Aug. 30, 1966 J. K. DIKOFF 3,269,040

STEAM IRON ACCESSORY

Filed Sept. 8, 1965

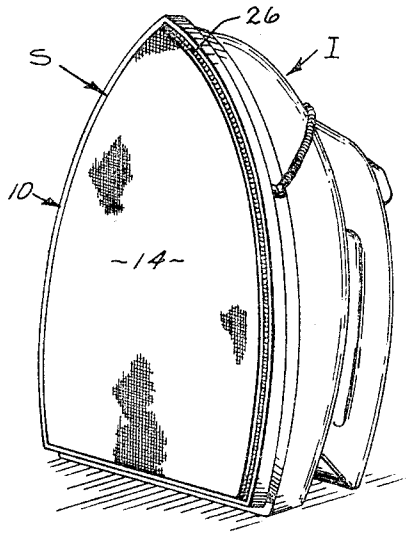



FIG. 1

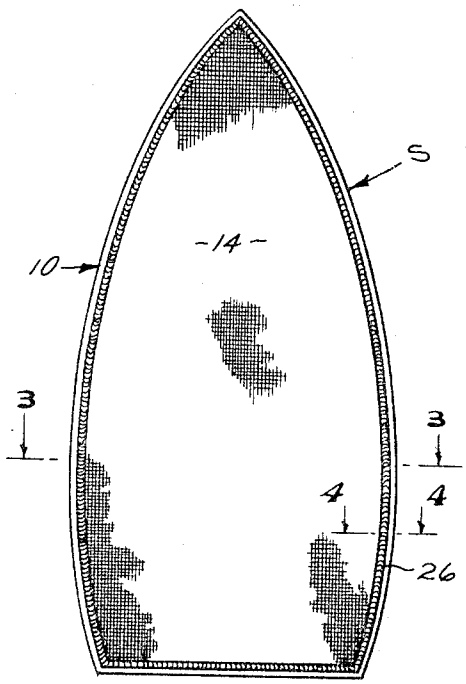



FIG. 2

FIG. 3

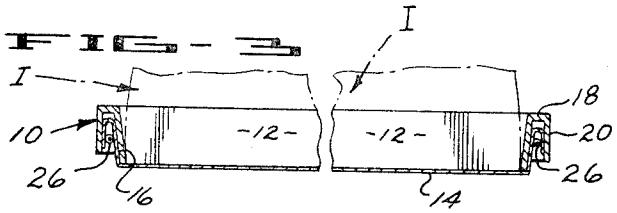
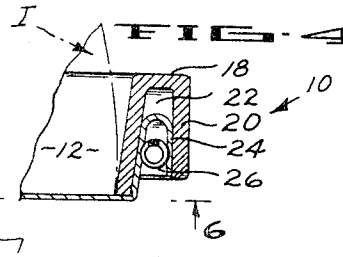



FIG. 4



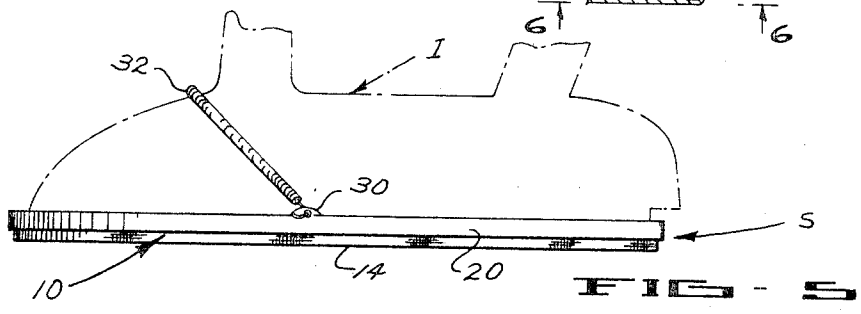




FIG. 5

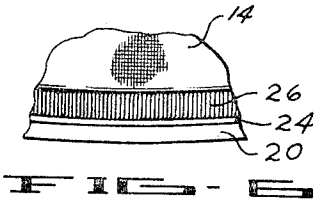



FIG. 6

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3,269,040

# STEAM IRON ACCESSORY

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3 Claims. (Cl. 38—97)

This is a continuation-in-part of my copending patent application Serial No. 447,247, filed April 12, 1965 and now abandoned.

The present invention is directed to a new and novel accessory attachable to a steam iron for improving the operation of such iron.

There have been heretofore proposed shoes attachable to the underside of the sole of a steam iron to improve the characteristics of such iron. By way of example, U.S. Patent No. 2,750,697 issued June 19, 1956, to S. Jacobson and U.S. Patent No. 2,876,565 issued March 10, 1959 to S. Jacobson disclose a shoe incorporating polytetrafluoroethylene that is attachable to the underside of the sole of a steam iron. This shoe is said to prevent burning of the textile being ironed and to otherwise improve the operation of the steam iron. In use, however, it has been determined that the polytetrafluoroethylene material is easily scratched from contact with buckles, zippers or the like. Additionally, it has been found that in utilizing such polytetrafluoroethylene shoes it is necessary to recalibrate the temperature adjustment of the steam iron as compared to the standard calibration of the iron. It has also been found that after use, moisture from the steam is trapped between the underside of the sole and the polytetrafluoroethylene shoe. This water oxidizes and causes pitting of the underside of the sole.

It is a major object of the present invention to provide a steam iron accessory which eliminates the aforementioned disadvantages of a polytetrafluoroethylene shoe while affording the advantages thereof.

It is another object of the present invention to provide a steam iron shoe of the aforedescribed nature that is considerably more economical of construction than heretofore proposed devices of this nature.

Yet a further object of the present invention is to provide a steam iron shoe which brings up the nap of the article being pressed.

An additional object of the present invention is to provide a steam iron shoe which will efficiently press a garment or the like without imparting a shine thereto.

A particular object of the present invention is to provide a method of making a steam iron shoe having a frame attachable to the underside of the sole of the iron and a sheet of aromatic polyamide stretched across the underside of the frame, with such sheet being sufficiently porous as to freely pass steam from the iron onto the textile being pressed.

These and other objects and advantages of the present invention will become apparent from the following detailed description, when taken in conjunction with the appended drawings wherein:

FIGURE 1 is a perspective view showing a preferred form of steam iron shoe embodying the present invention attached to a steam iron in operative position;

FIGURE 2 is a bottom view of said steam iron shoe in enlarged scale;

FIGURE 3 is a vertical sectional view taken along line 3—3 of FIGURE 2;

FIGURE 4 is a fragmentary vertical sectional view taken in enlarged scale along line 4—4 of FIGURE 2;

FIGURE 5 is a side elevational view of the steam iron and steam iron shoe of FIGURE 1; and

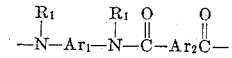
FIGURE 6 is a fragmentary upwardly-directed view taken along line 6—6 of FIGURE 4.



Referring to the drawings there is shown a shoe S embodying the present invention attached to the sole 9 of a conventional steam iron I. The shoe S includes a rigid frame, generally designated 10, which has a configuration generally corresponding to the lower portion of the sole 9 of the iron I. A sheet 14 of woven aromatic polyamide fibers is stretched across the underside of the frame 10. The aromatic polyamide will be described in detail hereinafter.

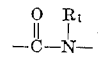
More particularly, the frame 10 is preferably of metallic construction and includes an inner wall 16 that extends upwardly and slightly outwardly. The lower end of the inner wall 16 generally corresponds to the periphery of the lower end of the sole 9. The upper end of the inner wall 16 is integrally joined to a horizontal top wall 18. A depending lip 20 is integral with the outer edge of the top wall 18, with an upwardly extending recess 22 being defined between the confines of the inner wall 16, upper wall 18 and outer wall 20, as indicated particularly in FIGURE 4. The frame 10 may be formed in any conventional manner.

The aromatic polyamides employed are high molecular weight polymers characterized predominately by the recurring structural unit

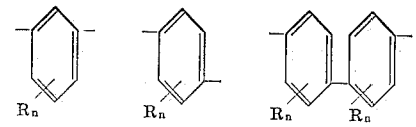


wherein $R_1$ is hydrogen or lower alkyl and wherein $Ar_1$ and $Ar_2$ may be the same or different and may be an unsubstituted divalent aromatic radical or a substituted divalent aromatic radical, the chain-extending bonds of these divalent aromatic radicals being oriented meta or para to one another and the substituents attached to any aromatic nucleus being one or more or a mixture of lower alkyl, lower alkoxy, halogen, nitro, lower carbalkoxy, or other groups which do not form a polyamide during polymerization.

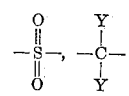
It will be seen that repeating units are linked by a carbonamide group, i.e., the



radical ($R_1$ being the same as above indicated), the nitrogen and carbonyl of each repeating carbonamide radical being directly attached to a carbon atom in the ring of an aromatic radical; that is, the nitrogen and carbonyl of each repeating carbonamide group each replaces a hydrogen of an aromatic ring. The term "aromatic ring" means a carbocyclic ring possessing resonance. Exemplary aromatic radicals have the following structural formulas



in which R is preferably a lower alkyl, lower alkoxy, or halogen group, $n$ is a number from 0–4, inclusive, and X is preferably one of the groups of

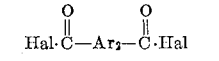


and —O—, in which Y is a hydrogen or a lower alkyl group. X may also be a lower alkylene or lower alkylene dioxy group although these are somewhat less desirable. R may also be a nitro, lower carbalkoxy, or other non-polyamide-forming group. All of these aromatic radicals are divalent and meta or para oriented, i.e., the unsatisfied bonds of the radicals (the "chain-extending bonds" when the radical is viewed in the repeating unit of the

structural formula of the polymer) are meta or para oriented with respect to each other. One or more of the aromatic radicals contain substituent groups as indicated and any aromatic ring may contain two or more of the same or different substituent groups. Preferable, however, are high molecular weight polymers in which the aromatic radicals are unsubstituted or contain only lower alkyl groups attached to any one ring. The term "non-polyamide-forming groups" refers to groups which do not form polyamides during the polymerization reaction herein disclosed. The term "chain-extending bond" refers to any bond in the polyamide which, if broken, would decrease the length of the polymer chain.

High molecular weight aromatic polyamides are prepared by reacting an aromatic diacid chloride with an aromatic diamine, the acid groups of the diacid chloride and the amine groups of the diamine being meta or para oriented relative to each other, at low temperatures (below 100° C.).

The diacid chloride of the dibasic aromatic acid useful as a reactant in the polymerization includes compounds of the formula



wherein $Ar_2$ is a divalent aromatic radical, i.e., it contains resonant unsaturation, and Hal is a halogen atom from the class consisting of chlorine, bromine, and fluorine. The aromatic radical may have a single, multiple, or fused ring structure. One or more hydrogens of the aromatic nucleus may be replaced by non-polyamide-forming groups such as lower alkyl, lower alkoxy, halogen, nitro, sulfonyl, lower carbalkoxy, and the like. The terms "lower alkyl" and "lower alkoxy" and "lower carbalkoxy" refer to groups containing less than five carbon atoms.

Diacid chlorides which may be utilized to prepare the polyamides include isophthaloyl chloride and lower alkyl isophthaloyl chlorides, such as methyl-, ethyl-, propyl-, etc., isophthaloyl chlorides.

The diamines useful as reactants in forming the aromatic polyamides are compounds of the formula $H_2N—Ar_1—NH_2$ and $R_1—HN—Ar_1—NH—R_1$ where $R_1$ is hydrogen or lower alkyl and $Ar_1$ is a divalent aromatic radical as defined above and the —$NH_2$ and —NHR groups are oriented meta or para with respect to each other. The diamines may contain single or multiple rings as well as fused rings. One or more hydrogens of the aromatic nucleus may be replaced by non-polyamide-forming groups such as lower alkyl, lower alkoxy, halogen, nitro, sulfonyl, lower carbalkoxy as mentioned above. The aromatic nucleus of the diamines may be identical to any of the aromatic radicals mentioned above for the diacid chlorides, and the diamine utilized in any given instance may contain the same or different aromatic radical as the diacid chloride utilized. The total number of carbon atoms in the substituent groups attached to any aromatic ring should not exceed nine.

Exemplary diamines which may be utilized include meta-phenylene diamine and lower alkyl substituted meta-phenylene diamine such as methyl-, ethyl-, propyl-, etc., meta-phenylene diamine; N,N'-dimethylmetaphenylene diamine, N,N'-diethylmetaphenylene diamine, etc.

The aromatic polyamides useful in this invention, methods of making same and resulting properties thereof are set forth in great detail in U.S. Patent No. 3,094,511, issued June 18, 1963, and entitled, "Wholly Aromatic Polyamides."

The disclosure of this patent is incorporated herein by the foregoing reference. Particular mention should be made, however, of the high melting point of the aromatic polyamides of the type described, their melting points being well in excess of 300° C., and in general, lying about 350° C.



The aromatic polyamide may be of the type sold by E. I. du Pont de Nemours & Co. under the trademark "Nomex."

The porosity of the aromatic polyamide sheet **14** should be such that steam from the steam iron **11** may freely pass downwardly therethrough onto the material being ironed. It has been found that a sheet **14** woven of about 0.0096 inch thick aromatic polyamide threads having a thread count of about 100 x 93 provides excellent results. Other dimensions, however, may be employed without departing from the scope of the present invention.

The periphery of the aromatic polyamide sheet **14** is preferably removably secured to the frame **10**. Thus, as indicated particularly in FIGURES 4 and 6, the periphery of the sheet **14** extends beyond the periphery of the frame **10**, and is doubled-over within the recess **22**, as indicated at **24**. The doubled-over length **24** of the sheet **14** is normally wedged within the frame recess **22** by means of a resilient elongated element such as a spiraled steel wire **26**. The steel wire **26** is readily removable from within the recess **22** to permit replacement of the sheet **14**.

It is also preferable that the frame **10** be removably attached to the steam iron I. To this end, the sides of the frame **10** are provided with upstanding lugs **30**. The lugs **30** receive the opposite ends of a steel spring **32** that passes upwardly over the upward nose portion of the steam iron I, as indicated particularly in FIGURE 5.

In the use of the aforedescribed shoe S it has been found that the temperature of the iron may be raised up to 700° F. without burning the textile being ironed. Additionally, utilizing the shoe S of the present invention will prevent a shine being imparted to the textile being ironed. By selecting a porosity of the aromatic polyamide sheet that freely passes steam, the use of the shoe will bring up the nap of the textile being ironed because of the slight drag imparted by the sheet **14** to such textile. Additionally, because of the porosity of the sheet **14** any moisture remaining between the upper surface of the sheet **14** and the underside of the sole **9** will quickly dry. Accordingly, the underside of the sole **9** will not become pitted. In actual use it has been determined that the temperature calibration of the iron I for different fabrics may remain the same with or without the shoe S. This eliminates the necessity of recalibrating the temperature control of the iron when the shoe S is utilized. It will be apparent that the aforedescribed shoe embodying the present invention will be economical of manufacture because of the considerably lower cost of aromatic polyamide as compared to polytetrafluoroethylene. Yet the aromatic polyamide is extremely resistant to scratching and hence will not become scratched when contacting buckles, zippers or the like.

Various modifications and changes may be made with respect to the foregoing detailed description without departing from the spirit of the present invention or the scope of the following claims.

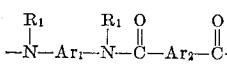
I claim:

**1.** A method of making a shoe for the sole of a hand-held steam iron that includes:

providing a frame that is attachable to the sole of said hand-held steam iron;

forming a thin sheet of aromatic polyamide fibers substantially less than 1/16 of an inch thick and having a porosity sufficient to freely pass steam from said iron and through said sheet;

shaping said thin sheet into a configuration similar to that of the periphery of said frame, said aromatic polyamide consisting essentially of the recurring structural unit



wherein $R_1$ is selected from the group consisting of hydrogen and lower alkyl and wherein $Ar_1$ and $Ar_2$ are selected from unsubstituted divalent aromatic

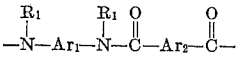
radicals and substituted divalent aromatic radicals, the chain-extending bonds of said divalent aromatic radicals being oriented para to one another, and the substitutions being non-polyamide forming during polymerization, said aromatic polyamide having a melting point in excess of 350° C.;

stretching said thin sheet over the underside of said frame and securing said thin sheet thereto, whereby it is adapted to come into direct contact with the underside of said hand-held steam iron when said frame is attached to the sole thereof.

2. A shoe for a hand-held steam iron, comprising:

a rigid frame attachable to the underside of the sole of said iron, the periphery of said frame being formed with a recess;

an unbacked thin sheet of aromatic polyamide fiber cloth substantially less than 1/16 of an inch in thickness which is stretched over the underside of said frame, said cloth being of similar configuration as said frame, said cloth having a porosity sufficient to freely pass steam from said iron, and said aromatic polyamide consisting essentially of the recurring structural unit



wherein $R_1$ is selected from the group consisting of hydrogen and lower alkyl and wherein $Ar_1$ and $Ar_2$



are selected from unsubstituted divalent aromatic radicals and substituted divalent aromatic radicals, the chain-extending bonds of said divalent aromatic radicals being oriented meta to one another, and the substitutions being non-polyamide forming during polymerization, with the periphery of said sheet extending into the recess of said frame;

and a resilient elongated element wedged within said recess in engagement with said polyamide fiber cloth to hold said sheet therein.

3. A shoe for a hand-held steam iron, as set forth in claim 2 wherein:

the fibers of said cloth are approximately .0096 inch in thickness; and

the polyamide fiber cloth has a thread count of approximately 100 by 93.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