May 25, 1943. R. S. MERKLE 2,320,043

RADIO TUBE HOLDER AND EXTRACTOR

Filed Nov. 22, 1941

Fig. 1.

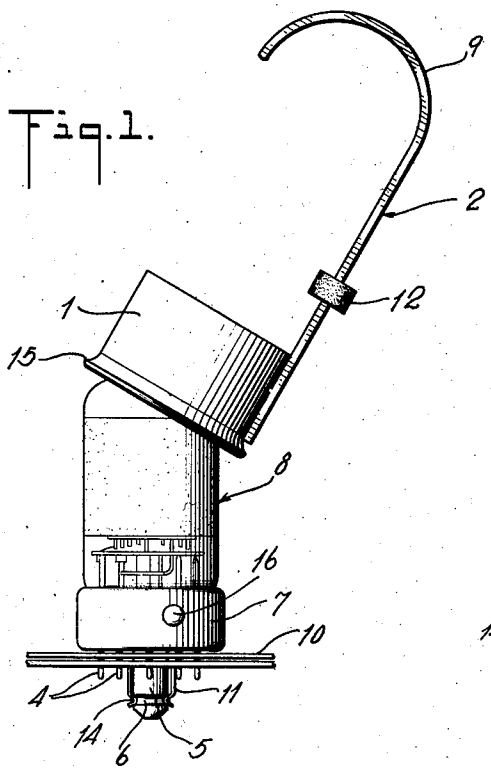
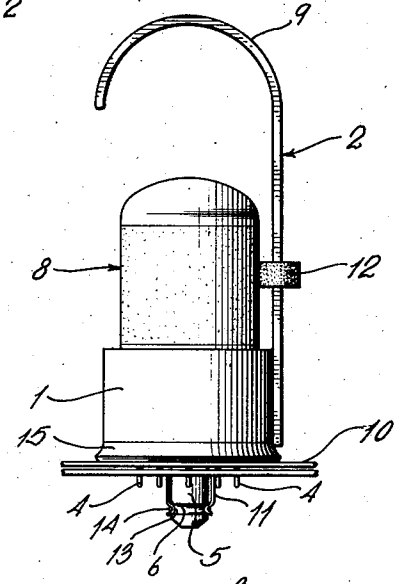


Fig. 2.



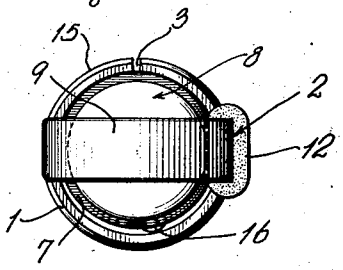


Fig. 3.

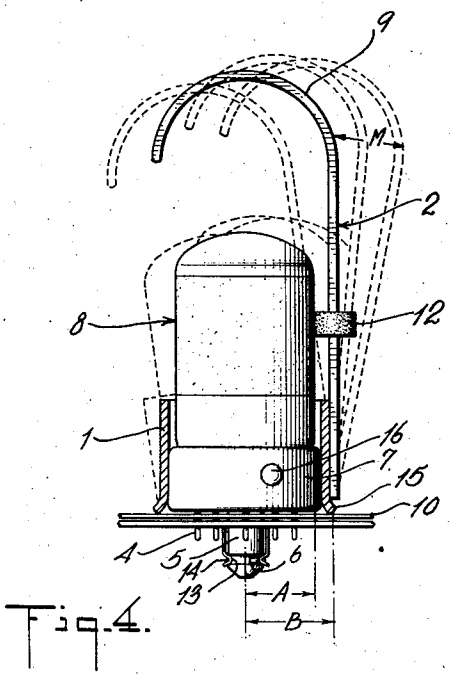


Fig. 4.

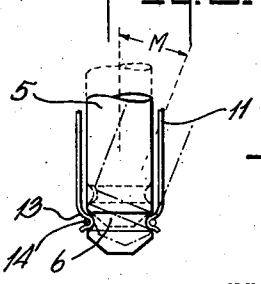


Fig. 5.

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RADIO TUBE HOLDER AND EXTRACTOR

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Application November 22, 1941, Serial No. 420,143

6 Claims. (Cl. 294—1)

This invention refers to extracting implements, and in particular to implements for removing devices such as radio tubes or lamp bulbs from their sockets.

In servicing and in trouble-shooting of radio sets, it is frequently necessary to remove tubes from their sockets for testing.

The tubes are usually spaced closely to each other or to other circuit elements in the chassis, and are, therefore, not alway easily accessible for gripping by the hand; and it is particularly difficult if not often impossible to grip the base of the tube for removing it from its socket, as is necessary with certain tube types.

In the latter case, it is necessary to apply the fingers to the tube envelope, and the pressure necessary for obtaining a firm grip on the envelope, so as to be able to release the contact pins from the socket, may damage the envelope. In some cases the envelope will be loosened from the basing cement before the friction between the base pins and the socket can be overcome.

Generally, the first step in trouble-shooting is a performance test of the radio set, from which the service men may gain indications for the possible causes of the unsatisfactory performance. During this performance test the tubes will become hot, and the tube temperature may become too high for comfortable direct contact with the hand.

Thus the operator will either lose time by waiting for the tube to cool sufficiently, or he may use a handkerchief or other heat insulating sheath between his hand and the tube envelope. This is not good practice because it obstructs the visual observance of adjacent equipment; decreases the friction between hand and tube; and weakens the sense of touch necessary for controlling the pulling. Furthermore, during the pulling the heat may penetrate the handkerchief sufficiently to give a sudden sting to the fingers, and in connection with the other contributing causes for lessened active control of the tube removal, the tube may drop to the floor and break or become inoperative.

The appropriate location at the tube for the application of the pulling force is, in any event, the tube base, and a number of tube pullers are known, which can be used for applying the pull at the proper place. Most of these known devices are built similar to pliers, which have to be kept closed by the hand that performs the pulling. The jaws of these pliers are either formed as semi-cylinders, surrounding the base of the tube, or as wedges to be inserted under the base.

This known type of tube puller has several disadvantages. It is not convenient to compress the two handles of a pair of pliers while pulling at the same time. Furthermore, the conventional radio cabinets are not high enough to allow the whole hand of the operator to enter together with the pliers; or at least not high enough to provide sufficient clearance to complete the pulling out motion after the pliers are inserted. It thus becomes necessary to remove the chassis from most of the radio cabinets before it is possible to use one of the plier-like tube pullers.

It is, therefore, a main object of the invention to provide a radio tube puller which allows in most practical cases, the removal of radio tubes from their sockets without first removing the chassis from the radio cabinet.

Another object of the invention is to provide a radio tube puller which may be operated with one finger only and does not require the opposition of the thumb and at least two other fingers for obtaining a firm grip on the base of a radio tube or for pulling.

A feature of the invention refers to a slotted ring-shaped elastic tube base holder, as a part of the tube puller, which may be conveniently slipped on the tube for inserting but will offer enough friction for pulling the tube out of its socket.

It is a further main object of the invention to provide a tube puller for tubes known in the trade as "Sylvania Lock-in" tubes, which may be removed by a tilting of the tube in the socket, whereby the locking spring which engages the groove in the center pin of the tube may be disengaged from this groove.

A feature of the invention refers to the increase in the lever arm to a length greater than the base radius of the tube, which is provided by the flared shape of the bottom part of the tube puller, whereby the force needed for tilting the tube against the socket axis is reduced.

Another feature of the invention refers to the elastic grip of the base holding ring, which prevents a dropping of the tube after the latter has been removed from the socket.

A further feature of the invention refers to application of a buffer such as a rubber padding ring over the handle, which prevents a high local pressure between the envelope and handle of the tube puller during the pulling operation.

An additional feature of the invention con-

sists in the increased friction between the tube envelope and the tube puller offered by the rubber buffer on the handle.

The invention will now be described in detail in connection with the attached drawing, in which

Fig. 1 shows the tube puller and a lock-in tube as it is about to be inserted.

Fig. 2 shows the tube puller ready in position for pulling the tube.

Fig. 3 is a top-plan view of Fig. 2.

Fig. 4 illustrates the tilting motion of the puller by which a "lock-in" tube is removed from its socket.

Fig. 5 is an enlarged diagrammatic view of part of Fig. 4.

The tube puller according to the invention consists of a slotted cylindrical metal ring 1, whose inner diameter in the normal or unstretched state is slightly smaller than that of the base 7 of the tube to be pulled. The ring is made elastic, so it will open up a little at the slot 3 (see Fig. 3) when it is forced down over the base 7 of tube 8. A handle 2 is, at its lower end, welded to ring 1, the top 9 of the handle being bent for insertion of a finger.

A padding ring 12, made of rubber, "neoprene" or any other suitable material may be slipped over the handle and located at a place as indicated in the drawing. This padding ring serves two purposes. First it protects the tube envelope from direct contact with the handle 2, which might occur during the tilting operation indicated in Fig. 4. Second it helps, in addition, to increase the friction between tube envelope and the puller and prevents a dropping of the tube from the puller after removal from the set if the puller has not been inserted all the way down to the socket. It should be observed that the ring 12 is sufficiently thick so that when in place it overlies the upper edge of ring 1 sufficiently far so as to press against the bulb 8.

There is shown in the drawing one well-known type of radio tube identified in the trade as a Sylvania "Lock-In" type having a series of contact pins 4 arranged in a circle at the bottom of the tube and surrounding a central metal keying boss 5 which is fastened to the metal tube base 7. The boss 5 is provided at its lower end with a circumferential groove 6. The drawing also shows the tube plugged-in to a suitable socket 10, having a series of circularly arranged contact prongs (not shown) to receive the pins 4 and a central split cylindrical collar 11 to receive the member 5. The collar 11 has adjacent its lower end an inward offset as indicated by the numeral 13 which offset is surrounded by a split spring ring 14 which tends to hold the member 11 at a reduced diameter. When the tube is fully plugged into the socket, the offset portion 13 engages the groove 6 wherein it is locked by means of the spring ring 14. With this type of construction, in order to remove the tube from the socket, it is necessary to tilt the tube slightly with respect to its vertical axis so as to disengage the offset 13 from the groove 6 whereupon the tube may be restored to its vertical position and pulled from the socket. In order to effect this disengagement of parts 6 and 13, without using the tube-puller of the invention, the lower corner edge of the tube base is used as a fulcrum so that the leverage is determined by the radius A (Fig. 4). When the puller 2 is used to remove the tube, it is inserted on to the tube base as shown in Figs. 1 and 2. Ordinarily, the base 7 is provided with a small smoothly rounded boss 16. Consequently, when the member 2 is pushed downwardly along the base 7, the boss 16 engages the flared portion 15 of ring 1 and expands the said ring sufficiently to allow it to embrace and tightly grip the base 7 as shown more clearly in Fig. 3. The puller 2 is pushed down sufficiently so that the lower edge of the flared portion 15 contacts with the upper surface of the socket 10 or with the chassis in which the socket is mounted. In this position, the rubber buffer 12 presses firmly against the bulb 8. Consequently, when the handle 2 is tilted through a slight angle M (Figs. 4 and 5), the fulcrum point is actually the lower edge of the flared portion 15 where it engages the socket 10. Consequently, the effective leverage on the tube is B (Fig. 4). This small tilting motion is therefore sufficient to produce a vertical displacement of groove 6 with respect to member 13 as shown clearly in Fig. 5 so that when the handle is tilted back to the vertical or to a slight distance beyond the vertical, the member 5 is unlocked from the member 11 thus releasing the tube so that it can be pulled out of the socket with comparative ease by pulling vertically on the hook portion 9 of the handle 2.

When the tube is thus removed, it remains firmly held in the tube puller by reason of the frictional engagement between the split ring 1 and the tube base and by reason of the engagement between the buffer 12 and the bulb 8. The tube can therefore be expeditiously removed from its socket by a single finger and without danger of the tube dropping from the puller after removal.

When the tube has been pulled out of its socket, it can be removed from the puller 2 by gripping the portion 1 with the left hand while pressing down on the top of the bulb 8 with the thumb of the left hand, the index finger of the right hand pulling outwardly on the hooked portion 9.

It will be understood of course that the invention is not limited to the particular type of tube illustrated and that the puller may be advantageously used to extract other plugged-in devices from their sockets whether these plugged-in devices be tubes, lamps, coils, condensers or other electrical circuit elements which are frictionally held in a plug-in type socket or receptacle.

Various changes and modifications may be made in the typical embodiment disclosed without departing from the spirit and scope of the invention. Subject matter disclosed herein but not claimed, is claimed in Design Patent No. 133,416.

What I claim is:

1. A device for removing a plugged-in article from a plug-in receptacle, said device comprising a substantially tubular expansible portion adapted to telescope over and tightly grip the periphery of the article, and a pulling handle fastened to said tubular portion and extending along the article with a finger engaging portion at its upper end.

2. A device for removing a plugged-in article from a plug-in receptacle, said device comprising a split cylinder of heavy springy metal, a vertically extending handle fastened to the side of said cylinder, said handle having a length which is much greater than the overall length of the article and terminating at its upper end in a rigid finger hook.

3. A device according to claim 2 in which the said cylinder has a normal inside diameter which

is slightly less than the maximum overall diameter of the base of the article.

4. A device according to claim 2 in which said finger-hook overlies the article when the device is in position on the article.

5. A device for removing a plugged-in article from a plug-in receptacle, said device comprising a substantially tubular expansible portion adapted to telescope over and tightly grip the periphery of the article, a pulling handle fastened to the said tubular portion, and a resilient buffer carried by said handle adapted to engage a side of the article during removal thereof.

6. A device for removing a plugged-in article from a plug-in receptacle, said device comprising a substantially tubular expansible portion adapted to telescope over and tightly grip the periphery of the article, and a pulling handle fastened to the said tubular portion, said tubular portion having an outwardly flared lower edge adapted to engage the receptacle or its support to provide an increased tilting radius effective in removing the article from the receptacle.

RALPH S. MERKLE.