June 27, 1961 W. GLUCK 2,990,532

COMBINED RADIO TUBE SOCKET AND TELESCOPIC SHIELD

Filed Sept. 19, 1957 2 Sheets-Sheet 1

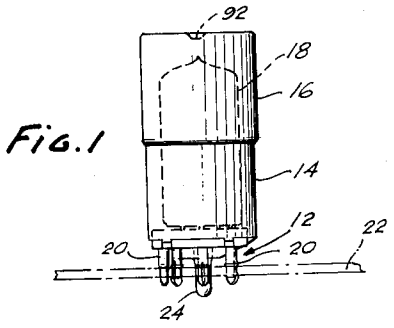


Fig. 1

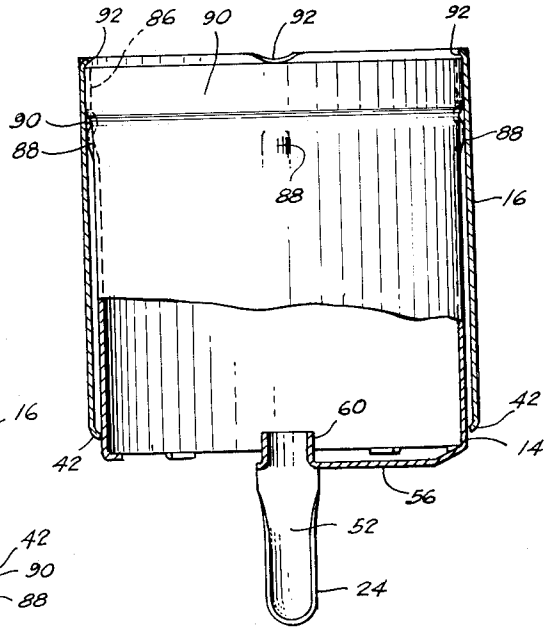


Fig. 2

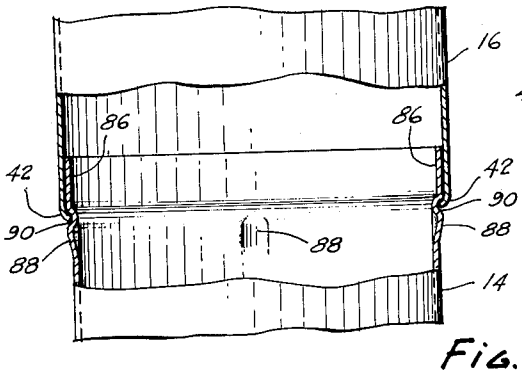


Fig. 3

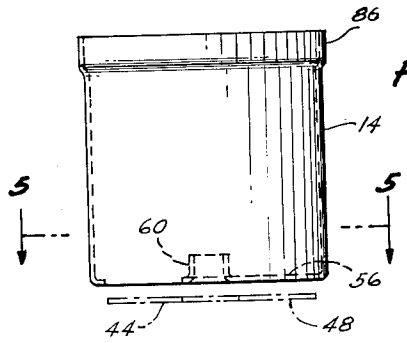


Fig. 4

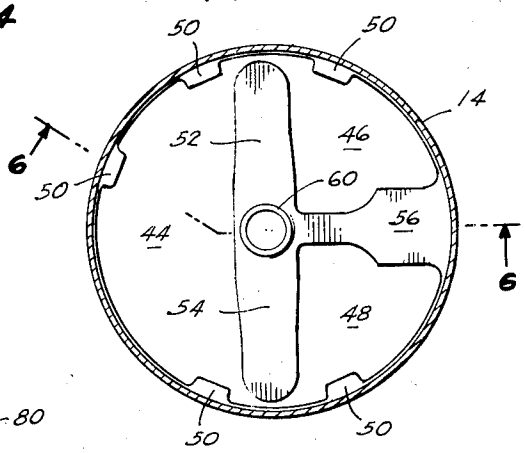


Fig. 5

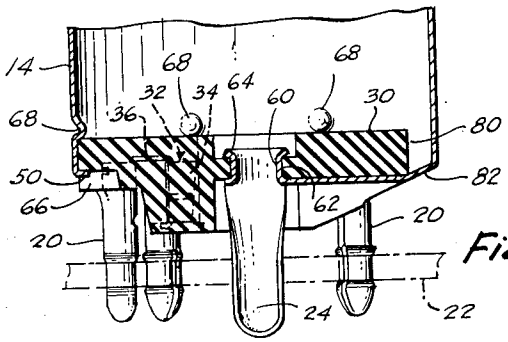


Fig. 6

INVENTOR.
WILLIAM GLUCK
BY James and Franklin
ATTORNEYS.

June 27, 1961 W. GLUCK 2,990,532

COMBINED RADIO TUBE SOCKET AND TELESCOPIC SHIELD

Filed Sept. 19, 1957 2 Sheets-Sheet 2

Fig. 7

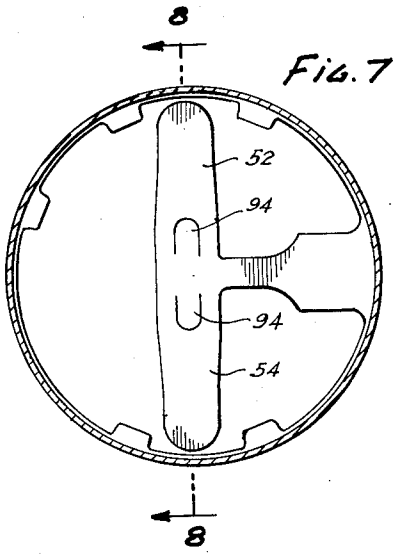


Fig. 8

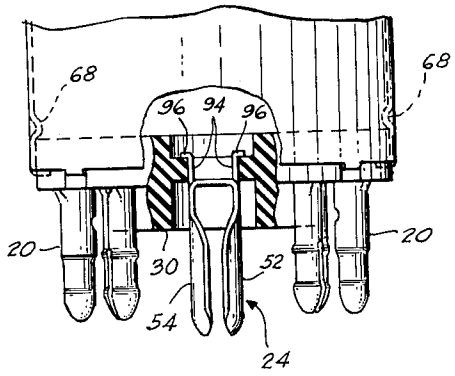


Fig. 9

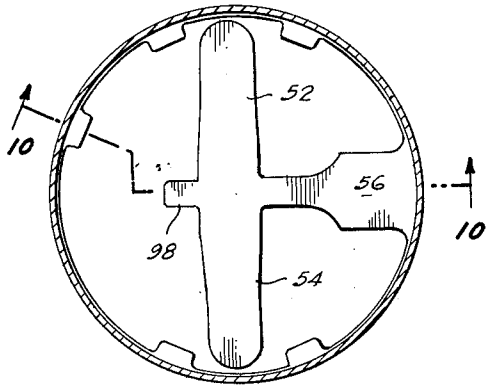
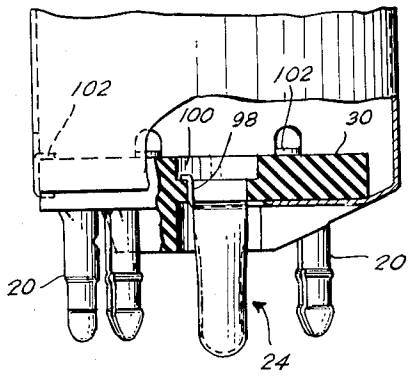


Fig. 10



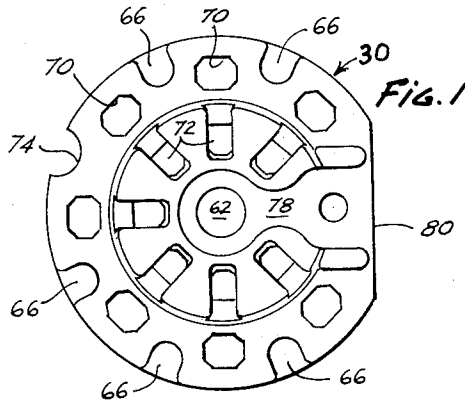


Fig. 11

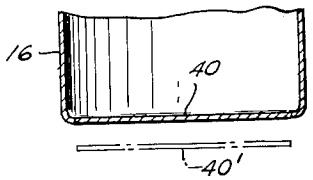


Fig. 12

INVENTOR.
WILLIAM GLUCK
BY James and Franklin
ATTORNEYS.

United States Patent Office 2,990,532 Patented June 27, 1961

2,990,532

COMBINED RADIO TUBE SOCKET AND TELESCOPIC SHIELD

William Gluck, Yonkers, N.Y., assignor to Industrial Electronic Hardware Corp., a corporation of New York

Filed Sept. 19, 1957, Ser. No. 684,968
5 Claims. (Cl. 339—14)

This invention relates to radio tube sockets and shields, and more particularly to a structure combining a radio tube socket with a telescopic tube shield.

Electronic tubes for radio, television and other circuitry are removably inserted in a mating socket. In many cases, it is necessary to shield the tube with a grounded conductive shield. The shield has been removable, but recently a so-called telescope shield has come into use, with the advantage that the shield is non-removable, yet affords access to the tube for removal, testing or replacement.

It has been necessary to secure such a telescopic shield to the chassis around the socket, or to a saddle which is secured to the chassis. In some cases, the shield has been preliminarily secured to the socket itself by means of an adapter or saddle, following which the socket is secured to the chassis. The socket is preferably provided with a grounded center post, which in turn requires a ground strap extending radially from the center post to the shield or/and chassis. The resulting circuit to ground would have three parts, with non-soldered mechanical connections therebetween, that is, the connection between the center post and the ground strap, and the connection between the ground strap and the shield. This would sometimes result in troublesome "intermittents."

The primary object of the present invention is to generally improve structures which combine a radio tube socket and shield. A more particular object is to overcome the aforesaid source of intermittents. Still further objects are to provide a combined structure which is simpler and cheaper to manufacture, and which requires no saddle to secure the shield to the socket. Another object is to form the center post, ground strap, and shield integrally, and yet provide the center post and strap out of what would otherwise be waste metal. Still another object is to provide a combined socket and shield making use of the socket described in my pending application Serial No. 666,916, filed June 20, 1957, and entitled "Socket for Radio Tubes or the Like." This socket is particularly intended for use with printed circuitry.

To accomplish the foregoing objects, and other objects which will hereinafter appear, my invention resides in the combined radio tube socket and shield, and method of fabricating the same, as are hereinafter more particularly described in the following specification. The specification is accompanied by drawings in which:

FIG. 1 shows the general relation of the tube, socket, shield, and printed circuit board;

FIG. 2 is a diametrical section through the shield in telescoped relation, with the socket omitted;

FIG. 3 is a fragmentary section showing the juncture of the telescopic shield portions when extended;

FIG. 4 shows the lower shield portion at an intermediate stage in its manufacture;

FIG. 5 is a horizontal section taken in the plane of the line 5—5 of FIG. 4;

FIG. 6 is a fragmentary section through the lower end of the combined socket and shield;

FIG. 7 is a section similar to FIG. 5, but showing a modification;

FIG. 8 is a fragmentary section taken in the plane of the line 8—8 of FIG. 7, with the socket added;

FIG. 9 is a view similar to FIGS. 5 and 7, but showing still another modification;

FIG. 10 is a fragmentary section taken in the plane of the line 10—10 of FIG. 9, with a socket added;

FIG. 11 is a bottom plan view of the insulation base of the socket, with the socket contacts and the shield omitted; and

FIG. 12 is explanatory of a step in the manufacture of the upper shield portion.

Referring to the drawing, and more particularly to FIG. 1, my improved structure combines a radio tube socket 12 with a shield having telescopically related lower and upper portions 14 and 16. The socket 12 is permanently secured within the lower end of the lower portion 14. A radio tube 18 is received by socket 12 in the usual manner, and for access to the tube 18, as for removal, testing or replacement, the upper portion 16 of the shield is slid down over the lower portion 14, as shown in FIG. 2. This exposes the upper portion of the tube 18 sufficiently to be seized and removed from the socket. The particular socket here shown is intended for use with printed circuitry, it being of the type disclosed in my said copending application Serial No. 666,916. The socket has a ring of posts 20 which act as terminal and support posts. They are terminals for resilient tube pin grips (not shown in FIG. 1). Expressed differently, the socket comprises an insulation base with a ring of metal contacts. Each contact has a pin grip (34 in FIG. 6) and a terminal, in this case a post 20. The posts 20 are received with a snap engagement in a mating ring of holes in printed circuit board 22, and the printed conductors (not shown) on board 22 lead to the holes. A permanent soldered connection may be provided later by the dipping or so-called "pot soldering" method.

In addition to the metal contacts, the socket 12 is also preferably provided with a center post 24. This is grounded and acts as a shield between the contacts. Ordinarily, one of the conductors printed on board 22 leads to a hole receiving the center post 24, thus establishing the desired ground. A metal strap, shown at 56 in FIG. 2, may extend from center post 24 to the shield 14, thus grounding the shield, as is necessary.

The insulation base of the socket is best shown at 30 in FIGS. 6, 8, 10 and 11. The metal contacts are generally designated 32. They each have a pin grip portion 34, as well as the terminal 20, these being connected to each other by a bridge 36. The terminals 20 may be made in varied ways, but are here shown in the form of support posts because the socket is specifically intended for use in printed circuitry.

To form the upper shield portion 16, a flat sheet metal blank is first drawn to form a seamless cylinder having a closed bottom end. This is indicated in FIG. 12, in which the cylinder 16 has a closed bottom end 40. Most of the closed end 40 is punched away, as is indicated in broken lines at 40', thus leaving the cylinder 16 with a narrow inwardly disposed rim or flange, also shown at 42 in FIGS. 2 and 3. This is dimensioned to slide on the outside of the smaller diameter cylinder 14. It serves to prevent complete separation of the shield portions 14 and 16. It also serves as part of a detent mechanism which holds the upper portion 16 in raised position.

Another flat sheet metal blank is drawn to form the smaller diameter lower portion 14. This too is seamless, and has a closed lower end when first formed. Referring now to FIG. 5, the portions generally designated 44, 46, 48 are punched away, leaving narrow inwardly directed rim portions 50 which hold the socket against downward separation from the shield. Also left is a substantial, generally T-shaped area 52, 54, 56, with the stem 56 of the T disposed radially, and the arms 52, 54 of the T disposed diametrically of the bottom.

The arms 52, 54 are preferably appropriately worked to give the same a concavo-convex or partially cylindri-

cal section, with the convexity upward, and are then bent downward and toward one another to form the center post **24**. FIG. 8 shows how the arms **52**, **54** come into parallel relation, with their convex surfaces outward, to form the desired center post. The lower end is rounded to facilitate insertion in a mating circular hole in the printed circuit board, and the sides of the post yield to fit the hole. The center post, the radial ground strap, and the shield are all formed integrally out of a single piece of metal, with perfect conductivity therebetween. The center post and the ground strap are formed out of what would otherwise be scrap or waste metal.

The metal at the center of the bottom is preferably drawn upward into a cylinder, as is best shown at **60** in FIGS. 2, 4 and 5 of the drawing. This is subsequently used as an eyelet to lock the post to the insulation base of the socket, and referring to FIG. 6, it will be seen that the part **60** above center post **24** is received in a mating hole **62** in base **30**, and the upper end is flared outward or riveted at **64** to permanently lock the post in position.

Referring to FIG. 11 of the drawing, the bottom of the insulation base **30** has five recesses **66**. Reverting to FIG. 5, the five flanges or rim portions **50** are located to register with the five recesses **66**. Referring now to FIG. 6, it will be seen how a rim portion **50** is received in a recess **66**, thus locking the parts against relative rotation, and locking them against outward separation. In addition, the side wall of cylinder **14** is preferably indented as shown at **68** immediately above the insulation base, thus locking the parts against inward movement. The metal may be lanced, if desired, but I have found that it is sufficient to merely indent or "dimple" the metal. This is done at a number of points, at least three points being used, and preferably five points as here shown, one over each tab **50**.

From inspection of FIG. 11 it will be seen that the number of recesses **66** is related to the distribution of the contacts in the socket, beause the recesses are located between the holes **70** which receive the posts **20**. The pin grip portions of the metal contacts (omitted in FIG. 11) are received in the inner holes **72**. In the present case, there are seven contacts at the spacing of eight. A notch is provided at **74** for orientation of the socket. If this notch is eliminated, another recess **66** may be provided at this point, in which case the shield may be provided with a sixth rim portion or tab **50** like the five shown in FIG. 5.

A socket substantially like that here shown is also made with nine contacts at the spacing of ten, and it will be understood that the number and location of the recesses **66** and their mating tabs **50** may be appropriately varied for that socket. It will also be understood that in each case, the number and location of the dimples **68** directly above the socket may, if desired, be appropriately varied.

It will be understood that if desired a continuous rim might be provided, instead of an interrupted rim or tabs, but the continuous rim would necessitate a slight increase in socket and shield diameter, compared to the present structure, in which the recesses **66** are located between the holes **70**.

A radial recessed area is provided at **78** (FIG. 11) leading to the center hole 62, and the ground strap is received in the recess 73. The base of the particular socket here shown has a flat at 80, while the shield is cylindrical. The gap therebetween is bridged by the ground strap, as shown at **82** in FIG. 6.

To prevent complete removal of the upper shield portion **16**, the upper end of the lower shield portion **14** is preferably expanded, as is best shown at 86 in FIG. 4. This enlargement of cylinder **14** is preferably carried entirely around the cylinder, for it is imperative that the upper cylinder **16** be not removed from the lower cylinder **14**. It will be understood that the upper part **86** of the lower cylinder cooperates with the bottom rim **42** of the upper cylinder, which similarly extends entirely around the cylinder, thus forming a strong positive stop.

To releasably hold the upper cylinder **16** in raised position, the lower cylinder **14** is preferably deformed, as indicated at **88**, **90** in FIG. 3. This deformation is localized at a number of points around the cylinder, say three points, and may be in the form of upright strips of metal, the side edges of which are lanced or slit from the main cylinder **14**. However, I have found that equally efficient results are obtained without actually shearing or slitting the sides of the deformed area. The deformation provides a sloping approach **88**, and an indentation **90** dimensioned to receive the rim **42** of the upper cylinder **16**. The upper cylinder may be pulled firmly upward until it snaps into position. It will not fall of itself, but can be pushed downward intentionally.

The top edge of upper cylinder **16** is preferably indented to prevent it from sliding in downward direction from the lower cylinder **14**. Such indentations are shown at **92** in FIGS. 1 and 2. If desired, the entire rim could be spun inward, but little or no strength is needed at this point because the upper cylinder cannot escape from the lower cylinder after the structure is secured on a printed circuit board. The primary purpose of the indentations **92** is to prevent separation of the parts during handling and shipment from the socket manufacturer to the set manufacturer.

Considered in sequence, and referring to FIG. 4, the expansion at **86** and the eyelet formation at **60** may be performed as a part of or immediately following the main drawing operation which forms the cylinder **14**. Thereafter, the detent indentations **88**, **90** (FIG. 3) are formed, because these incidentally serve to prevent relative rotation of the cylinder and die. As a next step, the bottom is punched away, as is indicated in broken lines at **44**, **48** in FIG. 4, and at **44**, **46**, **48** in FIG. 5. I then shape or convex the arms **52**, **54**. Thereafter, the arms are bent downward.

FIG. 2 shows the lower and upper parts assembled without the socket in position, but it will be understood that in practice, the lower part may be assembled with the socket, and the upper part added later. More specifically, the socket may be dropped into position in the lower cylinder **14**, following which the center eyelet may be expanded as shown at **64** in FIG. 6, and the indentations **68** may be provided, thus permanently locking the socket and lower cylinder together. This assembly is then readily dropped through the upper cylinder, following which the top indentations **92** are formed.

FIGS. 7 and 8 show a slight modification in the method of anchoring the center post to the socket. In FIG. 7, it will be seen that tongues **94** are excised from the arms **52**, **54** of the T. Referring to FIG. 8, the tongues **94** are bent upwardly to parallel one another, much as the arms **52**, **54** are bent downwardly to parallel one another. After assembly with the insulation base **30** of the socket, the upper ends of tongues **94** may be bent outwardly, as shown at **96**, thus locking the parts together.

FIGS. 9 and 10 show still another method of anchoring the center post to the socket. In this case, a single tongue **98** is provided, extending diametrically away from the ground strap **56**. FIG. 10 shows how tongue **98** may be bent outward at **100** to lock the parts in position. FIG. 10 shows another variation from FIGS. 6 and 8, in that a tab **102** is lanced free of the cylinder wall, and is bent downward over the top of the insulation base to lock it against upward movement. This is in lieu of the dimple **63** shown in FIG. 6.

It is believed that the structure of my improved combined radio tube socket and telescopic shield, and the method of fabricating the same, as well as the advantages thereof, will be apparent from the foregoing detailed description. It will also be apparent that while I have shown and described by invention in several preferred

forms, changes may be made in the structures shown, without departing from the scope of the invention, as sought to be defined in the following claims.

I claim:

1. In combination, a radio tube socket for detachably receiving the terminal pins of a tube, and a tube shield having telescopically related upper and lower portions, the upper portion being open at both ends and the lower portion being open at its uper end, said portions being of such length that they telescope to a shortened length which exposes the upper portion of the tube for seizure for removal, and an extended length which provides a shield for the tube, and means to prevent complete removal of the upper portion from the lower portion, said socket being permanently secured within the lower end of the lower portion and comprising an insulation base carrying a ring of metal contacts, said lower shield portion having a ground strap extending radially between the center of the socket and the shield, and said strap and lower shield portion being made out of a single integral piece of metal.

2. In combination, a radio tube socket for detachably receiving the terminal pins of a tube, and a tube shield having telescopically related upper and lower portions, the upper portion being open at both ends and the lower portion being open at its upper end, said portions being of such length that they telescope to a shortened length which exposes the upper portion of the tube for seizure for removal, and an extended length which provides a shield for the tube, and means to prevent complete removal of the upper portion from the lower portion, said socket being permanently secured within the lower end of the lower portion and comprising an insulation base carrying a ring of metal contacts, said lower shield portion having a center post projecting downwardly beneath the socket and having a ground strap extending radially from the center post to the lower shield portion, and said post, strap, and lower shield portion all being made out of a single integral piece of metal.

3. In combination, a radio tube socket for detachably receiving the terminal pins of a tube, and a tube shield having telescopically related upper and lower portions, the upper portion being open at both ends and the lower portion being open at its upper end, said portions being of such length that they telescope to a shortened length which exposes the upper portion of the tube for seizure for removal, and an extended length which provides a shield for the tube, and means to prevent complete removal of the upper portion from the lower portion, said socket being permanently secured within the lower end of the lower portion and comprising an insulation base carrying a ring of metal contacts, said lower shield portion having a center post projecting downwardly beneath the socket and having a ground strap extending radially from the center post to the lower shield portion, said lower shield portion having inwardly directed rim portions holding the socket against downward movement, and said strap, rim portions, and lower shield portion all being made out of a single integral piece of metal.

4. In combination, a radio tube socket for detachably receiving the terminal pins of a tube, and a tube shield having telescopically related upper and lower portions, the upper portion being open at both ends and the lower portion being open at its upper end, said portions being of such length that they telescope to a shortened length which exposes the upper portion of the tube for seizure for removal, and an extended length which provides a shield for the tube, and means to prevent complete removal of the upper portion from the lower portion, said socket being permanently secured within the lower end of the lower portion and comprising an insulation base carrying a ring of metal contacts, said lower shield portion having a center post projecting downwardly beneath the socket and having a ground strap extending radially from the center post to the lower shield portion, said lower shield portion having inwardly directed rim portions holding the socket against downward movement, said post having two sides extending downward from the sides of the free end of the strap, and said post, strap, rim portions, and lower shield portion all being made out of a single integral piece of metal.

5. In combination, a radio tube socket for detachably receiving the terminal pins of a tube, and a tube shield having telescopically related upper and lower portions, the upper portion being open at both ends and the lower portion being open at its upper end, said portions being of such length that they telescope to a shortened length which exposes the upper portion of the tube for seizure for removal, and an extended length which provides a shield for the tube, and means to prevent complete removal of the upper portion from the lower portion, said socket being permanently secured within the lower end of the lower portion and comprising an insulation base carrying a ring of metal contacts, said lower shield portion having a center post projecting downwardly beneath the socket but with its uper end secured in a mating hole in the center of the socket, said lower shield portion also having a ground strap extending radially from the center post to the lower shield portion, said post having two sides extending downward from the sides of the free end of the strap, but the upper end of said post projecting above the strap, and said post, strap, and lower shield portion all being made out of a single integral piece of metal.

References Cited in the file of this patent

UNITED STATES PATENTS

2,265,632	Coffin	Dec. 9, 1941
2,449,356	Wilkoff	Sept. 14, 1948
2,584,717	Alpert et al.	Feb. 5, 1952
2,641,826	Dreznes	June 16, 1953
2,770,787	Peters	Nov. 13, 1956
2,862,991	Reardon	Dec. 2, 1958
2,884,611	Gibson	Apr. 28, 1959
2,904,772	Artz	Sept. 15, 1959
2,917,723	Gluck	Dec. 15, 1959