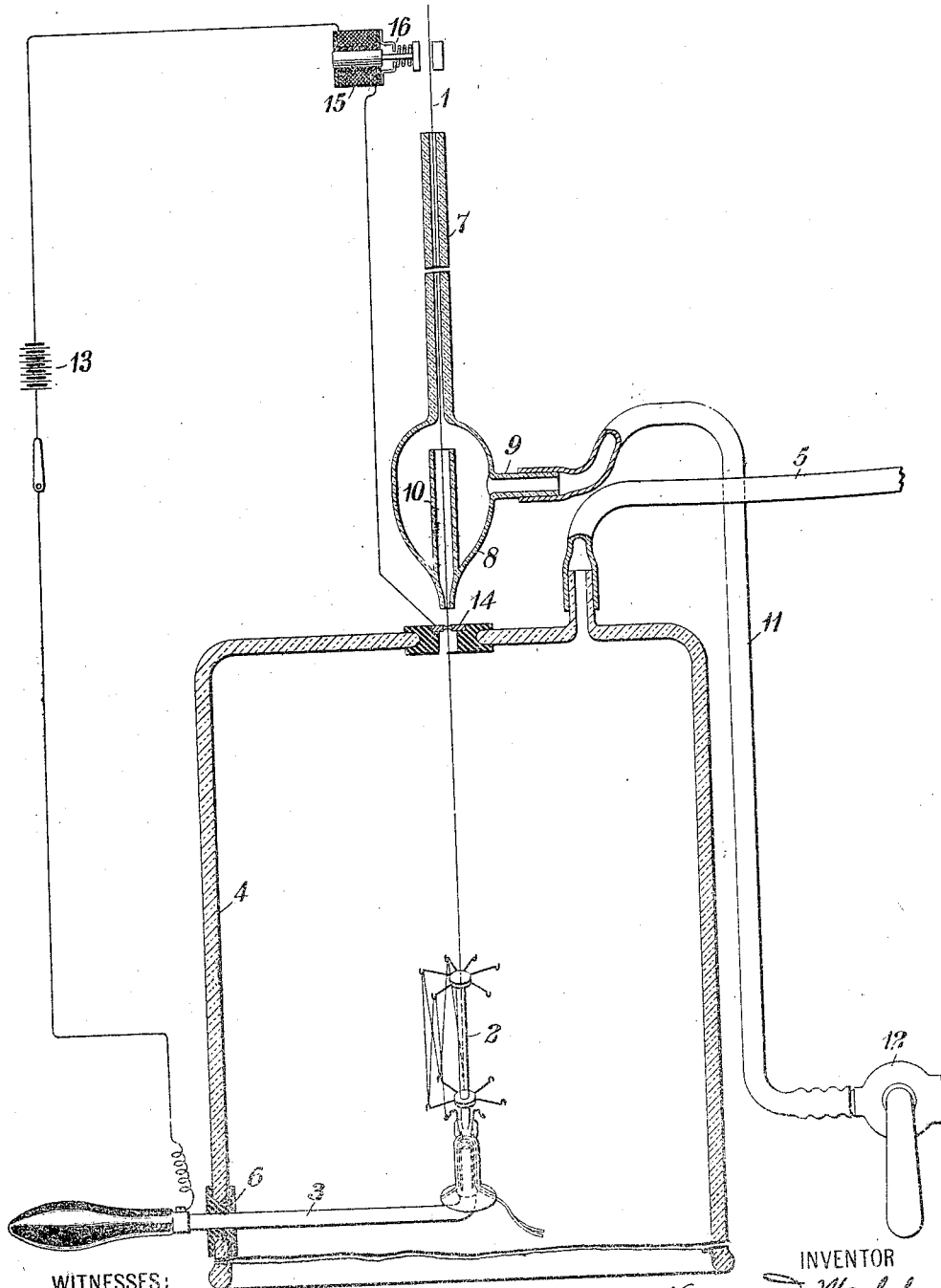


H. D. MADDEN.
TENSION DEVICE.
APPLICATION FILED MAR. 23, 1911.

Patented Dec. 10, 1912.

1,046,822.



WITNESSES:

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TENSION DEVICE.

1,046,822.

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To all whom it may concern:

Be it known that I, HARRY D. MADDEN, a citizen of the United States, and a resident of Bloomfield, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Tension Devices, of which the following is a specification.

My invention relates to devices for applying tension to filaments, threads, fibers and similar structures as they are drawn from coils or reels and applied to mountings or are otherwise used, and it has for its object to provide a device of this character which shall be particularly adapted for use in connection with extremely fragile materials, such as tungsten and similar filaments for incandescent lamps, and which shall permit of regulating the tension upon such filaments with a high degree of precision and accuracy.

The filaments of electric incandescent lamps are sometimes applied to mountings therefor by a suitable back and forth manipulation of the mountings, during which operation it is highly desirable that the filament be maintained taut. Owing to the fragile nature of the filament material used in some lamps, it is necessary that the means for exerting tension upon it in order to maintain it taut shall be of an exceedingly delicate character, while being sufficiently rigid and durable to be free from undue wear and attention while in use.

The device of the present invention permits of applying any suitable degree of tension to materials of extreme fineness and fragility without causing breakage thereof, and without being subject to wear or requiring increased attention with continued use.

In the single figure of the accompanying drawing, which is a view partially in section and partly in elevation of a device embodying my invention, a filament 1, which may be composed of tungsten, molybdenum or any other desired material, is drawn downwardly from any suitable source of supply, such as a coil or reel (not shown) by a back-and-forth movement or other proper manipulation of a mounting 2 to which it is thereby applied. The mounting 2 is carried at the inner end of a manually adjustable holder 3 that projects through one side of a bell-jar 4, within which the manipulation of the filament is effected and to which a suitable neutral gas is preferably admitted

through a supply pipe or hose 5 when the filament is composed of tungsten or molybdenum, or any other material which would be oxidized if highly heated in air. The holder 3 is surrounded, where it passes through the bell-jar 4, by a rubber or other suitable pliable bushing 6 that permits of movement of the holder in any direction for the purpose of effecting the proper movements and manipulations of the mounting 2.

As the filament 1 is drawn downwardly, it is led through a tube 7, the upper end of which has an internal diameter somewhat larger than the filament, and the lower end of which is provided with a chamber or enlargement 8 having a lateral inlet stem 9 and containing a tube 10 that is sealed to its lower end and extends nearly across the interior thereof, the internal diameter of said inner tube being materially larger than the filament. The exit end of the tube 7 is reduced to a proper diameter to afford means for directing and limiting the movements of the filament. The inlet stem 9 is connected to a hose or pipe 11 that leads from a suitable source (not shown) of supply of compressed air, a valve 12 being included in the connection between the said parts for the purpose of regulating the degree of force with which the compressed air enters the enlargement 8.

Air that enters the enlargement 8 passes both upwardly and downwardly around the filament and out of the chamber provided by the enlargement, and, by reason of its friction upon the filament, subjects the latter to tension. By reason of the smaller internal diameter and greater length of the tube 7 above the enlargement, the friction upon the filament in the said upper portion is greater than that upon it in the lower portion, the resultant effect being a force tending to draw the filament upwardly in opposition to the tension mechanically applied to it as it is wound upon the mounting 2. The tube 10 within the enlargement 8 serves to prevent the drafts of air entering the enlargement through the inlet stem 9 from blowing directly against the filament and the enlargement 8 is of such size that the pressure therein may become distributed and equalized.

During the application of the filament to the mounting 2, it is preferably heated to a sufficient degree to render it quite pliable

by the passage of an electric current through it, and, to this end, the holder 3 constitutes one terminal of an electrical circuit including any suitable source, such as a battery

- 5 13. An apertured terminal device 14, having mercury extending across the aperture, is connected to the other terminal of the source and is mounted over the opening in the upper end of the bell jar 4, the mercury
10 serving to make electrical contact with the filament where it passes through the aperture. When the mounting 2 is placed upon the holder 3, the leading-in wires make engagement therewith, and, when the filament
15 is connected to either or both of the said wires, the circuit is completed. The electrical circuit also preferably includes a magnet or other similar device 15 constituting a part of an electro-magnetically operated
20 brake 16 that is released during continuity of the circuit, but is set so as to prevent movement of the filament when the circuit is interrupted. The brake is provided for the purpose of preventing the filament from being
25 blown out of the upper end of the tube 7 when it is broken during its application to the mounting, or when it is desired to substitute a new mounting for one to which a filament has been applied.
- 30 Other suitable means may be provided, if desired, for stopping movement of the filament upon interruption of the electrical circuit, that shown being only indicative of suitable means for the purpose. It may be
35 desirable, for instance, to stop the flow of air into the enlargement 8 of the tension device upon interruption of the circuit including the filament.

I claim as my invention:

- 40 1. A device for applying tension to a moving filament comprising means for directing a draft upon the filament in opposition to its direction of movement.
2. A device for applying tension to a
45 moving filament comprising means for directing a draft upon the filament in opposition to its direction of movement, and means for regulating the force of the draft.
3. A device for applying tension to a
50 moving filament comprising means for directing a draft upon the filament in opposition to its direction of movement, and means for preventing movement of the filament in the direction of the draft upon
55 breakage thereof.
4. A device for applying tension to a moving filament comprising means for directing a draft upon the filament in opposition to its direction of movement, an electrical circuit including the filament, and means for preventing movement of the filament upon interruption of the said circuit.
- 60 5. A device for applying tension to a moving filament comprising means for directing a draft upon the filament in opposition

to its direction of movement, an electrical circuit including the filament, a brake for the filament, and means for causing the brake to stop movement of the filament upon interruption of the said circuit. 70

6. A device for applying tension to a moving filament comprising a tube through which the filament passes, and means for directing a draft through the tube in opposition to the direction of movement of the
75 filament.

7. A device for applying tension to a moving filament comprising a tube through which the filament passes, means for directing a draft through the tube in opposition
80 to the direction of movement of the filament, and means for preventing the filament, upon breakage thereof, from being blown out of the tube.

8. A device for applying tension to a
85 moving filament comprising a tube through which the filament passes having an intermediate draft inlet.

9. A device for applying tension to a moving filament comprising a tube through
90 which the filament passes having an intermediate draft inlet near its exit end.

10. A device for applying tension to a moving filament comprising a tube through
95 which the filament passes having an intermediate draft inlet and means for regulating the force of the draft.

11. A device for applying tension to the moving filament comprising a tube through
100 which the filament passes having an intermediate inlet for a draft whereby unequal degrees of tension are applied to the filament upon opposite sides of the inlet.

12. A device for applying tension to the moving filament comprising a tube through
105 which the filament passes having an intermediate inlet for a draft, whereby greater tension is exerted upon the portion of the filament within the entrance end of the tube than upon that in its exit end. 110

13. A device for applying tension to a moving filament comprising a tube through
115 which the filament passes having an intermediate enlargement, and means for directing a draft into the enlargement and through the tube in opposition to the direction of movement of the filament.

14. A device for applying tension to a moving filament comprising a tube through
120 which the filament passes having an intermediate enlargement, and a draft inlet to the enlargement.

15. A device for applying tension to a moving filament comprising a tube through
125 which the filament passes having an enlargement near its exit end, a draft inlet to the enlargement, and a tube within and extending partially across the enlargement, one end of the said inner tube being attached to the exit end of the enlargement. 130

16. A device for applying tension to a moving filament comprising a tube through which the filament passes having an enlargement near its exit end, a draft inlet to the enlargement, and a tube within and extending partially across the enlargement, one end of the said inner tube being attached to the exit end of the enlargement, the said inner tube being also of larger internal diameter than the main portion of the outer tube.

17. A device for applying tension to a moving filament comprising a tube through which the filament passes, the said tube closely surrounding the filament and having an intermediate draft inlet near its exit end.

18. A device for applying tension to a moving filament comprising a tube through which the filament passes, the said tube closely surrounding the filament and having an intermediate draft inlet.

19. A device for applying tension to a moving filament comprising a tube closely surrounding the filament and through which it passes, and means for directing a draft through the tube in opposition to the direction of movement of the filament.

20. A device for applying tension to a moving filament comprising a tube closely surrounding the filament and through which it passes, and means for directing a draft through the tube in opposition to the direction of movement of the filament, and means for stopping movement of the filament upon breakage thereof.

21. A device for applying tension to a moving filament comprising a tube closely surrounding the filament and through which it passes, the said tube having an intermediate enlargement, and means for directing a draft into the enlargement and outwardly through the tube.

22. A device for applying tension to a moving filament comprising a tube closely surrounding the filament and through which

it passes, the said tube having an enlargement located nearer one end than the other, and means for directing a draft into the enlargement and outwardly through the tube.

23. A device for applying tension to a moving filament comprising a tube having both ends open and through which the filament passes, the said tube having an intermediate draft inlet.

24. A device for applying tension to a moving filament comprising a tube having both ends open and through which the filament passes, the said tube having an intermediate draft inlet near its exit end.

25. A device for applying tension to a moving filament comprising a tube having both its ends open and through which the filament passes, and means for directing drafts through the tube in opposite directions from an intermediate point thereof.

26. A device for applying tension to a moving filament comprising a tube having both its ends open and through which the filament passes, and means for directing drafts through the tube in opposite directions from an intermediate point thereof which is located nearer one end than the other.

27. A device for applying tension to a moving filament comprising means for directing drafts upon, and longitudinally of, the filament in opposite directions.

28. A device for applying tension to a moving filament comprising means for applying confined drafts upon, and longitudinally of, the filament and in opposite directions.

In testimony whereof, I have hereunto subscribed my name this 15th day of March, 1911

HARRY D. MADDEN.

Witnesses:

C. E. KELLY,
A. YOUNGHOLM.