June 19, 1923. 1,459,519

R. P. SIMMONS

SHEET METAL RADIUS ROD

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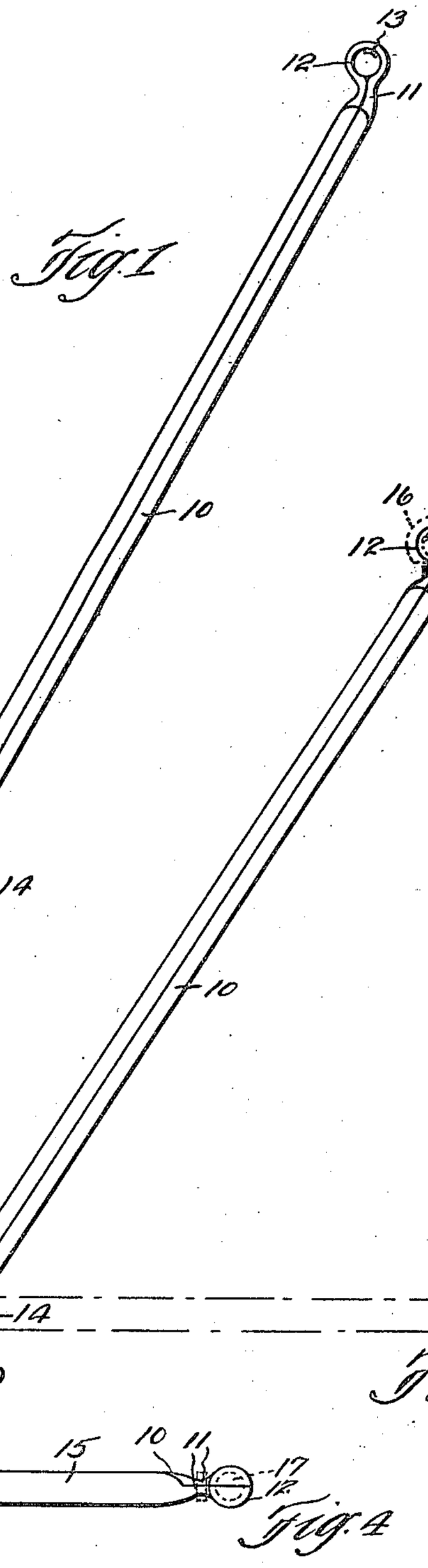


Fig. 1

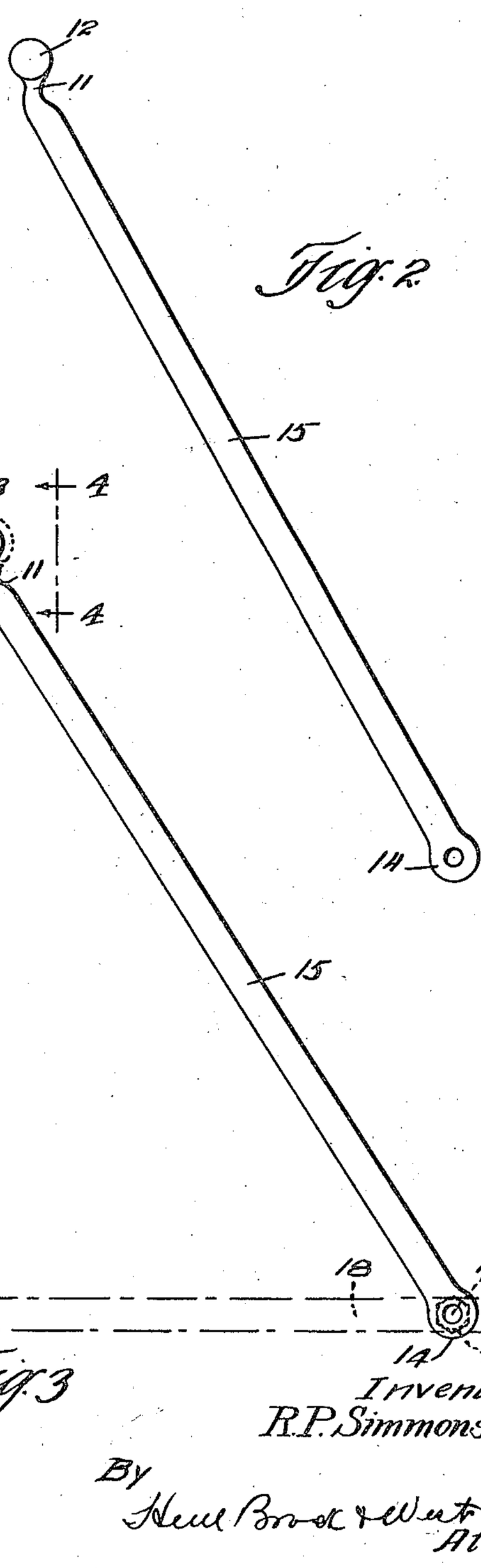


Fig. 2




Fig. 3

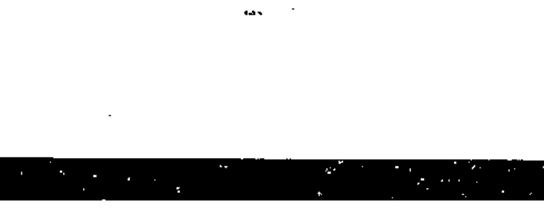


Fig. 4

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Fig. 5

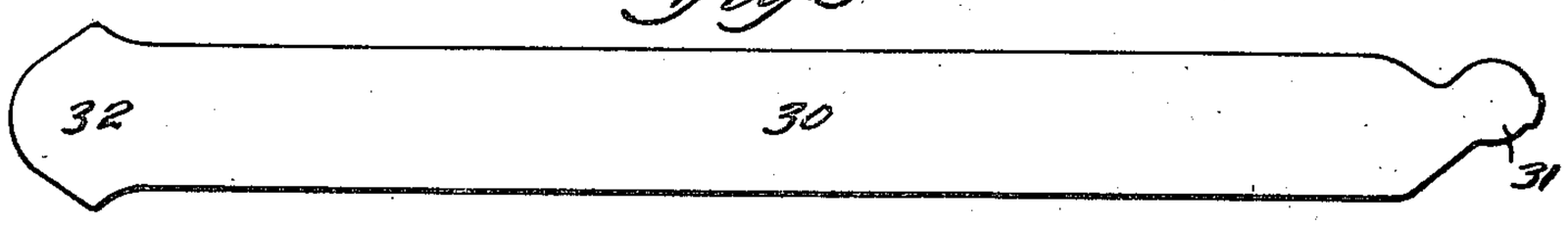


Fig. 6

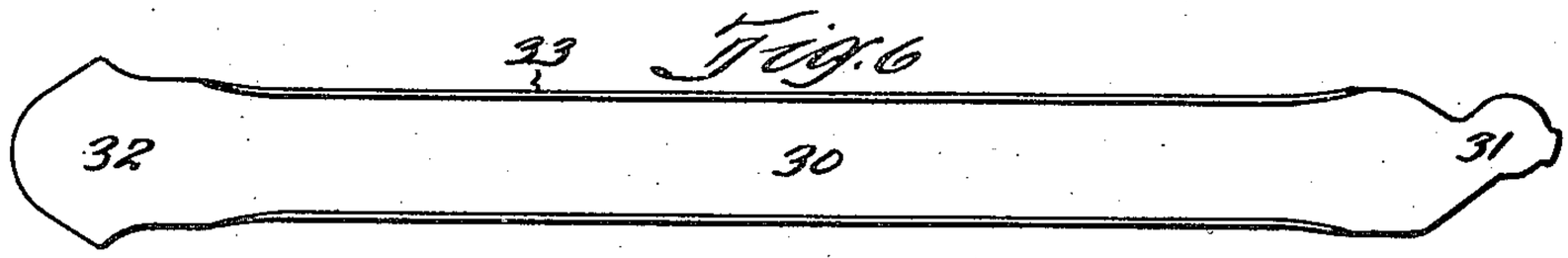


Fig. 7

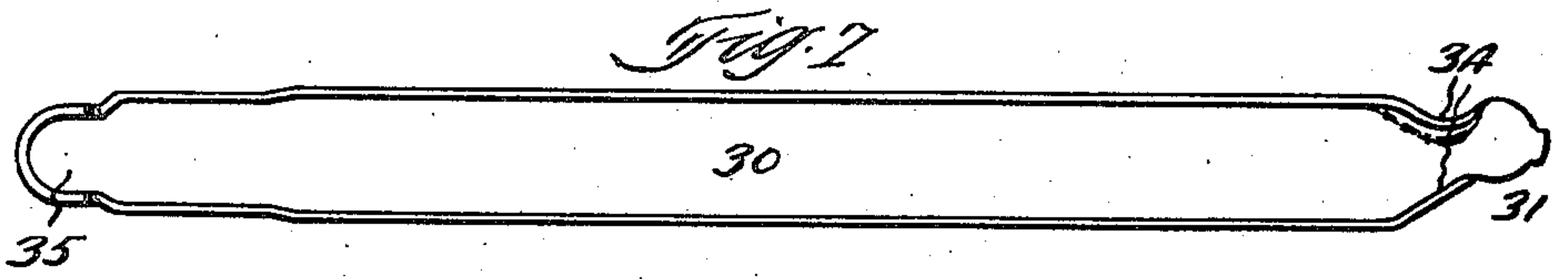


Fig. 8

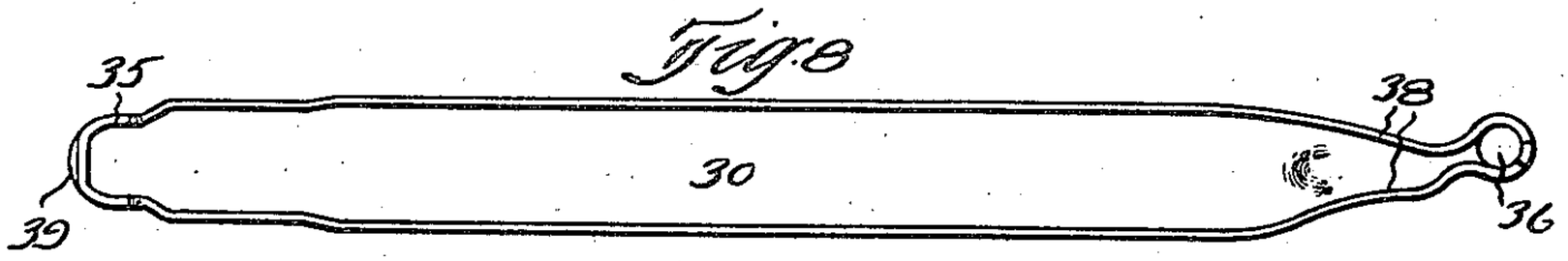


Fig. 9

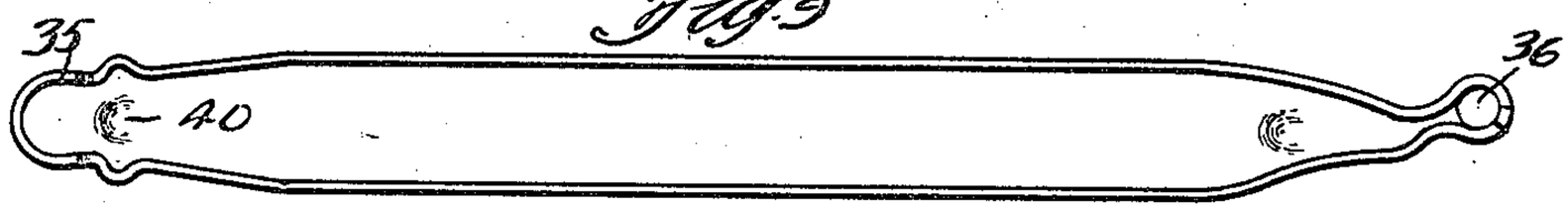


Fig. 10


Fig. 11

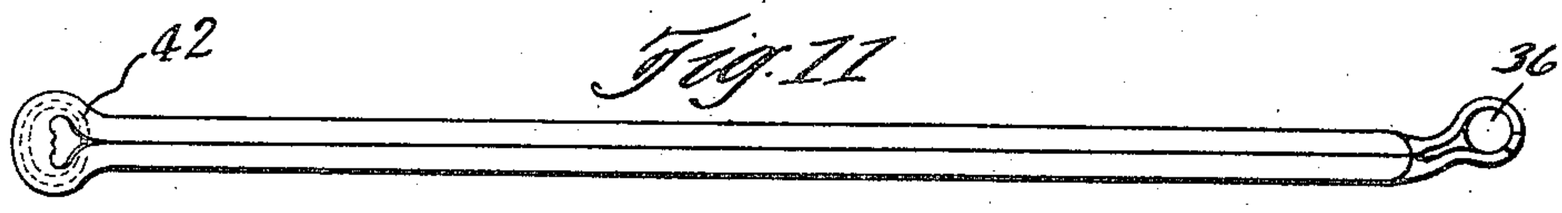


Fig. 11a

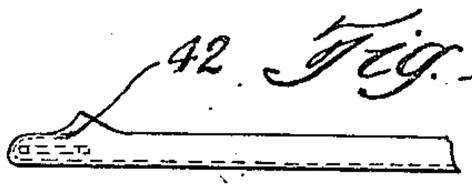


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Fig. 12.

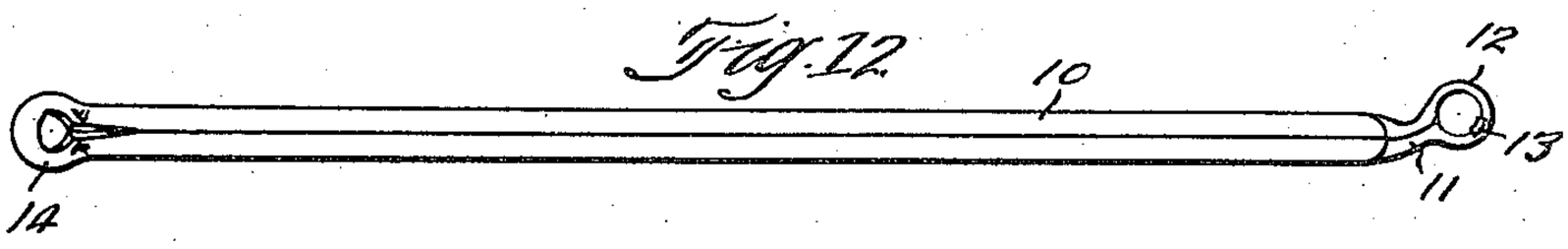
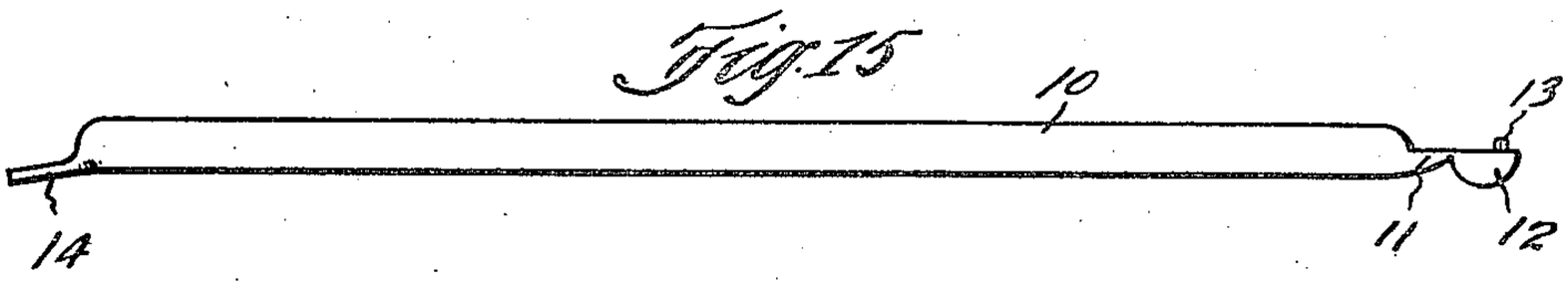



Fig. 13.


Fig. 14.


Fig. 15.



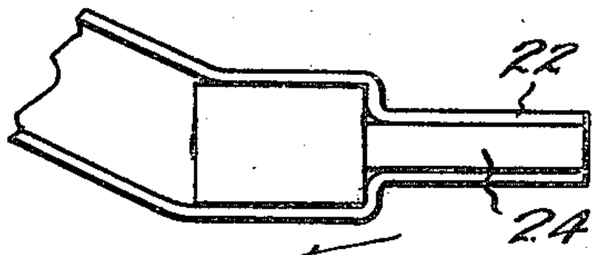




Fig. 16.


Fig. 17.

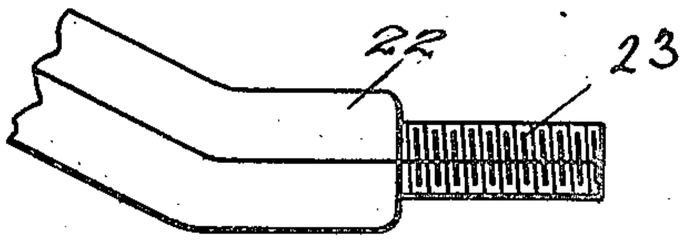



Fig. 18.

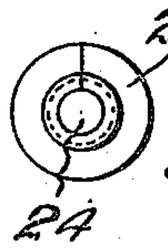



Fig. 19.

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Patented June 19, 1923. 1,459,519

# UNITED STATES PATENT OFFICE.

ROBERT P. SIMMONS, OF CLEVELAND, OHIO.

## SHEET-METAL RADIUS ROD.

Application filed March 20, 1923. Serial No. 626,249.

*To all whom it may concern:*

Be it known that I, ROBERT P. SIMMONS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Sheet-Metal Radius Rods, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to a sheet metal radius rod.

Heretofore this type of radius rod has been made from tubes in the ends of which has been welded or otherwise secured a forging by means of which the rod has been secured to the engine and axle or other parts of the automobile.

One well known construction is to employ a two-piece socket connected to the crank case of the engine and fitting into this two-piece socket is the spherical end of a forged coupling, said coupling having separated members to which the tubular radius rods are welded or otherwise secured and the opposite ends of these radius rods have been provided with forgings either in the form of a bolt adapted to project through the axle or having an eye for fastening to the axle by means of a bolt.

Radius rods constructed in this manner are more expensive to manufacture and do not possess the same amount of strength as the radius rod herein shown and described.

Broadly speaking, the invention consists in providing a sheet metal blank and shaping the same to provide at one end one half of the connecting portion which fits into the socket and at the other end a reinforcing portion shaped for connection to the axle.

The invention consists also in the novel form of the complementary end portions and also the novel form of the reinforced end. The invention consists also in certain details hereinafter fully described and set forth in the appended claims.

In the drawings forming a part of this specification Fig. 1 is a view showing one of the radius rods; Fig. 2 is a view showing the other radius rod; Fig. 3 is a view showing the radius rods connected together in their proper positions for connection to the motor vehicle.

Fig. 4 is a view showing the rear ends arranged together ready for insertion into a spherical socket.

Fig. 5 is a view of the blank.

Figs. 6, 7, 8, 9, 10, 11, 11ª, 12, 13 and 14 show successive steps in the shaping of the rod.

Fig. 15 is a side view of the complete rod; and

Figs. 16, 17, 18 and 19 show a modified form of end and method of making the same.

Referring to the drawings 10 indicates the tubular body portion of one of the radius rods and at the rear end thereof there is a closed neck portion 11 and at the end of this neck portion 11 is the hollow hemispherical head 12 having a lip 13 disposed along the edge and preferably set back from said edge as shown. At the opposite end of the tubular body portion 10 there is an integral apertured enlargement 14 and this enlargement is offset from the longitudinal axis of the tubular rod portion 10 as most clearly shown. 15 indicates the tubular body portion of the radius rod which is likewise formed with the closed neck portion 11 and the complementary hollow hemispherical portion 12 having the offset integral lip 13 and these hemispherical head portions are so constructed that when placed together they will provide a complete sphere which fits into the two-part socket 16 arranged upon the bottom of the engine crank case and the offset lip portions 13 engage the interior faces of the opposed head portions and thereby hold said complementary head portions from relative movement one with the other.

Inasmuch as these complementary head portions are fitted into a clamping socket the interlocking lip portions may in some instances be dispensed with if so desired and if some locking means must be provided in order to prevent any possible movement I may interpose a ball shown in dotted lines at 17 which fits into the complementary hemispherical head portions and this ball may be solid or hollow as preferred. The enlarged apertured end 14 is intended to be secured to the axle 18 by means of the bolt 19 and nut 20, this bolt serving also to carry the front spring of the vehicle and also secure the forward end of the radius rod to the axle. Inasmuch as the radius rods are arranged in pairs and each having a complementary hemispherical head portion it will be necessary to offset one of the

enlargements 14 in order to bring said enlargements in the same plane beneath the axle as most clearly shown.

A radius rod embodying the features just described and composed entirely of sheet metal is stronger than a radius rod composed of a tubular body portion and forged ends. Furthermore, a radius rod composed entirely of sheet metal can be manufactured in less time than the old type and for less money.

In case it is preferred to have the forward ends of the rods attached to the axle by projecting the ends thereof through apertures in the axle it can be accomplished by forming the forward ends of the blank so that they can be folded around a bolt or rod which can be projected through the opening in the axle and secured by means of a nut, the folded blank shown at 22 securely positioning the shouldered bolt or rod which in turn also serves as a reinforcement for the end of the rod.

In constructing radius rods from sheet metal in accordance with my invention, I first punch the blank as shown at 30 having the head portion 31 at one end and the enlargement 32 at the opposite end. During the first operation the edges of the body portion are bent up slightly as shown at 33 and in the third operation the edges of the neck are bent up as shown at 34 and the opposite end is cupped as shown at 35. During the next operation the hemispherical form of the head is embodied as shown at 36, the lip being in the line with the edge of the head section and the edges of the neck portion drawn somewhat closer together as indicated at 38 and the cup-like portion at the opposite end is turned slightly inward at one end as most clearly shown at 39.

When the forward end of the radius rod is to be offset a depression 40 is produced adjacent the cup-like portion which has been formed.

After the blank has passed through the operative stages just described a washer 41 is inserted in the cup-like portion and then the edges of the body portion are brought together and likewise the edges of the neck portion, the neck portion being folded together and offset so as to provide a substantially solid neck portion between the end of the tubular rod and the hollow hemispherical head. The edges of the cup-like portion are folded as shown at 42 in Figs. 11, 11[a] and 12 in over the washer and closed so as to provide a substantially solid head (Fig. 13) and then an aperture is punched through the bottom of what was the cup-like portion (Fig. 14) and in this manner the washer is securely fastened in the folded over sheet metal end providing a substantially solid end and then by means of suitable shaping dies the end thus formed is given its proper relative position with reference to the tubular rod (Fig. 15) and is also expanded out to provide a substantially circular head and as before stated inasmuch as the radius rods are right and left and formed with complementary head portions which when slipped together provide a spherical head which fits into a socket it is necessary that the forward end of one of the rods be offset in order that the said forward ends can be arranged in the same horizontal plane in case the forward ends of the radius rods are to be secured to the underside of the front axle. When the forward end of the radius rod is to be passed through the front axle the forward end of the blank is shaped slightly different as indicated at 22 and the shouldered bolt 24 is placed in said end after the same has been stamped to a semi-circular cross sectional form and then the end is completely folded over the bolt, securely fastening the same, and the end is threaded providing the threaded end 23 of the reinforced rod. The shouldered bolt prevents the withdrawal of the same, and the enlarged end provides a point against which the offset portion of blank can be folded (Fig. 6). When the neck portion is completely closed the lip is also offset inwardly as shown, this offsetting being necessary in order to permit the said lips to engage the interior surface of the opposite head portion when the two head portions are placed together to provide a complete spherical head which is to be fitted into the socket attached to the engine. In practice, the neck portion of the two rods may be welded together or a clamp of any kind can be placed about said neck portions as indicated in Figs. 3 and 4.

It will thus be seen that broadly speaking the method consists in punching the blank from a sheet of metal and folding the same to provide a tubular rod with a reinforced apertured forward end and a hollow hemispehrical rear end and a solid integral connecting neck portion, the hemispherical head portions being provided with interlocking means to prevent displacement.

Having thus described my invention, what I claim is:

1. A sheet metal radius rod having a hemispherical enlargement at one end, and an apertured enlargement at the opposite end.

2. A sheet metal radius rod having a hemispherical enlargement at one end, and an apertured enlargement at the opposite end, said apertured enlargement being reinforced.

3. A sheet metal radius rod, having a hemispherical enlargement at one end, and a reinforced opposite end, said reinforced end being shaped for attachment to the front axle.

4. A sheet metal radius rod having a

hemispherical enlargement at one end and an apertured enlargement at the opposite end, both enlargements being offset from the longitudinal axis of the rod, the apertured enlargement being reinforced.

5. A pair of sheet metal radius rods each having complementary enlargements at one end adapted when combined to fit into a spherical socket, the opposite ends of said rods being shaped for separate attachment to the front axle.

6. A pair of sheet metal radius rods each provided at one end with a hemispherical enlargement and at the opposite end with an apertured enlargement, the hemispherical enlargements being adapted to fit together into a spherical socket, the apertured enlargements being shaped for attachment to the front axle at spaced points.

7. A pair of sheet metal radius rods each formed at one end with a hollow hemispherical enlargement and interlocking means for holding said enlargement against separation.

8. A pair of sheet metal radius rods each provided with a hemispherical enlargement and each enlargement having an offset interlocking lip, the opposite end of each rod having an apertured enlargement.

9. A pair of tubular sheet metal radius rods, each rod having a solid neck terminating in a hollow hemispherical head portion, the opposite end of each rod having an apertured enlarged portion and a reinforcing annular member within said enlarged portion.

10. A pair of tubular sheet metal radius rods each having a substantially solid neck portion at its rear end and a hollow hemispherical portion at the rear end of said neck portion each hollow hemispherical portion having an offset lip, the opposite end of each rod having an apertured enlargement and a washer interposed in said apertured enlargement.

In testimony whereof, I hereunto affix my signature.

ROBERT P. SIMMONS.