

No. 708,882.

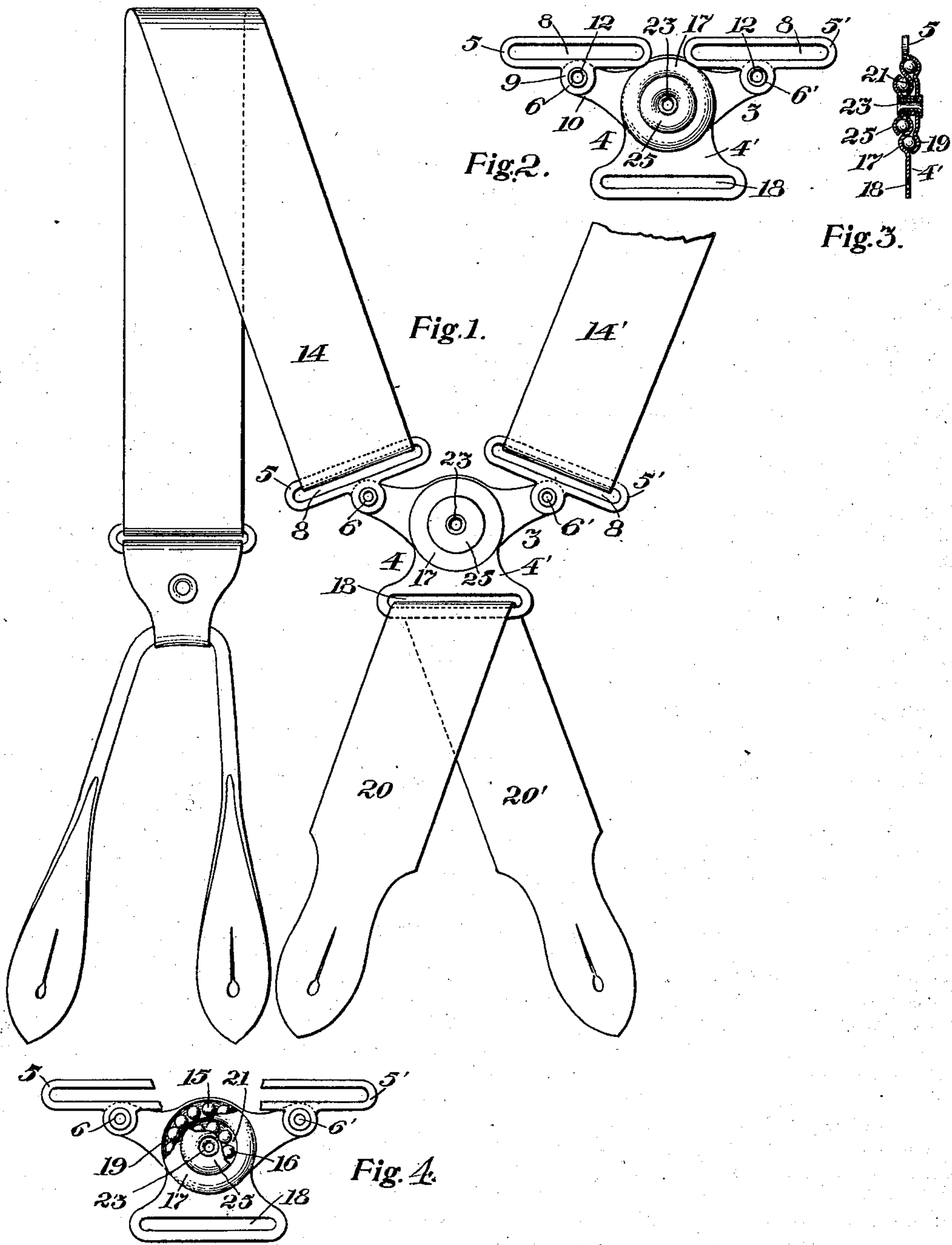
Patented Sept. 9, 1902.

H. C. HINE.

SUSPENDERS OR OTHER GARMENT SUPPORTER.

(Application filed June 20, 1902.)

(No Model.)



Witnesses:

*Robert Head*  
*R. M. Pittman*

Inventor:

*Henry C. Hine,*  
By his Attorney,  
*F. A. Richards.*



# UNITED STATES PATENT OFFICE.

HENRY C. HINE, OF NEW BRITAIN, CONNECTICUT.

## SUSPENDERS OR OTHER GARMENT-SUPPORTER.

SPECIFICATION forming part of Letters Patent No. 708,882, dated September 9, 1902.

Application filed June 20, 1902. Serial No. 112,404. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY C. HINE, a citizen of the United States, residing in New Britain, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Suspenders or other Garment-Supporters, of which the following is a specification.

This invention relates to that class of garment-supporters commonly designated as "suspenders;" and its object is to connect the shoulder-straps to the rear suspender-end by a device which comprises a lever, to which the shoulder-straps are connected, and a hanger, to which the suspender-end is connected, said hanger and lever being pivoted together, thereby securing the requisite freedom of action of the shoulder-straps. Suspender-trimmings are commonly made of thin sheet metal, because it is not only inexpensive, but is cheap to manufacture into the various shapes required. Heretofore it has not been found practicable in this art to use a shoulder-strap lever pivoted to a hanger, owing to the thinness and peculiar character of the sheet metal which it is necessary to employ in making the trimmings, said metal being only about one sixty-fourth of an inch in thickness, and hence offering practically a knife-edge at the bearing parts, and, moreover, being of an easily-workable material, which is extremely liable to "bite" at the joint if a simple pivot is employed, causing the metal to cut away rapidly, especially as the lever is subjected to considerable strain and in many cases is in constant motion.

The object of my invention is to avoid this difficulty and enable the use of a lever and hanger so pivoted together as to have great durability and avoiding altogether the cutting action of the edge or edges of the thin metal, thus making it practicable to put upon the market a first-class suspender at the same price as a low-grade suspender.

Referring to the drawings accompanying the specification, Figure 1 is a view illustrating the mode of applying my present improvements to an ordinary pair of suspenders. Fig. 2 is a view of the connecting device whereby the shoulder-straps are connected with the end pieces. Fig. 3 is an edge view in section, further illustrating the construction of

the device in that form thereof in which a plurality of sets of balls are used in the main joint of the same. Fig. 4 is a partial view similar to Fig. 2, drawn with some parts broken away for more fully illustrating the preferred construction of the device in its more complete form.

Similar characters designate like parts in all the figures.

My improved suspender-connecting device and equalizer is illustrated in the drawings as being applied to an ordinary suspender; but it is obvious that the improvement is applicable to various forms and kinds of garment-supporters where a plurality of straps or bands are located side by side and are to be connected with another portion of the supporter in such manner that the several members of the supporter shall have the forces transmitted from one to another in a way to properly proportion and distribute the several stresses and at the same time give the required amount of freedom from constraint or resistance, so that the wearer shall not be subjected to discomfort while using a suspender or supporter provided with an equalizing connecting device. In my present improvements I attain this object in an unusually perfect manner by means of a device comprising an organization of parts assembled together in such a way as to transmit the total strain from one portion of the suspender-brace or supporter to the other portion thereof through an equalizer and connecting-pieces pivotally joined together and provided at the main joint with a bearing of the ball-bearing kind so constructed and applied as to secure free action of the two main portions of the suspender or other supporter the one portion with respect to the other portion, and accomplish all this without loss of strength and rigidity in the line of the strain and by the employment of component members of such character as shall be readily manufactured of relatively thin sheet materials otherwise suitable for use in goods of the suspender class. In order to satisfactorily meet the various requirements of this peculiar line of manufactures, it is found necessary to generally resort to sheet metals of comparatively small thickness and of such quality as to permit the production of the



complete devices at an extremely low cost. On the other hand, it is found equally desirable to furnish the suspenders with a strong and reliable connecting device which shall not only be efficient considered merely as a connecting device, but shall also be durable in use and smooth and free in its operation. For meeting these peculiar and exacting requirements I have organized my improved draft-equalizing and connecting device by providing a main lever or carrier 3, connected midway of its length with the intermediate linkage or connection 4, the ends of said main carrier being shown pivotally connected (see Fig. 2) at 6 and 6' with the attachments 5 and 5'. In the form in which these attachments are shown in said Fig. 2 they each consist of a loop 8, formed with an eyepiece 9, that is connected to the outer end 10 of the main carrier 3, such connection being preferably made by means of an eyelet-form fastening or by a rivet in lieu thereof, as shown, for instance, at 12. In some cases, if preferred, other forms of strap attachments or eyepieces may be substituted for the particular form of such attachment shown in said Fig. 2. Especially may this be done when the strap instead of being flat web, as herein shown, (the same being designated by 14 and 14',) the manufacturer shall use a cord or other form of suspender-band or tie-piece.

Referring now to Figs. 3 and 4, in which the ball-bearing comprises two sets of balls, the outer set 15 and the inner set 16, respectively, it will be seen that the grooves or channels for the balls are constructed of correspondingly-formed portions 17 and 19 of the respective members 3 and 4 of the device. For the purpose of securing the construction here indicated the said members are shown as being cut out of sheet metal of relatively small thickness, so as to secure sufficient lightness with some degree of flexibility, especially in the extending arms of the main carrier, so as to provide for a slight elasticity desirable in this class of articles, the sheet metal being of sufficient thickness and firmness to provide against too great flexibility while in use, even in the most severe strains to which suspenders and like supporters are necessarily subjected. It will be remembered in this connection that in equalizer-levers generally the heaviest strain comes in the middle portion of the lever or member, and for meeting this condition as it is developed or exists in the present construction I construct the sheet metal or main carrier 3 with a circular concaved portion 19, that for the purposes of constituting it a suitable ball-channel is made of substantially circular cross-sectional form and is also made of a relatively considerable diameter, so that it extends across the major portion of the width of the said member, and this formation, which is in the nature of a ribbed construction, constitutes a reinforcing element or feature for the middle portion of the length of said member 3, with the result

of imparting to said member in that portion thereof a high degree of stability and rigidity, especially adapting it to perform the full measure of work required at that point without liability of injury or derangement under any proper service and without impairing the relatively considerable elasticity existing in the outer portions or arms of the said main carrier. For coöperating with said specially-constructed middle portion of the main carrier I provide the attaching-piece 4, especially in the more complete form of the device shown in Figs. 2, 3, and 4, with a corresponding channeled construction, as will be more clearly seen from the sectional and broken views of the same contained in Figs. 3 and 4, in which the ball-groove for the outer row of balls is indicated by 17 and the opposite groove for the inner set of balls is indicated by 21. It will be seen that the plate portion 4' of this form of the said member 4 joins the ribbed or channeled portion thereof by a curved line, these several features resulting in a rigid and peculiarly-reliable structure. It will also be noted that the manner in which the two sets of balls are located and the way in which the said member 4 is formed to receive the two sets, one set being of larger diameter than the other, gives to the cross-sectional form a reversed curvature, that is evidently particularly effective for still further increasing the stability and efficiency of this portion of the device. As a convenient means for holding together the said parts 3 and 4 and at the same time for completing the construction of the second or inner channel of ball-bearings of the device I have shown the supplemental bearing member having therein the channel or groove 25, said disk being suitably attached to the main bearing member 3. In the present instance this attachment is made by means of a tubular rivet 23, which may be applied in the usual way by means of suitable dies in a press or analogous appliance.

It will be also understood, as indicated from the foregoing description of the pivoted chapes 5 and 5', that the member 4 may be provided with a loop 18, as shown in the accompanying drawings, or in lieu thereof with other suitable chape for receiving end pieces or other straps, as 20 20', as may be required in any particular instance.

By the practical use of full-sized specimens of my present improvements I find that the operation of the same is peculiarly free and smooth and that the principal part of the work thrown upon the several joints taken together is sustained by the ball-bearing or middle joint and that this joint, notwithstanding the strong and firm construction of the device as regards its operation in the direction of the principal stress, operates without any grinding or other unpleasant action—such, for instance, as is ordinarily due to the use of sliding attachments of various kinds, such as heretofore known in the market—and that for the heavier kinds of service the



double ball-bearing construction of the main joint and the consequent rigidity of the members obtained through the manner in which the ball-channels are constructed furnishes an efficient means for connecting the parts and one which is particularly free of objection under all the varying conditions to which this class of articles are necessarily subjected.

It will be observed that the thin sheet-metal lever and hanger 3 and 4 are so stamped or formed and assembled that they cooperate to form an annular race, in which the balls 15 are placed, said balls preferably running in contact with each of said lever and hanger elements; that means are provided for retaining said lever, hanger, and balls in cooperative relation, said means including in this instance the centrally-arranged rivet or connector 23 and its annular cap 25, between the latter of which and the hanger runs the inner row of bearing-balls; that in all cases, whether or not the hanger and lever are held together by the specified connector or by some other device, an extensive bearing-surface of the thin sheet metal is brought into use and rapid cutting away of a bearing by the thin edge of either of said lever or hanger elements is avoided; that preferably at least one of the lever and hanger elements has stamped therein an annular channel forming a portion of a ball-race, while the other of said members or elements has formed therein a cooperative ball-race portion; that in the illustrated construction each of the lever and hanger elements has a struck-up annular channel; that one of said members, preferably the hanger, has a second annular channel of smaller diameter, in which runs a second or smaller set of bearing-balls, the part 25 holding both sets of bearing-balls in cooperative relation with the other parts of the device, and that the hanger is provided with struck-up ball-channels upon its opposite faces.

It will be understood that variations may be resorted to within the scope of my invention, and particularly so long as balls are used in order to prevent the cutting action of the thin edge of the metal of one of the lever and hanger members upon a pivot it is not essential in all cases how many sets of bearing-balls are employed.

Having thus described my invention, I claim—

1. A pair of suspenders comprising a pair of shoulder-straps, a suspender-end, and a device connecting said straps to said suspender-end, said connecting device comprising a lever to whose opposite ends said shoulder-straps are connected, and a hanger to which said suspender-end is connected; said lever being formed of thin sheet metal, and said hanger being also formed of thin sheet metal and being connected to said lever between the ends of the latter; a set of bearing-balls; said lever and hanger being so stamped or formed and assembled that they cooperate to form an annular race in which said balls are placed,

said balls running in contact with each of said lever and hanger elements; and means for retaining said lever, hanger and balls in cooperative relation; whereby extensive bearing-surfaces of the thin sheet metal are brought into use, and the rapid cutting away of a bearing by the thin edge of either of said lever and hanger elements is avoided.

2. A pair of suspenders comprising a pair of shoulder-straps, a suspender-end, and a device connecting said straps to said suspender-end; said connecting device comprising a lever to whose opposite ends said shoulder-straps are connected, and a hanger to which said suspender-end is connected; each of said lever and hanger elements being stamped up from thin sheet metal, and at least one thereof having stamped therein an annular channel forming a portion of a ball-race, and the other of said members having formed therein a cooperating ball-race portion; a set of balls working in said channel or said race; and means for retaining said lever, hanger and balls in cooperative relation.

3. A pair of suspenders comprising a pair of shoulder-straps, a suspender-end, and a device connecting said straps to said suspender-end; said connecting device comprising a lever to whose opposite ends said shoulder-straps are connected, and a hanger to which said suspender-end is connected; each of said lever and hanger elements being stamped up from thin sheet metal, and each having struck up therein an annular channel, the channels together forming a ball-race; a set of balls working in said race; and means for retaining said lever, hanger and balls in cooperative relation.

4. A pair of suspenders comprising a pair of shoulder-straps, a suspender-end, and a device connecting said straps to said suspender-end; said connecting device comprising a lever to whose opposite ends said shoulder-straps are connected, and a hanger to which said suspender-end is connected; said straps being connected to said lever by means of chapes pivoted to the latter; each of said lever and hanger elements being reinforced by an annular channel struck up therein, said channels taken together forming a ball-race; a set of balls in said race; and a central device holding said lever, hanger and balls in cooperative relation.

5. A pair of suspenders comprising a pair of shoulder-straps, a suspender-end, and a device connecting said straps to said suspender-end; said connecting device comprising a lever to whose opposite ends said shoulder-straps are connected, and a hanger to which said suspender-end is connected; each of said lever and hanger elements being stamped up from thin sheet metal, and each having struck up therein an annular channel, the channels together forming a ball-race; a set of balls working in said race; a second annular channel provided upon one of said lever and hanger elements; a second set of balls in said second



channel; and means for retaining in cooperative relation said lever, said hanger and said sets of balls.

6. A pair of suspenders comprising a pair  
5 of shoulder-straps, a suspender-end, and a device connecting said straps to said suspender-end; said connecting device comprising a lever to whose opposite ends said shoulder-straps are connected, and a hanger to which  
10 said suspender-end is connected; each of said lever and hanger elements being stamped up from thin sheet metal; one of said lever and hanger elements having upon its opposite  
15 faces struck-up annular channels, and the other thereof being provided with means on both sides of said first-mentioned member for cooperating with both of said channels to form ball-races; and sets of balls in said races; one  
20 of said races being of smaller diameter than the other.

7. A pair of suspenders comprising a pair  
of shoulder-straps, a suspender-end, and a device connecting said straps to said suspender-end, said connecting device comprising a  
25 lever to whose opposite ends said shoulder-straps are connected, and a hanger to which said suspender-end is connected; each of said lever and hanger elements being stamped up from thin sheet metal; one of said lever and  
30 hanger elements having upon its opposite

faces struck-up annular channels, and the other thereof having a struck-up annular channel for cooperating with one of said first-mentioned channels to form a ball-race, and a centrally-arranged transverse connector  
35 having a head which cooperates with the other of said first-mentioned channels to form another ball-race; and sets of balls in said races.

8. A pair of suspenders comprising a pair  
of shoulder-straps, a suspender-end, and a device connecting said straps to said suspender-end, said connecting device comprising a member to which said shoulder-straps are connected, and a second member to which said suspender-end is connected; said members being  
40 stamped up from thin sheet metal, and being connected together; a set of bearing-balls; said members being so stamped or formed and assembled that they cooperate to form an annular race in which said balls are placed; and  
50 means for retaining said members and said balls in cooperative relation; whereby extensive bearing-surfaces of the thin metal are brought into use, and the rapid cutting away  
55 of a bearing by the thin edge of either of said members is avoided.

HENRY C. HINE.

Witnesses:

FRANCIS H. RICHARDS,  
FRED. J. DOLE.