport permits a still greater degree of flexibility when the spring construction is in position to yield but it is as rigid as the other when reversed in position. Moreover, the construction is not limited to the use of angle iron members, as channel sections having flanges 22 and webs 23, an extension 24 of one web overlapping the web of the adjacent section, may be used and pivotally connected at 25, as shown in Fig. 9; this construction being quite as well adapted for use as the angle iron construction in any place where the bars, flexible in one direction but not in the other, are to be used.

This spring construction may be used in other places than davenports, and in Fig. 7 it is shown as applied to both the seat and back of a chair, the only modification needed being to attach the lower section of the flexible bars used in the back to stationary posts 26. It is obvious that the same can be used in the same way for the backs and cushions of motor or other vehicle seats.

While the angle and channel bars pivotally connected in sections are very satisfactory in use, it is possible to make the different sections of the flexible bars of wire. In Figs. 12 and 13, a showing of such construction is made, each section being made of a single piece of wire having sides 27 in the length of which a coil 28 is made, said sides being integrally connected by a cross wire 29 at one end, and terminating at the other end in hooks 30 adapted to pass through the eyes formed by the coils 28 in the section next behind. When thus connected the cross wire 29 passes under the sides 27 of the section next ahead and it is obvious that the desired flexibility of the structure in one direction and rigidity in the opposite direction is fully attained. The springs 7 may be attached in the space between the cross wire 29 of one section and the coils 28 of the adjacent section.

This construction of spring is one of value in many relations. It is particularly valuable in davenport use, combining as it does the greatest measure of flexibility when flexibility of the spring is desired, and less flexibility, in fact none in the coiled spring support when reversed. In practice it has proven a success in all particulars. For use in chairs, vehicle seats, and the like it is also of value though the rigidity of the flexible bars in one direction is not needed, and my invention is not to be limited to flexi-

ble bars necessarily rigid against bending in one direction, but is limited only by the appended claims.

I claim:

1. A spring construction comprising a plurality of rows of coiled springs, flexible connecting bars passing across one end of all of the springs in a row and connected thereto, said bars being comprised of a plurality of sections pivotally connected together in alinement, and interengaging means on the sections limiting the pivotal movement thereof with respect to each other to one direction only away from a straight line, substantially as and for the purposes described.

2. A spring construction comprising a plurality of coiled springs, and means connecting the springs at one end thereof, said means comprising a plurality of pivotally connected sections with interengaging means on the sections limiting the pivotal movements of the sections with respect to each other to one direction only away from a straight line, whereby the sections follow the springs when they are compressed, but are rigid against movement in the opposite direction when the sections are in substantially straight line alinement with each other, substantially as described.

3. In combination, a support, a plurality of rows of springs mounted on and extending away from the support, a plurality of sectional bars located against the outer ends of the rows of springs and connected thereto, each comprising a number of sections pivotally connected together and normally located in substantially straight line alinement, said bars following the springs when they are compressed, means on the different sections for preventing movement of the sections in an opposite direction beyond their normal straight line position, means for connecting one end of all of the bars to the support, a member located transversely of and at the opposite ends of said sectional bars, and movable means connecting said opposite ends of each of said sectional bars to said member, said means moving when any associated sectional bar is moved away from its normal position on compression of any of the springs connected to said bar.

4. In combination, a substantially rectangular support, a plurality of rows of springs positioned transversely of the support, a plurality of bars loosely connected to the outer ends of the springs, said bars being made up of a plurality of pivotally connected sections and also located transversely of the support, means stopping pivotal movement of the sections with respect to each other in an outward direction, whereby said bars normally occupy a substantially straight line position, means connecting one end of each of the bars to the support, another sectional bar located lengthwise of the support at and within the opposite ends of the first bars, and a plurality of arms pivotally connected to said last named sectional bar, each of said arms being pivotally connected to one of the first named sectional bars, substantially as described.

5. In combination, a support, a plurality of rows of springs carried by the support, a plurality of bars disposed between the rows of springs at one end thereof, each of said bars including a number of pivotally connected sections, means connecting said bars to the springs of the two rows of springs between which each is located, interengaging means for stopping movement of the sections of the bars with respect to each other in one direction, and means for connecting the ends of said bars to the support, substantially as described.

6. In combination, a support, a plurality of rows of coiled springs carried by the support, a plurality of bars located one between each two adjacent rows of springs, each of said bars being formed of a plurality of sections of angle iron pivotally connected together, stop means on adjacent ends of said sections to limit the pivotal movement of the sections to one side only of the normal substantially straight line position of the sections, one of the legs of each of the angle irons having a plurality of spaced apart holes therethrough and against which leg the ends of a row of springs contact, and a flexible connection passed through the holes and connecting the springs to said sections, substantially as described.

7. A spring construction comprising a plurality of springs, and a plurality of bars connected to the springs at one end thereof, said bars being formed of a plurality of substantially rigid sections pivotally connected end to end in alinement, and interengaging stop means on the sections whereby the sections may move with the springs when compressed but are stopped against movement beyond a substantially straight line position of the sections in the opposite direction.

In testimony whereof I affix my signature.

STANLEY G. SMITH.