No. 752,034. PATENTED FEB. 16, 1904.

E. CLIFF.

SEMIELLIPTIC SPRING.

APPLICATION FILED NOV. 10, 1903.

NO MODEL.

Fig. 1.

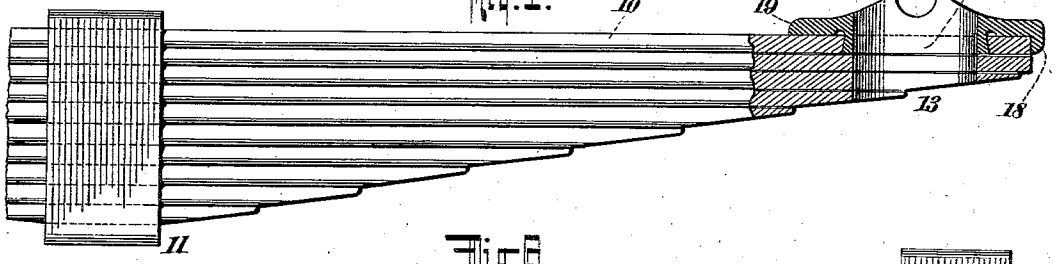


Fig. 6.

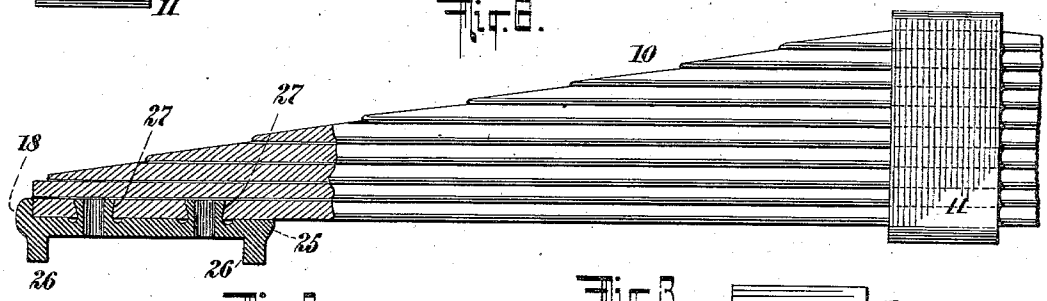


Fig. 2.

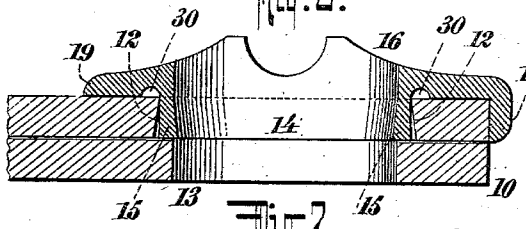


Fig. 3.

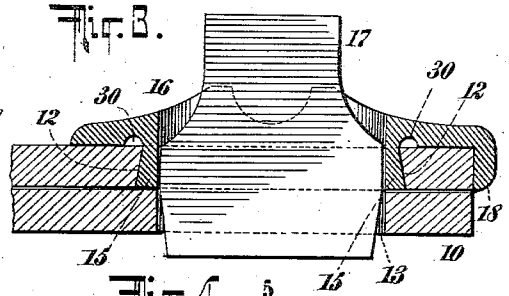


Fig. 7.

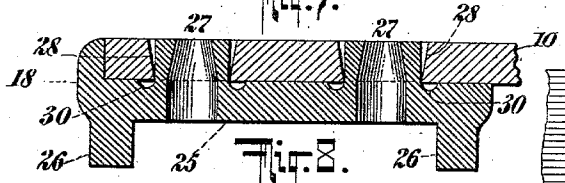


Fig. 4.

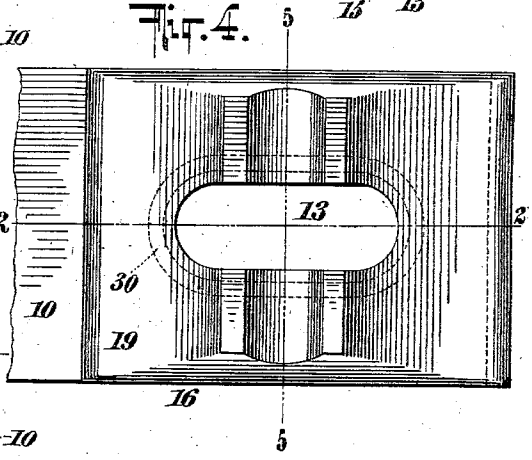


Fig. 8.

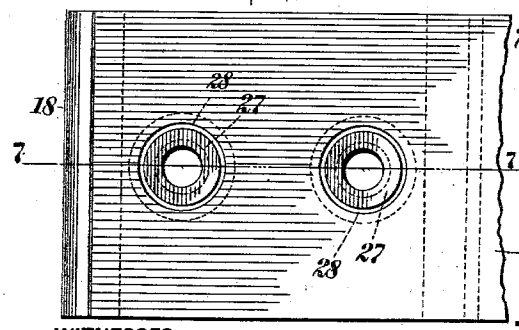
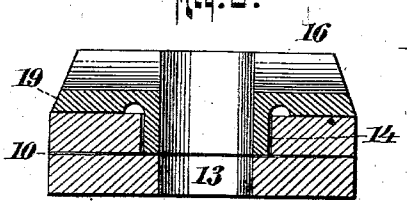


Fig. 5.



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ATTORNEY

No. 752,034. Patented February 16, 1904.

UNITED STATES PATENT OFFICE.

EDWARD CLIFF, OF EAST ORANGE, NEW JERSEY.

SEMI-ELLIPTIC SPRING.

SPECIFICATION forming part of Letters Patent No. 752,034, dated February 16, 1904.

Application filed November 10, 1903. Serial No. 180,503. (No model.)

To all whom it may concern:

Be it known that I, EDWARD CLIFF, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Semi-Elliptic Springs, of which the following is a specification.

The invention relates to improvements in semi-elliptic springs; and it consists in the novel features hereinafter described, and particularly pointed out in the claims.

The invention pertains more particularly to the construction of the end portions of the springs and to the novel dabs or bearing-plates secured to said ends to support or sustain the load.

The invention will be fully understood from the detailed description hereinafter presented, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation, partly in section, of a portion of a leaf-spring constructed in accordance with and embodying the invention. Fig. 2 is an enlarged detached longitudinal section of the end portion of the spring shown in Fig. 1, the bearing-plate being shown as having been applied to position, but not locked to the spring. Fig. 3 is a like view of same, illustrating the bearing-plate as having been locked into position by means of a suitable wedge-shaped tool, the latter being represented in side elevation in operative position. Fig. 4 is an enlarged top view of one end of the spring with the bearing-plate in position. Fig. 5 is a transverse section of same on the dotted line 5 5 of Fig. 4. Fig. 6 is a side elevation, partly in section, of a portion of a leaf-spring equipped with some of the features of my invention, the bearing-plate illustrated in Fig. 6 being intended to be engaged by a hanger of usual form adapted to embrace the end of the spring and support the spring in proper position to sustain the load to be placed upon it. Fig. 7 is an enlarged central vertical section of the end portion of the spring shown in Fig. 6, the bearing-plate being represented in Fig. 7 as having been applied to position on the end of the spring, but not locked into such position, the bearing-plate being shown in Fig. 6 as locked in position. Fig. 8 is a top view of the same and indicates by the dotted line 7 7 the section on which Fig. 7 is taken.

In the drawings, 10 designates the several leaves of the spring, these leaves being, except at their end portions, of usual form and construction and secured together at their central portions by means of a suitable band 11.

Referring to Figs. 1 to 5, inclusive, it will be seen that the end portions of the upper leaves of the spring are formed with a vertical elongated slot, that portion of the slot in the upper leaf being larger than those portions of the slot cut through the lower leaves, and that the walls 12 at the end portions of said slot diverge downwardly and outwardly, as more clearly shown at 12 in Figs. 2 and 3. The slot through the end portions of the leaves of the spring is designated as a whole 13.

The bearing-plate (shown in Figs. 1 to 5, inclusive) contains an elongated opening or slot in line with the aforesaid slot 13 and is formed with a depending flange 14, which enters the slot in the upper leaf of the spring, and more especially at its end portions (numbered 15) is wedge-shaped, being thicker at its lower edge than at its upper edge, as clearly illustrated in Figs. 2 and 3. In the normal condition of the flange 14 before the bearing-plate 16 is secured to the spring the end portions of said flange project slightly inwardly beyond the bore of the lower portion of the slot 13, as shown in Fig. 2, there then being a small space left between the outer end walls of the flange 14 and the adjoining inclined diverging walls 12 of the slot in the upper leaf of the spring. After the bearing-plate 16 has been placed upon the upper leaf of the spring, with its flange 14 inserted into the slot thereof, as represented in Fig. 2, I lock said plate rigidly in position by driving outwardly the end portions of the flange 14 against the diverging walls 12 in the manner represented in Fig. 3, in which the flange 14 is illustrated as having been driven outwardly against the said walls 12 by means of a wedge-shaped tool 17, which is simply in operation driven downwardly through the slot in the bearing-plate and through the slot 13 in the spring, the effect of this tool 17 being to force

the end portions of the flange 14 outwardly into close union with the walls 12 of the upper leaf of the spring. It is not necessary that the side walls of the flange 14 shall be of wedge shape or shall be driven outwardly, and hence in the preferred construction the wedge shape is only given to the end portions of the flange 14, and the diverging walls 12 are only formed at the end portions of the opening or slot in the upper leaf of the spring, and when the said end portions of the flange 14 have been driven outwardly, as shown in Fig. 3, the slot in the bearing-plate 16 then coincides with the slot in the lower leaves of the spring, as shown in Fig. 1, and hence when the bearing-plate is in its proper position a slot of uniform size extends through the spring and bearing-plate to receive the usual hanger or strap (not shown) in a well-understood manner. I also provide the bearing-plate 16 with an end lip 18 to engage the outer end or edge of the upper leaf of the spring, this lip 18 not extending below said upper leaf.

The novel features (shown in Figs. 1 to 5, inclusive) comprise the enlarged opening or slot in the upper leaf of the spring and the depending flange 14 on the bearing-plate to enter and be forced laterally into said opening and to wedge therein, the said bearing-plate being slotted in line with the slot provided in the spring below the upper leaf thereof. The bearing-plate 16 is firmly seated upon the upper leaf of the spring, and by reason of its flange 14 it may be firmly and conveniently locked upon the spring without deadening the end of the latter. I regard it as an important feature that the bearing-plate 16 may be locked upon the end of the spring, because under such condition the bearing-plates may be applied to the springs and the springs shipped without the necessity of wiring the bearing-plates in position to prevent their loss, and it is obvious that there are other advantages in securing the bearing-plates upon the springs in a firm durable manner. If occasion should require, the bearing-plate 16 may be removed from the spring by driving a wedge below the base portion 19 of said plate, the force exerted by the wedge serving to distort the flange 14 sufficiently for it to escape from its receiving opening or slot without injury to the spring, and thus if at any time one of the bearing-plates 16 should become broken another bearing-plate may be substituted for it. The spring illustrated in Fig. 6 is, so far as its leaves are concerned, simply a reversal of the spring shown in Fig. 1, the main leaves of the spring being at the lower side of the latter in Fig. 6 and receiving at their ends dabs or bearing-plates 25, having flanges 26, and adapted to receive the strap-hanger of usual form in this art. The bearing-plate 25 illustrates a modification of a portion of the bearing-plate 16, (shown in Figs. 1 and 2,) in that instead of employing the elongated or elliptical flange 14 (shown in Figs. 1 and 2) the bearing-plate 25 employs two circular flanges 27 to enter two openings 28 in the main leaf of the spring, as more clearly illustrated in Figs. 7 and 8. The flanges 27 are of wedged outline corresponding with the end portions of the flange 14 of Fig. 2, and the walls of the openings 28 in the leaf of the spring are on upwardly-diverging lines. The bearing-plate 25 is applied to the leaf of the spring by inserting the tubular flanges 27 into the aforesaid openings 28, as shown in Fig. 7, and the said bearing-plate is then locked to the said leaf by expanding outwardly the thicker edges of the said flanges 27 against the tapered walls of the openings 28, said flanges 27 then assuming the position in which they are shown in Fig. 6 and effectually locking the bearing-plate to the spring in the same manner that the bearing-plate 16 is locked to the spring in Fig. 3. I illustrate the two tubular flanges 27 in Figs. 6, 7, and 8, so as to indicate that I do not in every instance limit the present invention to the formation of one elongated or elliptical flange 14, it being obvious that for the spring shown in Fig. 1 the one elongated flange 14 is preferable, while in the employment of the spring shown in Fig. 6 the two tubular flanges 27 may be used with entire satisfaction. One of the tubular flanges 27 would lock the bearing-plate 25 to the main leaf of the spring; but it is preferable for the sake of strength and efficiency and to avoid cutting unduly large holes in the leaf of the spring to employ the two tubular flanges 27. In both forms of the invention I provide at the inner side of the base of the bearing and close to the outer sides of those portions of the flange to be expanded outwardly a groove 30 to facilitate the operation of expanding the flange outwardly against the tapered walls of its receiving aperture or opening and to avoid during such operation injury to the metal of the bearing-plate along that portion of the flange or flanges adjacent to the inner base-surface of the bearing.

In the construction shown in Fig. 1 the opening through the bearing-plate and the opening through the lower leaves of the spring properly register with each other when the bearing-plate has been secured in position, and this feature is illustrated in Figs. 1 and 5. Fig. 5 also illustrates the feature, hereinbefore referred to, of the wedged expansible portion of the flange 14 being at the end portions only of said flange, it being unnecessary in the bearing of Fig. 1 to have a flange 14 of wedge shape through its entire length, it being sufficient that this flange be made of wedge shape at two opposite portions only.

I form the tubular flanges 27 of wedge shape throughout their circumference because they are small in diameter and may easily be expanded outwardly by driving a circular tool or rod through them.

The invention sought to be protected by this application is not confined to any special form for the outer surface of the bearing-plates, but to the means provided for securing said plates to the ends of the springs. The bearing-plates illustrated, with the exception of the means provided for securing them in place, are of known outline; and my invention consists in providing the bearing-plates with flanges to be expanded outwardly against undercut or diverging walls in the main leaf of the spring and also in the special features of construction, hereinafter claimed, connected with the employment of said flange.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The spring formed of leaves, the main or outer one of which contains vertical openings in its ends, the walls of said openings being undercut or diverging, combined with end bearing-plates applied to the ends of said spring and having flanges to enter the said openings, said flanges being adapted to be moved outwardly against said diverging walls for locking said plates upon the spring; substantially as set forth.

2. The spring formed of leaves, the outer one of which has undercut or diverging surfaces at its end portions, combined with end bearing-plates applied to the ends of the spring and having integral flanges adapted to be pressed against said diverging surfaces for firmly locking said plates in position, said flanges being of wedge shape or thicker at their outer than at their inner end adjacent to said plates, thereby providing an increased thickness of metal to engage said undercut surfaces; substantially as set forth.

3. The spring formed of leaves, the longer ones of which contain the vertical openings at their ends, the openings in the outer leaf being larger than the openings in the leaves adjoining it, combined with the end bearing-plates applied to the ends of said spring and having flanges to enter the said openings in the said outer leaf, said bearing-plates having the openings through them and the inner walls of said flanges, when said bearing-plates are in position, being in line with the walls of said openings in the leaves below the outer leaf; substantially as set forth.

4. The spring formed of leaves, the outer ones of which contain the vertical openings in their ends, the openings in the outer leaf being larger than the openings in the adjoining leaves and having walls which are undercut or diverging, combined with end bearing-plates applied to the ends of said spring and having flanges to enter the said openings in the outer leaf, said flanges being adapted to be moved outwardly against said diverging walls for locking said plates upon the spring, and the inner walls of said flanges, when said plates are locked in position, being in line with the openings in the leaves adjacent to the outer leaf; substantially as set forth.

5. The spring formed of leaves, the outer one of which contains the vertical openings in its ends, the walls of said openings being undercut or diverging, combined with end bearing-plates applied to the ends of said spring and having flanges to enter the said openings formed therein, said flanges having a wedge shape and being thicker at their outer entering end than at their inner end adapted to move outwardly against said diverging walls for locking said plates upon the spring; substantially as set forth.

6. The spring formed of leaves, the outer one of which has undercut or diverging surfaces at its end portions, combined with end bearing-plates applied to the ends of the spring and having integral flanges adapted to be pressed against said diverging surfaces for firmly locking said plates in position; substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 9th day of November, A. D. 1903.

EDWARD CLIFF.

Witnesses:
CHAS. C. GILL,
ARTHUR MARION.