Nov. 17, 1970 TOMIO MAKINO 3,541,302

HEAT STORING CURLING BOBBIN AND HEATING DEVICE

Filed June 19, 1968 2 Sheets-Sheet 1

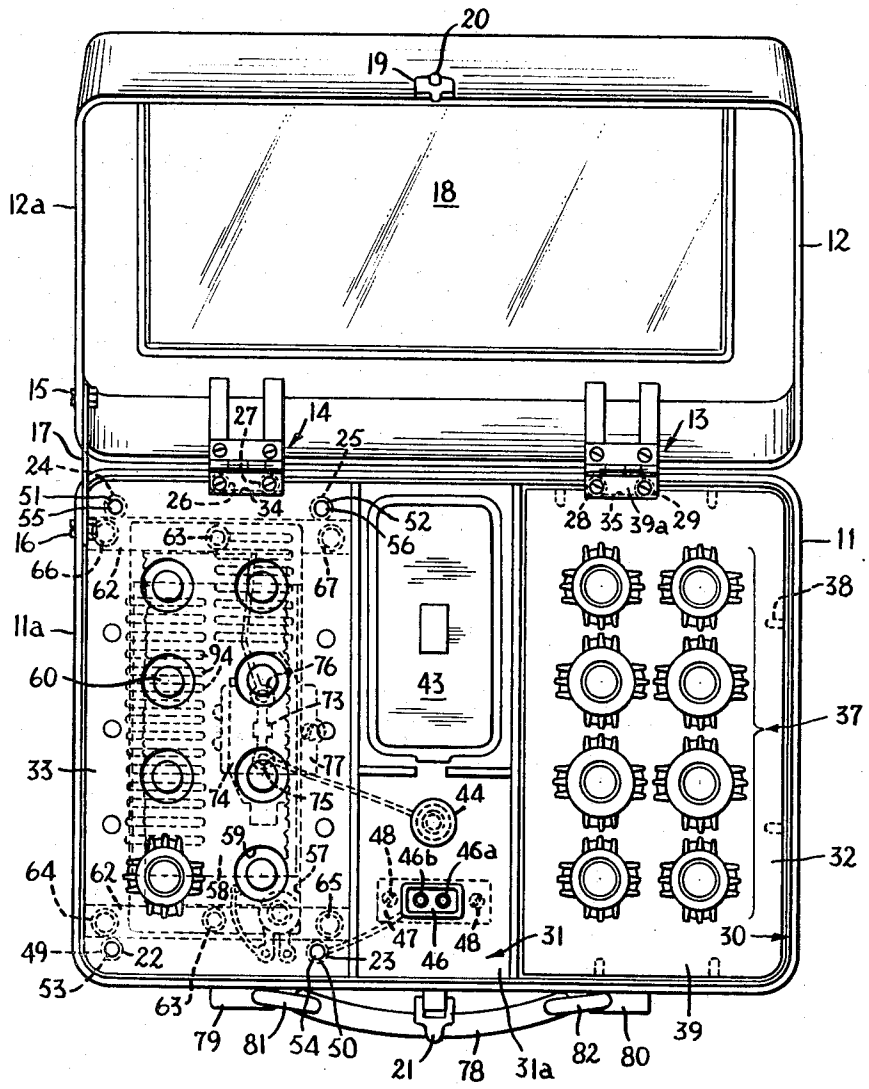


FIG. 1

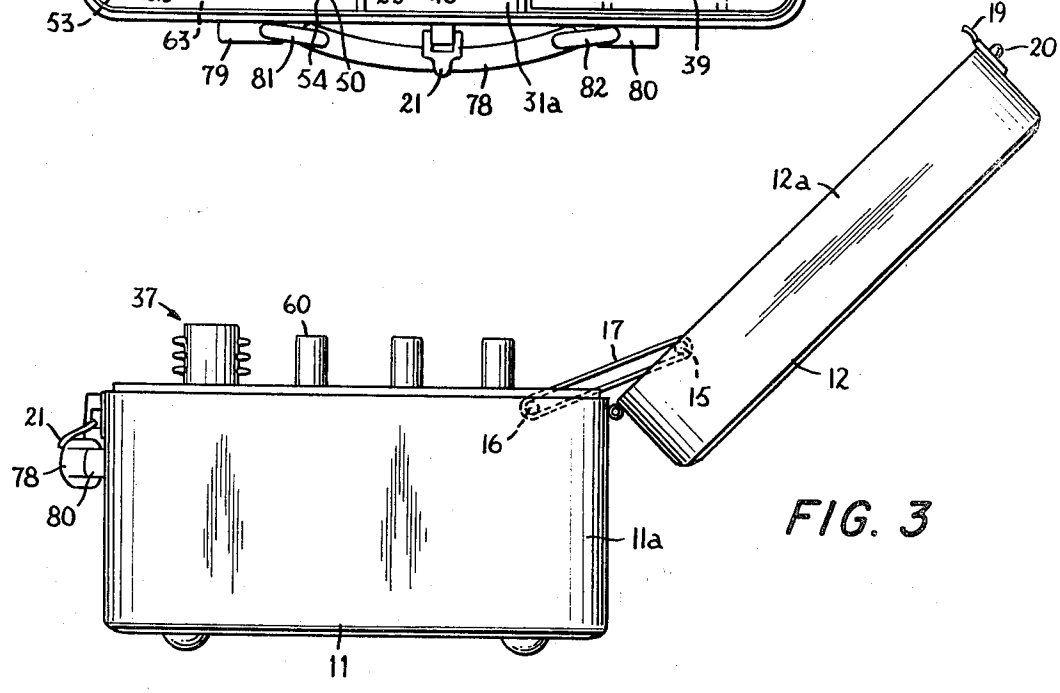


FIG. 3

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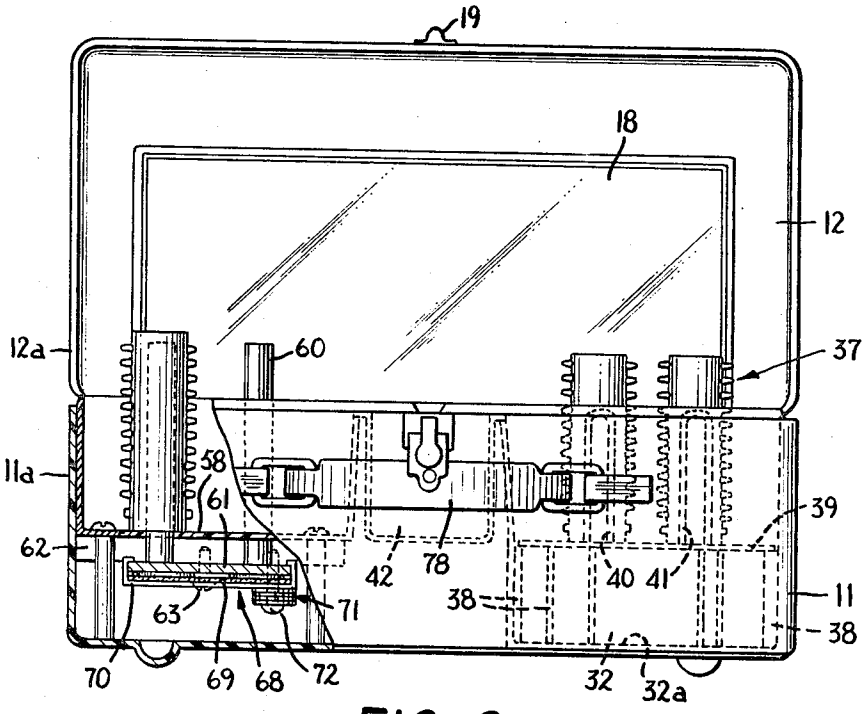


FIG. 2

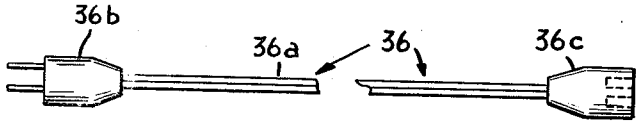


FIG. 4

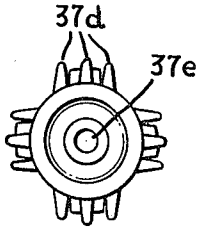


FIG. 6

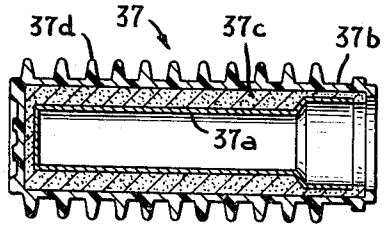


FIG. 5

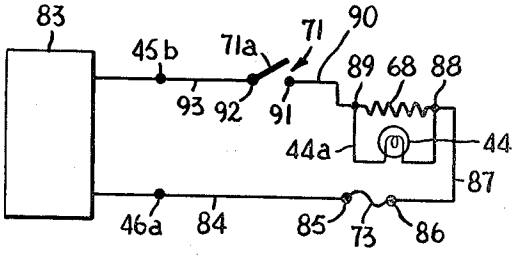


FIG. 7

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HEAT STORING CURLING BOBBIN AND HEATING DEVICE

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9 Claims

ABSTRACT OF THE DISCLOSURE

A device for curling hair comprises an electrical heating plate mounted in a case and disposed so as to heat a plurality of thermally conductive rods mounted on the plate. A hollow curling bobbin is removably mounted on each of the rods and each curling bobbin comprises an inner cylinder of thermally conductive material such as aluminum, an intermediate cylinder formed of a heat storing material such as polycarbonate and an outer cylinder formed of a hard synthetic resin. The outer cylinder has a plurality of radial projections adapted for twining hair on the bobbin. The device has a first safety device which regulates the temperature of the heater rods and a second safety device which interrupts electrical power to the heater rods if the first safety device fails.

The invention relates in general to hair curling devices and more particularly to heating devices for curling hair.

Conventional heat storing curling bobbins have a layer of paraffin contained between inner and outer cylinders. The bobbins are heated by external means and heat is stored in the paraffin layer. This type of bobbin is subject to problems such as the paraffin leaking out from between the inner and outer cylinders. Conventional heaters for paraffin type bobbins are also subject to disadvantages such as a requirement for accommodating different inner diameters found on paraffin type bobbins and usually require complex electrical thermostats and complex mechanical assemblies.

An object of this invention is to provide a device for heating curling bobbins in which overheating is prevented even if the thermostat means are out of order.

Another object of this invention is to provide a heat storing curling bobbin which does not use paraffin as a heat-storing material.

Another object of this invention is to provide a device in which curling bobbins can be easily mounted for heating and can be easily removed when heated.

Another object of this invention is to provide a device in which it is possible to confirm the fact that the bobbin temperature is high enough for use.

Another object of this invention is to provide a device which is of simple construction and is portable.

Other objects and a fuller understanding of the invention may be had by referring to the following description and claims, taken in conjunction with the accompanying drawing, in which:

FIG. 1 is a plan view of a hair curling set in accordance with the invention comprising a plurality of bobbins and heating means housed in a case shown with the cover of the case open.

FIG. 2 is a front view of the hair curling set with a portion of the case cut away.

FIG. 3 is a side view of the hair curling set with a single bobbin shown in place.

FIG. 4 is a view of the power cord.

FIG. 5 is a longitudinal cross sectional view of a bobbin.

FIG. 6 is a view of the closed end of the bobbin.

FIG. 7 is a circuit diagram showing electrical connections according to the invention.

A hair curling set in accordance with the invention shown by way of example in the drawing comprises a plurality of bobbins and heating means housed in a case. The case is made of a synthetic resin and comprises an outer case **11** and cover **12** which are connected by connecting means suh as hinges **13** and **14**. The opening of the cover **12** is limited by a link **17** and by stopper pins **15** and **16** which are disposed on portions **11***a* and **12***a* of the case **11** and cover **12** respectively.

The cover **12** is provided with a mirror **18** on its inner surface and with a fastener **19** which locks with a fastener **21** on the case **11** when the cover is closed.

The case **11** is provided with a pair of mounting tubes **22** and **23** projecting from the bottom of the case near the front and a second pair of mounting tubes **24** and **25** projecting from the bottom of the case near the back. These tubes are integrally formed as part of the case or alternately may be bonded to the case.

Each of the tubes has an internal thread. Additional mounting tubes **26**, **27**, **28** and **29** are provided at the locations of the hinges **13** and **14** which are attached to case **11** by means of screws fitting into the tubes **26**, **27**, **28** and **29**.

An inner case **30**, made of a synthetic resin is fitted inside case **11** and is supported on mounting tubes **22**, **23**, **24** and **25**. Inner case **30** is divided by means of a center partition **31** into compartments **32** and **33**. Mounting tubes **26** and **27** are received in a recess **34** and mounting tubes **28** and **29** are received in a recess **35** which are formed in the outer walls of compartments **33** and **32** respectively. Compartment **32** is somewhat deeper than compartment **33**.

A plurality of projecting springs **38** are located on the inner wall of compartment **32** and are used to support the bottom of a support plate **39** thus creating a space between the support plate and the bottom **32***a* of compartment **32**. This space is used to store a power cord **36**. The power cord **36** is provided with plug **36***b* on one end of lead wire **36***a* and connector **36***c* on the other end.

Spare curl bobbins **37** are stored on projecting rods **40** and **41** which are mounted on the support plate **39**. As can be seen in FIG. 1, the rear margin of the support plate **39** is notched at **39***a* to accommodate the recessed portion **35** of the compartment **32**.

The partition **31** is provided with a countersunk compartment **42** on which a cover **43** is detachably mounted. Compartment **42** is intended for housing hair pins (not shown).

A pilot lamp **44** is fitted on the top plate **31***a* of the said partition **31** by usual means. An electrical connector **46** with connector pins **46***a* and **46***b* is firmly fitted in the top plate **31***a* of partition **31** slightly spaced from and in front of the pilot lamp by means of a mounting plate and screws **48**.

Screw holes **49**, **50**, **51** and **52** are provided in the corner portions of the bottom wall **33***a* of the abovementioned compartment **33** at positions corresponding to the mounting tubes **22**, **23**, **24** and **25** provided in the outer casing **11**. The inner casing **30** can firmly be secured in the outer casing **11** by screwing screws **53** to **56** into the threaded holes **49** to **52** provided in the bottom wall **32***a* and in their corresponding mounting tubes **22** to **25** on bottom of the outer casing. The center part of the bottom wall **33***a* of the compartment **33** has a rectangular opening **57** which is fitted firmly with a rectangular plate **58** made of synthetic resin or similar insulating material. Plate **58** is provided with circular holes **59** aligned both laterally and vertically. Eight holes **59** illustrated in the drawing are merely an example, and 6 holes or 9 holes or an arbitrary number of holes will do.

Heat conductors **60** are inserted in holes **59** with a slight clearance and their tops project slightly above the

opening of the compartment **33** as shown in FIG. 2. The eight heat conductors **60** appearing in the drawing are illustrated only by way of example and not as a limitation on the scope of the invention. The heat conductors **60** are made of high thermal conductivity material, such as brass, copper, aluminum or equivalent material, formed into rod-shaped and having lower end portions embedded into a heat conducting plate **61** as illustrated in FIG. 2.

The heat conducting plate **61** is likewise made of high thermal conductivity material and is rectangular in shape. The heat conducting plate **61** is mounted spaced from plate **58** by wooden frame members **62** which extend transversely of the plate. The heat conducting plate **61** is fixed to the wooden frame members **62** at both of its ends by means of screws **63**. The ends of the frame members **62** are fixed firmly to the bottom wall **33***a* of compartment **33** by means of screws **64**, **65**, **66** and **67**.

A heating element **68** is provided under the conducting plate **61** and is covered on its bottom with insulating material **69**. The combination of the heating element **68** and the insulating material **69** is suspended from the heat conducting plate **61** by means of a channel-shaped metal plate **70**. The outermost layer of said insulating material **69** is in contact with said plate **70** as shown in FIG. 2, and the side edges of said plate **70** along those of the heat conducting plate **61** are bent to hold said heat conducting plate **61**.

As a protective device, a thermostat mechanism **71** is fitted to the right lower corner of the said heat conducting plate **61** in the manner that a screw **72** is screwed up into the said heat conducting plate **61** to secure said mechanism **71** to the said heat conducting plate **61**. Since the structure of the thermostat mechanism **71** is itself well known, detailed explanation and illustrations are not given here. However, the electrical connection concerning the said mechanism will be described in detail later.

As a second protective device, a temperature responsive fuse **73** is fitted firmly in a fuse holder **74** mounted on the inner wall of the outer casing **11** by means of screws **75** and **76**. As seen in FIG. 2, the fuse is located below a central portion of the conducting plate **61**.

The fuse is accessible by opening a cover **77** of an opening in the bottom wall of the outer casing **11**. The fuse is arranged to interrupt the circuit if a temperature higher than the normal operating temperature is reached.

A handle **78** is fitted to the outside wall of the said outer casing **11** through the medium of holders **79** and **80** and connecting rings **81** and **82**, for the convenience of carrying the casing.

In FIGS. 5 and 6 there is shown in more detail a bobbin **37** comprising an inner cylinder **37***a* and an outer cylinder **37***b*. All of the bobbins have the same inner diameter irrespective of the outer diameters in order to mount easily on the heater rods **60**.

The annular space between the inner cylinder **37***a* and the outer cylinder **37***b* is filled with heat accumulating material **37***c*, for instance, polycarbonate (melting point 200 to 300° C.).

The inner cylinder **37***a* is made of high thermal conductivity material, by way of example, aluminum, formed with one end open and the other end closed. The open end of the inner cylinder is enlarged as seen in FIG. 5. On the other hand, the outer cylinder **37***b* is made of hard synthetic resin, for example polypropylene, formed with its one end open and the other closed, and its enter outer surface is provided with projections **37***d* on which to twine hair.

Red colored thermo paint **37***e* is coated on the center of the closed end of said outer cylinder **37***b*. This thermo point **37***e* reversibly turns black when bobbin **37** reaches a certain prescribed temperature, which is helpful in confirming the reaching of temperatures necessary for curling hair.

The inner cylinder **37***a* is detachably engageable in heat transferring relation with the abovementioned heat conductor rods **60**. The electric circuit is shown in FIG. 7. The terminals **46***a* and **46***b* of the connector **46** are to be connected electrically to an AC 120 v. power supply **83** through the medium of the cord **36**.

The terminal **46***a* is connected by a lead wire **84** to one end **85** of the thermostat temperature fuse **73** device. The other end **86** of the said temperature fuse **73** is connected by a lead wire **87** to one end of the heating element **68** through branch terminal **88**. The other end of the heating element **68** is connected through a branch terminal **89** and lead wire **90** to one terminal **91** of the thermostat mechanism **71**. The other terminal **92** of the thermostat mechanism **71** is connected by a lead wire **93** to the terminal of the aforementioned connector pin **45***b*.

The abovementioned branch terminals **88** and **89** are connected with each other by means of lead wires **44***a* of the pilot lamp **44**, whereby the pilot lamp **44** forms a circuit in parallel with the heating mechanism **68** of the conducting plate **61**.

As shown in FIG. 1, ventilating holes **94** are formed in the bottom wall **11***a* of the outer casing **11**.

The operation of the device is as follows. The fasteners **19** and **21** provided between the outer casing **11** and the cover **12** are disengaged in order to open the cover **12**.

The support plate **39** is removed from compartment **32** by pulling upwardly on the spare bobbins **37** or on rods **41**. The power cord **36** can then be removed from compartment **32** and is supported on projecting springs **38** which are arranged on the inner wall of compartment **32**. The desired curling bobbins are engaged with heat conductors **60**. The top surface of heat conducting plate **58** is in contact with the bottom end of the bobbins. Connector **36***c* of power cord **36** is connected to connector pins **46***a* and **46***b* and plug **36***b* is connected to an AC power supply **83**. Current flows to connector **36***c* from the power supply through plug **36***b* and power cord **36***a*. From connector **36***c* the current passes through connector pin **46***b*, lead wire **93**, the thermostat mechanism **71**, lead wire **90** and reaches the branch point **89**. Current then flows through the electric heating element **68** and reaches branch point **88**, and then flows through lead wire **87** and into terminal **86** of temperature fuse **73** and returns to power supply **83** after passing through terminal **85** lead wire **84**, connector pin **46***a* connector **36***b*, cord **36***a* and plug **36***c*.

The electric heating element **61** gets red hot and the heat evolved is transmitted to the heat conducting plate **61** incorporated into a single unit with insulating material **69**, and further communicated to the heat conductors **60** arranged on the heat conducting plate and to the inner cylinders **37***a* of the bobbins **37** on said conductors **60**.

The heat thus communicated to the inner cylinders **37***a* is communicated to the outer cylinder **37***b* while it is partly stored in the heat accumulating material **37***c*.

In course of the above heat transmission, the heat conducting plate is heated up to a prescribed temperature. When it reaches a prescribed level of temperature, the contact **71***a* of the thermostat mechanism **71** disengages the terminal **91** of the said mechanism **71** (see FIG. 7), thereby current flowing from the power supply **83** is interrupted, and simultaneously with this, pilot lamp **44** goes out.

After a certain period of interruption, the temperature of the heat conducting plate **61** falls below a set value and the said thermostat mechanism **71** establishes again the heating circuit as explained above.

According to experiments, it takes about 6 min. after supplying current to the heating circuit until thermo paint **37** coated on the bobbin **37** turns from red to black. This discoloration is very helpful in judging whether the bobbin **37** is at an optimum temperature level.

After they have reached the optimum temperature, one can apply the bobbins **37** to the hair in an ordinary way after taking them off the heat conductors **60**.

The heat storing material in the bobbin results in an effective use period of approximately 15 minutes.

Even if the first safety device **71** gets out of order so that it can not cut off power even when the heat conducting plates **61** reaches a set temperature, the temperature responsive fuse **73** constituting a second safety device, can automatically cutoff power thus preventing damage to the device.

In an alternative construction of the bobbins, the open ends of the inner and outer cylinders are connected. Another modification comprises fastening the heating mechanism to the heat conducting plate by means of a series of hooks formed in the bottom metal plate of the heating mechanism and cooperating with the top surface of the heat conducting plate.

Although I have described my invention with a certain degree of particularity, it is understood that the present disclosure has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

What I claim is:

1. A heat storing curling bobbin and heating device comprising: a case having a floor portion composed of heat insulating material; said floor portion having a plurality of holes therethrough; a heat conductive plate beneath said heat conductive plate for heating the same; mounting means for mounting as an integral unit said heat conductive plate and electrical heating means beneath said floor portion in spaced relation thereto comprising spaced insulating strips positioned immediately beneath said floor portion and secured thereto, means securing said heat conductive plate to said strips, means mounting said heating means beneath said heat conductive plate, said mounting means comprising a channel-shaped plate having a bottom portion beneath said heating means and side edges secured to said heat conductive plate; temperature responsive means connected in circuit with said heater means and arranged in heat conductive relation to said heat conductive plate for controlling the tempreature of said plate, a plurality of heat conductive heater rods projecting from said heat conductive plate through said holes in said floor portion; a plurality of heat storing curling bobbins each removably mounted on a heater rod and each comprising a hollow inner cylinder having a closed end and an open end and an intermediate cylinder disposed on the outside

of said inner cylinder with said intermediate cylinder formed of heat storing material and an outer cylinder disposed on the outside of said intermediate cylinder with said outer cylinder having a plurality of radial projections for twining hair, whereby said bobbins receive and store heat generated by said heating means.

2. A heat storing curling bobbin and heating device as in claim **1** wherein said outer cylinder is formed of a hard synthetic resin.

3. A heat storing curling bobbin and heating device as in claim **1** wherein said outer cylinder is formed of polypropylene.

4. A heat storing curling bobbin and heating device as in claim **1** wherein said inner cylinder is formed of a material having high thermal conductivity.

5. A heat storing curling bobbin and heating device as in claim **1** wherein said inner cylinder is formed of brass.

6. A heat storing curling bobbin and heating device as in claim **1** wherein said intermediate cylinder is formed of polycarbonate.

7. A heat storing curling bobbin and heating device as in claim **1** wherein an end portion of said outer cylinder is coated with a temperature responsive paint which changes color when reaching a predetermined temperature.

8. A heat storing curling bobbin and heating device as in claim **1** wherein the internal diameters of said inner cylinders of all of said bobbins are equal irrespective of the outer diameters of said outer cylinders.

9. A heat storing curling bobbin and heating device as in claim **1** wherein the portions defining the open ends of said inner and said outer cylinders are connected in a fluid tight joint.

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ANTHONY BARTIS, Primary Examiner

U.S. Cl. X.R.

132—33; 219—242, 517