Oct. 19, 1954 N. J. RAINONE ET AL 2,691,817

DEVICE FOR APPLYING COILED FILAMENTS TO SETTING MANDRELS

Filed Dec. 14, 1950

Fig. 1.

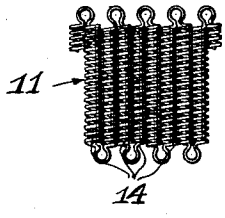


Fig. 2.

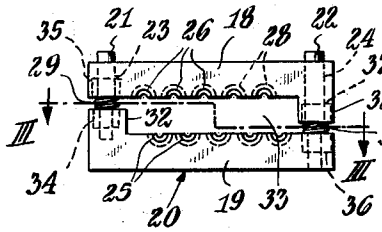


Fig. 4.

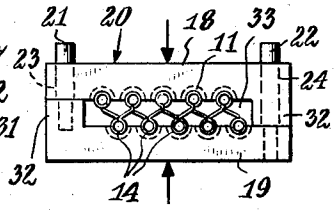


Fig. 8.

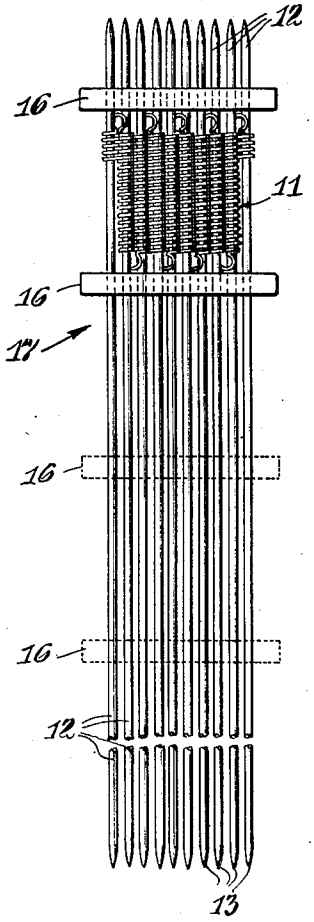


Fig. 3.

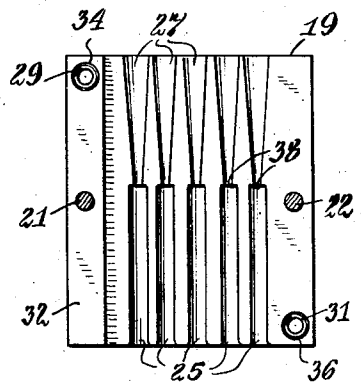


Fig. 5.

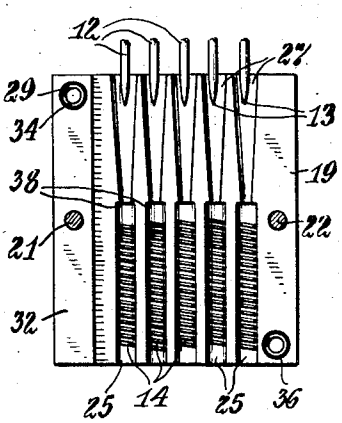


Fig. 7.

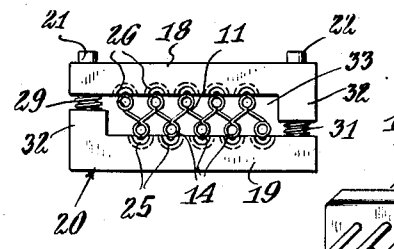


Fig. 6.

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DEVICE FOR APPLYING COILED FILAMENTS TO SETTING MANDRELS

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5 Claims. (Cl. 29—284)

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This invention relates to apparatus for shaping filaments for incandescent electric lamps and the like and, more particularly, to means for applying coiled filaments to setting mandrels.

The principal object of our invention, generally considered, is to provide a device or loading fixture for holding the coiled lengths of a filament when bent into a plurality of side-by-side segments, and provide a funnelling entrance for conveniently simultaneously receiving the mandrels of a jig on which said filament segments are heated to set them in proper relationship with respect to one another.

Another object of our invention is to devise a method for externally holding the several segments of each coiled length of filament, such as is used for projection and other high wattage electrical devices, in proper relationship with respect to one another, and then funnelling internal supporting means in place for holding said segments in proper relationship with respect to one another while being heat-treated to a temperature where they are set, so that upon removal they will remain spaced in the desired relationship.

A further object of our invention is to devise a fixture comprising blocks with internal depressions which provide, upon being placed in mating engagement, nests for holding the several side-by-side segments of a coiled length of filament in proper relationship with respect to one another, and funnelling grooves which properly guide mandrels into the interior of said segments, so that upon release from said blocks the segments are held in proper relationship with respect to one another and may be then heated on said mandrels to a setting temperature.

Other objects and advantages of the invention will become apparent as the description proceeds.

Referring to the scale drawing:

Figure 1 is an elevational view of one form of coiled and segmented filament with which our invention may be employed.

Figure 2 is an end view of the fixture for holding the coiled segments of such a filament in position for application to the mandrels of a setting jig, the blocks forming said fixture being shown in release position.

Figure 3 is a sectional view on the line III—III of Figure 2, in the direction of the arrows.

Figure 4 is a view corresponding to Figure 2, but showing the blocks in mating engagement, with a segmented filament in place therebetween.

Figure 5 is a view corresponding to Figure 3, but showing the mandrels of a setting jig in the process of being guided into the several segments of a coiled filament held in the fixture.

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Figure 6 is a view in perspective, showing the mandrels of a setting jig in place in the coiled segments of a filament, while held in the fixture.

Figure 7 is a view corresponding to Figure 2, but showing a filament between the blocks of the fixture, in the process of being released.

Figure 8 is a plan of a setting jig, showing a filament in place thereon.

The segments of coiled filaments for projection lamps, whether formed by hand or by machine, are after initial forming not sufficiently accurately aligned for use in lamps. By this we mean that the side-by-side segments of coiled lengths of filament, whether of the so-called monoplane or biplane type, which are commonly used in projection lamps and other high wattage electrical devices, are not formed accurately enough for use in such devices without some adjustment, either by hand or mechanically. If such segments are reshaped by hand with the aid of a pair of tweezers, the average production is low and the shrinkage high. The purpose of the present invention is to eliminate hand adjusting and facilitate the application of such filaments to the mandrels on which they are held while being baked to a temperature at which the sections are set with respect to one another.

The jig upon which it is desired to place such filaments, one form of which is indicated at 11 in Figure 1, is illustrated in Figure 8. Filaments 11 are each formed by bending a coiled length of wire into a plurality of side-by-side segments, staggered from one plane to a parallel spaced plane, forming two rows, with alternate segments lying in equally spaced planes parallel to one another and perpendicular to said first-mentioned spaced planes. In said figure, the reference character 12 designates mandrels, desirably of considerable length, formed of tungsten, and pointed at opposite ends as indicated at 13. One mandrel is provided for each section 14 of the filament, the present embodiment involving ten sections. These mandrels are such a size that they accurately fit the interior of the several coiled segments, so as to hold them in proper relationship with respect to one another when said mandrels are properly spaced by passing through apertures 15 in the preferably molybdenum spacer plates 16. In other words, the axes of apertures 15 in the spacer plates 16 are spaced to agree with the spacing desired between the axes of the sections 14 of each filaments 11.

It will be obvious that it would be difficult and time-consuming to apply such a filament 11 directly to one mandrel 12 at a time of the jig 17, formed by said mandrels and spacer blocks 16, as it would mean trying to get the, in the present nistance ten, mandrels in the corresponding number of separate apertures in the sections 14, which apertures are not necessarily initially accurately spaced for the reception of such mandrels.

We have overcome this difficulty by providing a fixture 20 for conveniently threading the segments of coiled filaments simultaneously and quickly upon such a jig. Such fixture consists essentially of a nest with tapered entrance guides. Both of these features are formed in a pair of blocks 18 and 19, which are movable from release position, shown in Figure 2, to mating position shown in Figure 4, along studs 21 and 22. Both of said studs are desirably, but not necessarily, fastened to one block, say that designated 19, and the other block as formed with apertures 23 and 24 closely receiving said studs, so that the block 18 is accurately guidable therealong from a position separated from the block 19, to a position in mating engagement therewith as illustrated in Figure 4.

One block, 19 for example, is formed with plurality of semi-cylindrical nesting grooves or depressions 25, disposed parallel to one another and spaced the distance desired for the several segments one one side of the coiled biplane filament 11. The other block 18 has a corresponding series of grooves or depressions 26 for similarly nesting the several segments at the other side of the coiled biplane filament 11. This means that the grooves 25 and 26 are offset with respect to one another, when the blocks 18 and 19 are mated, corresponding with the desired offset or staggering between the segments 14 of the two rows of the filament 11, that is, a distance equal to half the distance between adjacent grooves.

The grooves 25 and 26 are of a length corresponding with the length of the segments 14 of the coiled filament 11, while the blocks 18 and 19 are sufficiently longer to carry the outwardly flaring grooves 27 in the lower block and 23 in the upper block. Said grooves 27 and 28 are respectively semi-frusto-conical in shape, flaring from a diameter approximating or slightly larger than that of the mandrels 12 to a considerably larger diameter, so as to conveniently funnel the separate mandrels directly to the interior of coil segments held in the nesting grooves 25 and 26, respectively.

The function of the nests is to position the coiled segments and hold them at the spacing desired. The tapered entrances provided by the flaring grooves 27 and 28 allow for positive guiding of the several pointed mandrels 12 simultaneously into the centers of the respective coiled segments 14. Preferably weak springs 29 and 31 are associated with the blocks 18 and 19 to, upon release, cause them to separate to the position shown in Figure 7, and allow for the convenient removal of the jig 17 with a segmented coil 11 thereon, as shown in Figure 8. Figure 8, however, shows such a filament in place on the jig 17 after the application of an outer spacer plate 16.

From the foregoing, it will be seen that we have devised a fixture for externally temporarily holding the individual coiled segments in proper relationship and, at the same time, providing funnelling guides for receiving the mandrels of a jig for internally holding such coils while heat treated to setting positions. In the present embodiment, when used for biplane filaments, each block 18 desirably has a spacing leg 32, or one block has two of such legs, so that even when the blocks are mated, as in the position of Figure 4, there is a space 33 between the planes of the two rows of filament segments.

If, however, the device were used with a monoplane filament, there would be no such spacing and no necessity for such extensions 32, because all of the coiled segments would lie in one plane.

In all instances, however, weak springs indicated at 29 and 31 would preferably be employed for moving the blocks to a release position, shown in Figure 2, said springs having their ends desirably set into pockets 34 and 35 for spring 29, and 36 and 37 for spring 31.

A preferred method of employing the fixture described is as follows:

1. The mandrels 12 are threaded through two spacing blocks 16 to pre-position them.

2. A coiled filament 11 is pushed into the nest end of the fixture, when held in the position of Figure 4, and positioned as there shown, the inner ends of said coiled segments 14 engaging the shoulders 38, formed at the junctions between the nesting grooves 25 and 26, on the one hand, and the tapered entrance grooves 27 and 28, on the other.

3. The pre-positioned mandrels 12 are inserted simultaneously into the tapered guiding grooves 27, until all of the coiled segments 14 are threaded thereon, as shown in Figure 6.

4. The fixture 20 is then released, allowing the blocks 18 and 19 to separate to the position of Figure 7. The jig 17 may then be removed with a coiled filament 11 in place thereon.

5. The threaded coil 11 is then moved toward the other end of the jig 17, and a spacing bar 16 is placed in front of it, on the mandrels 12, as shown in Figure 8. This procedure is continued until the mandrels are filled to capacity, say up to 16 or 18 coiled filaments.

6. The coils are then baked while in place on the mandrels in a hydrogen furnace at about 1650° C. for about 30 minutes, cooled, and removed. The coiled segments will be found perfectly aligned, spaced, and ready for mounting in bulbs to make lamps.

The employment of the fixture heretofore described, and the practicing of the method disclosed, results in the following advantages.

1. The elimination of hand adjusting, which was slow, tedious and costly.

2. With the loading fixture, the process of setting coils by baking has been made practical and efficient. At mounting, such coils require less adjusting, thereby speeding up production and giving greater uniformity.

3. The loading fixture permits the accurate reshaping of approximately 4300 coils per week per operator.

4. Coils which formerly would be classified as shrinkage and unadjustable by hand, can be nested and threaded with no trouble using the loading fixture of our invention.

5. Mechanical threading is now deemed a possibility, using the above-mentioned loading fixture as a basis.

6. The fixture has been used in factory work with a great deal of success, making it possible to meet high production demands.

Although a preferred embodiment of our invention has been disclosed, it will be understood that modifications may be made.

We claim:

1. A fixture for holding the coiled lengths of a filament, when bent into a plurality of side-by-side segments, staggered from one plane to a parallel spaced plane, with alternate segments lying in equally spaced planes parallel to one another, and perpendicular to said first-mentioned planes, in position for being threaded on the mandrels of a setting jig, comprising a pair of blocks movable between releasing and mating positions, which have generally semi-cylindrical depressions, respectively corresponding in spacing with that desired for the filament segments in said first-mentioned planes, extending parallel to one another from one end, terminating short of the other, spaced and numerically corresponding with the segments of such a coiled length of filament, the depressions in one block being, when the blocks are mated, offset along their plane, with respect to the depressions of the mating block, a distance equal to half the distance between adjacent depressions so that they will nest the opposite sides of segments of such a filament and hold said segments in properly spaced staggered parallel relationship, entrance depressions in said blocks extending from the inner ends of said nesting depressions, flaring outwardly from a diameter only slightly larger than that of the mandrels and not greater than the inside diameter of the turns of said segments, forming guides for funnelling said mandrels into the respective segments of said filament, and means for guiding said blocks to and from mating position.

2. A fixture for holding the coiled lengths of a filament, when bent into a plurality of side-by-side segments, staggered from one plane to a parallel spaced plane, with alternate segments lying in equally spaced planes, parallel to one another, and perpendicular to said first-mentioned planes, in position for being threaded on the mandrels of a setting jig, comprising a pair of blocks movable between releasing and mating positions, which have generally semi-cylindrical depressions, respectively corresponding in spacing with that desired for the filament segments in said first-mentioned planes, extending parallel to one another from one end, terminating short of the other, spaced and numerically corresponding with the segments of such a coiled length of filament, the depressions in one block being, when the blocks are mated, offset along their plane, with respect to the depressions of the mating block, a distance equal to half the distance between adjacent depressions so that they will nest the opposite sides of segments of such a filament and hold said segments in properly spaced staggered parallel relationship, entrance depressions in said blocks extending from the inner ends of said nesting depressions, flaring outwardly from a diameter only slightly larger than that of the mandrels and not greater than the inside diameter of the turns of said segments, forming guides for funnelling said mandrels into the respective segments of said filament, and a plurality of studs on one of said blocks fitting corresponding apertures in the other block for insuring that said blocks properly register with respect to one another and for subsequently guiding them between mating and releasing positions.

3. A fixture for holding the coiled lengths of a filament, when bent into a plurality of side-by-side segments, staggered from one plane to a parallel spaced plane, with alternate segments lying in equally spaced planes parallel to one another, and perpendicular to said first-mentioned planes, in position for being threaded on the mandrels of a setting jig, comprising a pair of blocks movable between releasing and mating positions, which have spacing legs extending therebetween and depressions respectively corresponding in size and spacing with that desired for the filament segments in said first-mentioned planes, extending parallel to one another from one end, terminating short of the other, spaced and numerically corresponding with the segments of such a coiled length of filament, the depressions in one block being, when the blocks are mated, offset along their plane, with respect to the depressions of the mating block, a distance equal to half the distance between adjacent depressions so that they will nest the opposite sides of segments of such a filament and holding said segments in properly spaced staggered parallel relationship, entrance depressions in said blocks extending from the inner ends of said nesting depressions, flaring outwardly from a diameter only slightly larger than that of the mandrels and not greater than the inside diameter of the turns of said segments, forming guides for funnelling said mandrels into the respective segments of said filament, springs disposed between said blocks and partially housed in said spacing legs for normally holding said blocks spaced from one another to allow for insertion and removal of such a filament, and means for guiding said blocks to and from mating position.

4. A fixture for holding coiled lengths of a filament, when bent into a plurality of side-by-side segments, in position for being threaded on the mandrels of a setting jig, comprising a pair of blocks movable between releasing and mating positions, which have depressions respectively corresponding in spacing with that desired for the filament segments, extending parallel to one another from one end, terminating short of the other end of said blocks, spaced and numerically corresponding with the segments of such a coiled length of filament, so that when in mating position they will nest the opposite sides of segments of such a filament and hold said segments in properly spaced parallel relationship, entrance depressions in said blocks extending from said terminated-short ends of said nesting depressions, flaring outwardly from a diameter only slightly larger than that of the mandrels and not greater than the inside diameter of the turns of said segments, forming guides for funnelling said mandrels into the respective segments of said filament, means for guiding said blocks to and from mating position, and means resiliently tending to separate said blocks to releasing position.

5. A fixture for holding coiled lengths of a filament, when bent into a plurality of side-by-side segments, in position for being threaded on the mandrels of a setting jig, comprising a pair of blocks movable between releasing and mating positions, which have depressions respectively corresponding in spacing with that desired for the filament segments, extending parallel to one another, terminating at one end short of that end of said blocks, spaced and numerically corresponding with the segments of such a coiled length of filament, so that when in mating position they will nest the opposite sides of segments of such a filament and hold said segments in properly spaced parallel relationship, entrance depressions in said blocks extending from said terminated-short ends of said nesting depressions, flaring outwardly from a diameter only slightly larger than that of the mandrels and not

greater than the inside diameter of the turns of said segments, forming guides for funnelling said mandrels into the respective segments of said filament, and means for guiding said blocks to and from mating position.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
245,068	Hotchkiss	Aug. 2, 1861
1,289,607	Batchelder	Dec. 31, 1918
1,306,337	Hayden	June 10, 1919
1,726,480	Fehse	Aug. 27, 1929
1,992,797	Zabel	Feb. 26, 1935
2,073,030	Sefcik, Jr.	Mar. 9, 1937
2,080,722	Lee	May 18, 1937
2,226,440	Parker	Dec. 24, 1940
2,299,505	Shaffer	Oct. 29, 1942
2,410,140	Young	Oct. 29, 1946
2,449,653	Isaac et al.	Sept. 21, 1948
2,536,677	Brunner et al.	Jan. 2, 1951
2,555,310	Beltz	June 5, 1951

FOREIGN PATENTS

Number	Country	Date
590,005	Great Britain	July 4, 1947