Jan. 16, 1934. R. W. LUCE 1,943,978

ART OF PRODUCING SHEET METAL REFLECTORS

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Fig. 1.

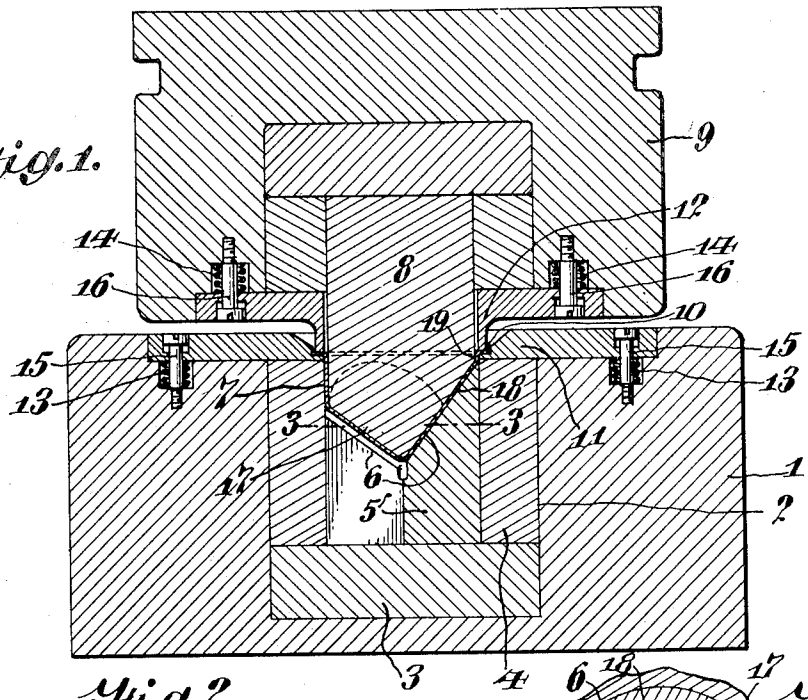


Fig. 2.

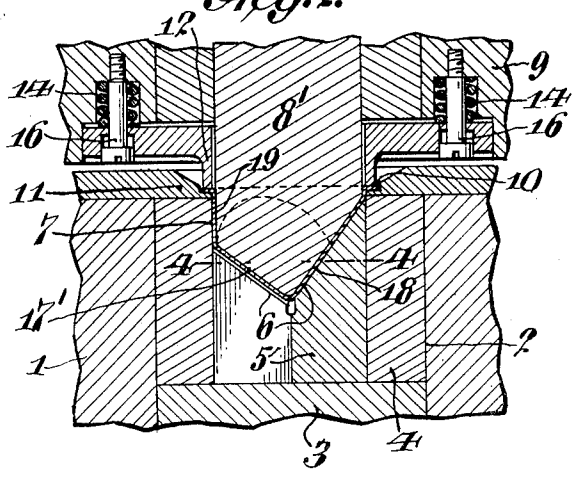


Fig. 3.

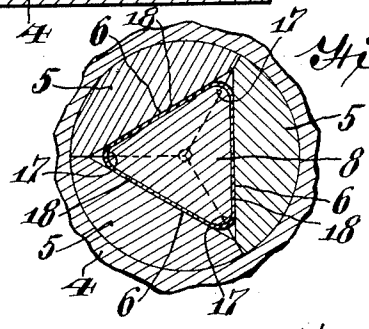


Fig. 4.

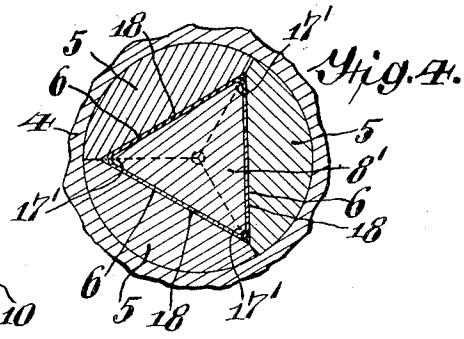


Fig. 5.

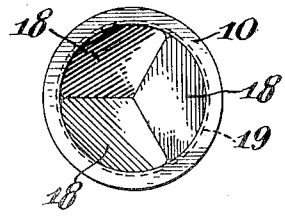
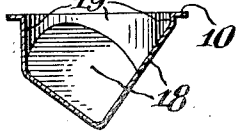


Fig. 6.



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Fig. 7.

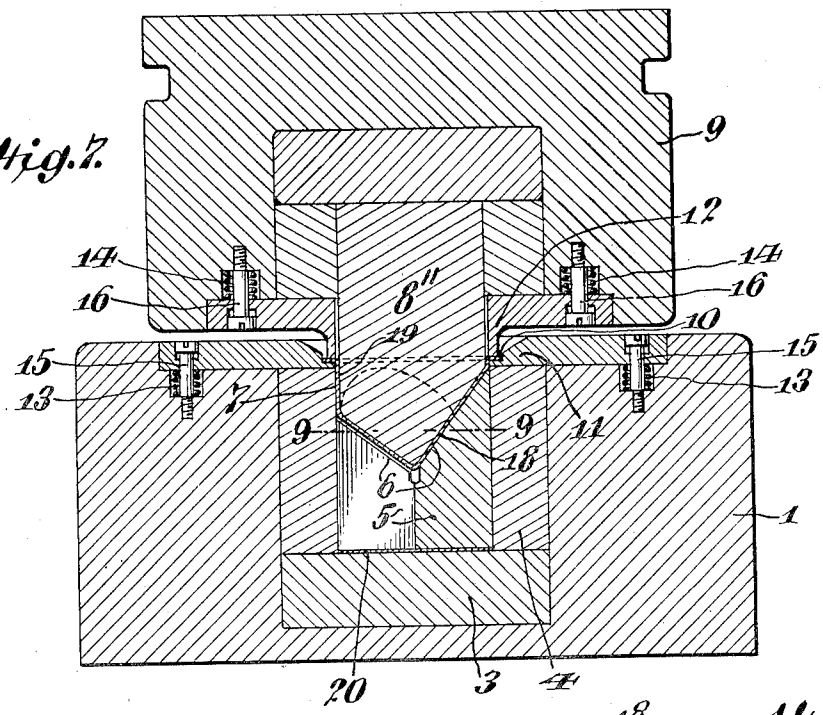


Fig. 8.

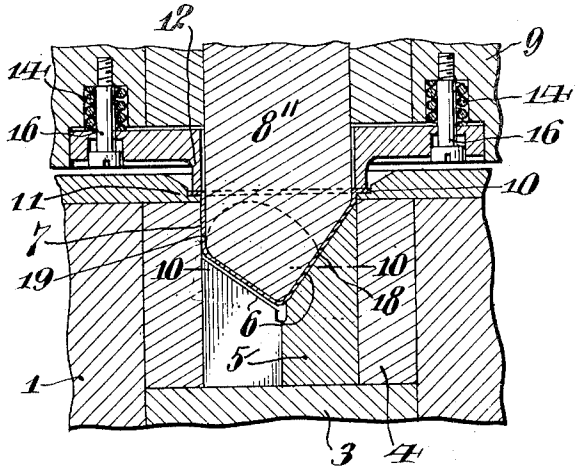


Fig. 9.

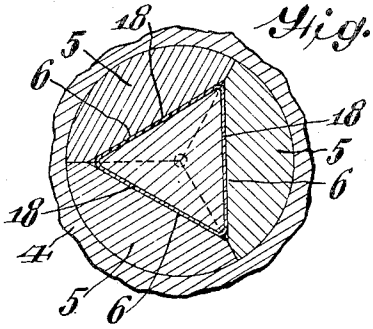
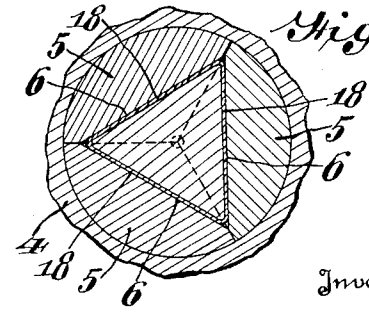


Fig. 10.



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UNITED STATES PATENT OFFICE

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ART OF PRODUCING SHEET METAL REFLECTORS

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Application September 19, 1931
Serial No. 563,744

14 Claims. (Cl. 113—51)

My invention relates to the art of producing sheet metal reflectors wherein the polishing of the reflecting surfaces is effected by pressure in the operation of forming the same in the dies or mould used for that purpose. In the formation of reflectors from sheet metal by means of dies to press the sheets to the shape desired, extreme pressure is necessarily employed in order to impart to the reflecting portions of the surface the high polish that is essential in reflectors of the kind to which my invention particularly relates. It has been found in the case of sheet metal reflectors, especially those of the triple reflector type, manufactured in accordance with previously known pressure polishing methods, that the reflecting surfaces are frequently distorted and, as a consequence, these surfaces do not function properly in the reflection of light for the various purposes for which they are designed, such as for signals for highway traffic control, located either along a highway or street, or upon a vehicle. Such distortion or lack of flatness in the reflecting surface has been found to be due to a large extent to unevenly distributed stresses in the sheet metal from which the reflector is made, and these unevenly distributed stresses are brought about, in part, by operations theretofore performed upon the metal, or by the extreme pressure to which the sheet metal is subjected during the high pressure forming and polishing operations.

The general object of my invention is to provide a novel method of making sheet metal reflectors by pressure forming and polishing operations which, in the case of triple or other plane surface reflectors, produce reflecting surfaces that are flat and without distortion, and which, in the case of reflectors having curved reflecting surfaces, produce reflecting surfaces without distortion. I accomplish the object of my invention by slightly stretching the metal of the reflecting portions of the reflector after the final pressure forming and polishing operation. My method is particularly applicable to sheet metal reflectors of the central triple type such as are now widely used in signal devices for regulating and guiding traffic upon highways, streets, vehicles and the like, although, as will be apparent from the following description, it may be utilized in making reflectors of other types as well.

Without attempting to point out in further detail at this point in the specification the various other objects of the invention, I shall proceed with a detailed description thereof, wherein further objects of the invention will become apparent.

In order that the invention may be readily understood and its particular advantages fully appreciated, reference will be made to the accompanying drawings wherein I have shown certain means for carrying out and accomplishing the method embodying my invention. It will be understood, however, that other means than that which I have shown may be utilized in the practice of my invention.

In the drawings:

Fig. 1 is a view in vertical central section of a die press or mould showing means by which one step of my novel method, in its preferred form, may be carried out.

Fig. 2 is a similar view showing portions of a die press by means of which another step of my invention, in its preferred form, may be carried out.

Fig. 3 is an enlarged transverse sectional view taken on line 3—3 of Fig. 1.

Fig. 4 is an enlarged transverse sectional view taken on line 4—4 of Fig. 2.

Fig. 5 is a front view of a finished reflector made in accordance with my novel method.

Fig. 6 is a longitudinal sectional view of the completed reflector.

Fig. 7 is a view in vertical central section of a die press or mould showing a modification of the means by which one step of my invention may be practiced.

Fig. 8 is a view similar to Fig. 7, showing parts of the press in different positions from those shown in Fig. 7.

Fig. 9 is a transverse sectional view taken on line 9—9 of Fig. 7.

Fig. 10 is a transverse sectional view taken on line 10—10 of Fig. 8.

In the drawings I have shown at 1 a base member of a die press which I utilize in practicing my invention. Formed in the upper face of the base 1 is a cavity 2 in the bottom of which is located a spacing block 3 upon which a tubular lining member 4 is supported and which fits snugly within the cavity 2. Within the opening through the tubular member 4 are located the forming members 5. In this particular case, these forming members are three in number, although it will be understood that the number may be varied as desired. The upper ends of the forming members 5 are cut away as shown at 6 so that when these forming members are in place in the cavity 2 the upper surfaces thereof conform to the outer surface of the reflector which is to be made therein. Preferably these forming members are so shaped at their extreme upper

ends as to provide a circular cross section for the outer end of the completed reflector as hereinafter described.

The forming members 5 in cooperation with the punch or plunger 8 of the press and the inner surface 7 of the tubular member 4, operate to produce as a result of pressure applied thereto a reflector which may be a central triple reflector or a reflector of any other desired type. The punch member 8 is mounted upon a supporting member 9 which is usually made the reciprocating member of the press. It will be understood, however, that the plunger supporting member 9 may be stationary, if desired, and movement of reciprocation given to the forming members 5. In other cases, it may be desirable to make both the plunger 8 and the forming members 5 movable.

In reflectors of the type herein described, it is usual to provide a flange on the front end thereof, as indicated at 10. The formation of metal cup members with such flanges thereon is well known in the art, forms no part of my present invention, and need not be described herein. This flange may be gripped between the inner edge of spring-pressed holding members 11 and 12 mounted upon the base 1 and the support 9 respectively. The members 11 and 12 are resiliently supported upon coiled springs 13 and 14 surrounding screws 15 and 16 passing through suitable openings in the members 11 and 12 into the base 1 and the support 9 respectively.

As shown in Figs. 1 and 3 of the drawings, the plunger 8 is preferably of substantially cylindrical shape and is so made that rounded corners 17 are provided at the junctures of contiguous working faces. The working faces of the plunger 8 are so polished and the plunger is operated under such pressure as to form reflecting surfaces on the reflecting portions 18, and the rounded corners between the working faces of the plunger produce correspondingly rounded junctures between contiguous reflecting portions of the reflector at the completion of this step of my process. It will thus be seen that, upon completion of the drawing, forming and polishing operations performed by the device shown in Figs. 1 and 3, a reflector is produced having three right angularly related reflecting portions 18 which merge into a portion 19, circular, in cross section, at the outer end of the reflector, and that contiguous reflecting portions 18 are joined by rounded corners as shown in Fig. 3.

After the reflector has been subjected to the forming and polishing operations by the apparatus shown in Fig. 1 of the drawings, it is removed therefrom and placed in a press such as shown in Figs. 2 and 4. The parts of the press shown in Figs. 2 and 4 may be identical with corresponding parts of the press shown in Figs. 1 and 3, except for the shape of the working faces of the plunger 8, and no detailed description is therefore given of similar parts. In practicing the step of my process for which the press shown in Figs. 2 and 4 is utilized, I provide a plunger 8', the edges between contiguous working faces of which are not rounded as in the case of plunger 8. Instead, these edges are substantially angular, as indicated at 17'. It will thus be seen that when the reflector is taken from the die press shown in Fig. 1 and placed in the press shown in Fig. 2 that the edges of the working faces of plunger 8' will come into contact with the rounded junctures of contiguous reflecting portions of the reflector before the working faces of the plunger come into contact with reflecting surfaces 18. Continued movement of plunger 8' downwardly operates, therefore, to stretch the metal in reflecting portions 18 to an extent depending upon the shape of the edges between contiguous working faces of plunger 8 and the edges between corresponding contiguous working faces of plunger 8'.

The result of this stretching operation is to remove any unevenly distributed internal stresses in the metal of which the reflector is made. I have discovered that the reflecting portions 18 of the reflector may be sufficiently stretched by the method heretofore described to remove unevenly distributed internal stresses and leave the reflecting surfaces flat and undistorted. I have also found that this stretching operation may be carried out without any substantial effect upon the polish theretofore given to the reflecting surfaces. I have also found that reflectors made in this manner do not tend to warp or become distorted as is frequently the case with many reflectors after they have been in use for some time.

By the employment of the final stretching step in the manner above described, I am enabled to produce sheet metal reflectors of uniform quality and in all of which the reflecting surfaces have the necessary flatness to produce the results desired in the reflection of light for highway and street traffic purposes. In some cases, particularly those of smaller sizes, it happens that reflectors produced by pressure polishing operations will be satisfactory for the purposes for which they are desired without being subjected to the stretching operation, but to insure that all reflectors made of sheet metal shall possess the desired characteristics as to flatness of the reflecting surfaces, I have found it desirable that this stretching operation be employed.

In Figs. 7 to 10 of the drawings, I have shown an apparatus by means of which my invention may be practiced in another way. The apparatus shown in Figs. 7 to 10 may be identical with that shown in Fig. 1, except for the form of the plunger 8'' and the use of the shim 20 shown in Fig. 7. A detailed description of the parts shown in Figs. 7 to 10, to the extent that these parts are similar to the parts of the device shown by Fig. 1, will therefore be omitted.

By reference to Fig. 7, it will be observed that I place a thin sheet of metal or shim 20 beneath the forming members 5. After the previously formed cup from which the reflector is made is subjected to pressure in this press sufficient to form the reflector and the polished reflecting surfaces thereof, the shim 20 is removed from beneath the forming dies 5, or the reflector may be placed in another similar press from which shim 20 is absent. When the plunger 8'' is then lowered, the entire working faces thereof contact with the reflecting surfaces previously made. The rim 10 of the reflector will be tightly gripped between the inner edges of members 11 and 12 so that further downward movement of plunger 8'' operates to stretch the metal so as to remove any unevenly distributed internal stresses in the reflecting portions 18. The extent of the stretching operation in this case will, of course, depend upon the thickness of shim 20. While I have found that this method of performing the stretching operation is satisfactory in certain cases, in other cases I prefer to practice my invention in the manner illustrated in Figs. 1 to 4. In utilizing means such as I have disclosed in Figs. 7 to 10, it sometimes happens

that the stretching of the metal in the reflecting portions 18 is insufficient, such stretching being too largely confined to the circular portion 19 of the reflector. I have found, however, that this objection may be avoided by practicing my invention in the manner described in connection with Figs. 1 to 4.

Although I have illustrated and described my invention as being employed in connection with the manufacture of sheet metal triple reflectors, I desire it to be understood that it may be employed as well in the manufacture of reflectors of other types wherein the formation thereof and the provision of polished reflecting surfaces thereon are effected by pressure operations performed upon a die press or by other similar means.

Having thus described my invention, what I claim and desire to secure by United States Letters Patent is:

1. The method of producing a sheet metal light reflector which comprises the formation of a light reflecting surface by the application of pressure to the sheet metal, and thereafter stretching the sheet metal to remove unevenly distributed internal stresses.

2. The method of producing a sheet metal light reflector which comprises the formation of the light reflecting surfaces by imparting to the sheet metal sufficient pressure to shape the reflector and produce a light reflecting polish thereon, and thereafter removing unevenly distributed internal stresses from the sheet metal.

3. The method of producing a light reflector which comprises the application of pressure to a sheet of metal to form the same into the desired shape and to impart to portions of the surface thereof a light reflecting polish, and thereafter stretching the polished portions of the sheet to remove unevenly distributed internal stresses.

4. The method of making a light reflector which comprises the application of pressure to a sheet of metal to form the same into the desired shape and to impart to a portion of the surface thereof a light reflecting polish, holding the reflectors thus formed with the light reflecting portion unsupported and applying sufficient pressure to the reflecting portion to slightly stretch the same.

5. The method of making a light reflector which comprises the application of pressure to a sheet of metal to form the same into substantially the shape desired and to impart to portions of the sheet a light reflecting polish, and thereafter stretching the light reflecting portions of the sheet.

6. The method of making a light reflector which comprises the application of pressure to a sheet of metal to form the same into substantially the shape desired, imparting to portions of the reflector thus formed a light reflecting polish and stretching the light reflecting portions to remove unevenly distributed internal stresses therefrom.

7. The method of making a light reflector which comprises the application of pressure to a sheet of metal to form angularly related light reflecting portions and to impart a light reflecting polish to the surfaces of said portions, and thereafter applying sufficient pressure to the junctures of the contiguous light reflecting portions to slightly stretch the metal of said light reflecting portions.

8. The method of making a light reflector which comprises the application of pressure to a sheet of metal to form angularly related light reflecting portions and to impart a light reflecting polish to the surface of said portions, and applying sufficient pressure to the junctures of the contiguous light reflecting portions to remove unevenly distributed stresses therefrom.

9. The art of producing a light reflector of sheet metal which comprises the formation by pressure of a hollow reflector and imparting by pressure to the inner side thereof a light reflecting polish, supporting the said reflector at its outer open end, the light reflecting portion of said reflector being unsupported, and applying uniform pressure to the inner side of the reflecting portion of said reflector to effect stretching thereof.

10. The art of producing a light reflector of sheet metal which comprises the formation by pressure of a hollow reflector and imparting by pressure to the inner side thereof a light reflecting polish, supporting the said reflector at its outer open end, the light reflecting portion of said reflector being unsupported, and applying uniform pressure to the reflecting portions only of the inner side of the said reflector to remove internal stresses from the metal of said reflector.

11. The art of producing triple reflectors of sheet metal for reflecting light which comprises the subjection of a sheet of metal plate to pressure to form said reflector and to impart to the surfaces of the sides thereof a light reflecting polish, and thereafter effecting a slight elongation of the said reflector.

12. The art of producing triple reflectors of sheet metal for reflecting light which comprises as steps therein the application of pressure to a section of sheet metal to form the said reflector and to impart to the inner surfaces of the sides thereof a light reflecting polish, supporting the said reflector at its open end with the sides of said reflector unsupported, and applying pressure to all points of the inner surfaces of the said sides to effect a slight stretching thereof.

13. The method of making a triple reflector which comprises the application of pressure to a sheet of metal to form angularly related reflecting portions with rounded junctures between contiguous reflecting portions and to impart a light reflecting polish to the inner surfaces of said portions, supporting the open end of the reflector thus formed, and applying sufficient pressure to the rounded junctures between the contiguous reflecting portions to slightly stretch the metal of said portions.

14. The method of making light reflectors which comprises the application of pressure to a sheet of metal by means of a forming die having angularly related working faces and rounded edges between contiguous faces to bring said sheet into substantially the shape desired in the finished reflector, and applying to the reflector thus formed sufficient pressure by means of a similarly shaped forming die having substantially angular edges between contiguous working faces to slightly stretch the metal of the reflector.

RICHARD W. LUCE.