Sept. 5, 1944. E. M. DAVID 2,357,636

CONVERTIBLE PROTECTIVE GARMENT

Filed June 16, 1943 2 Sheets-Sheet 1

Fig. 1

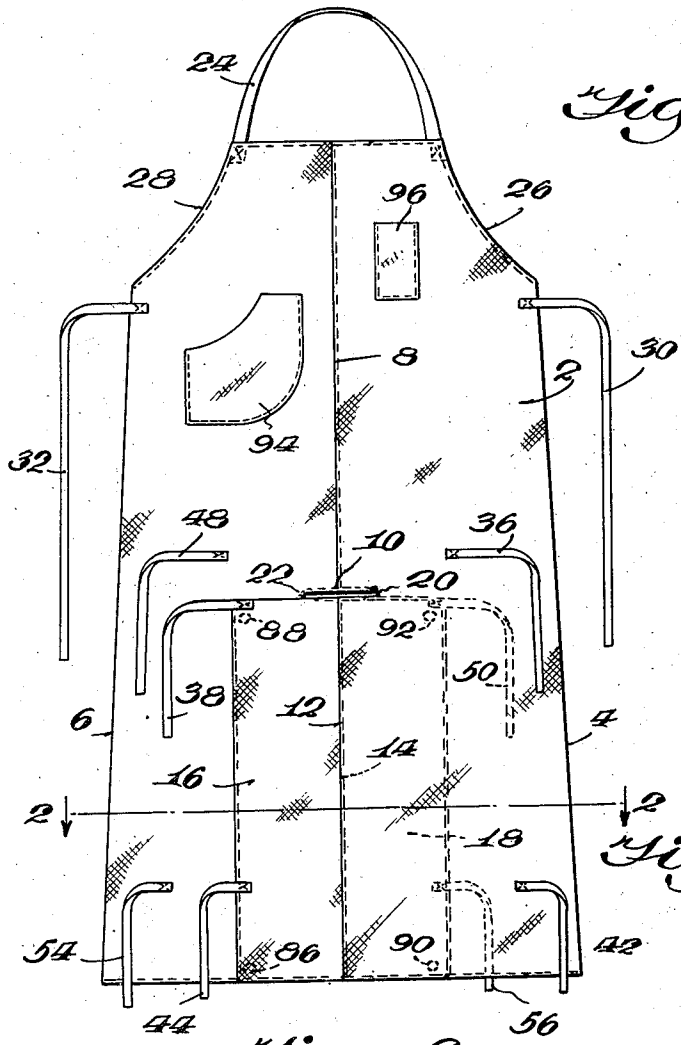


Fig. 2

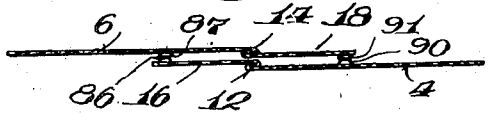


Fig. 3

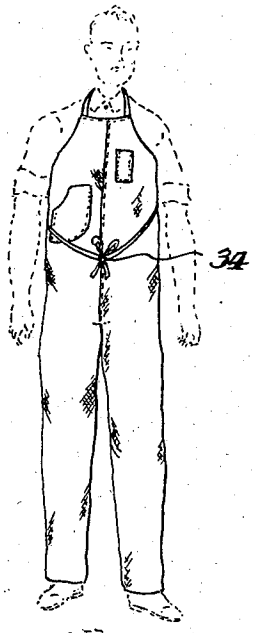
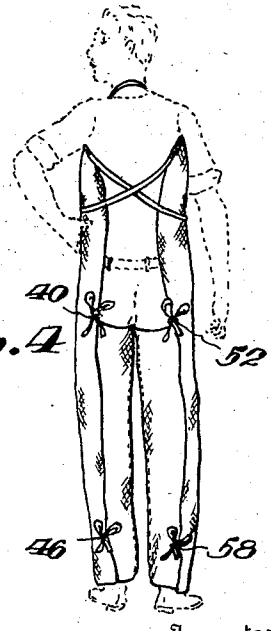


Fig. 4



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Filed June 16, 1943 2 Sheets-Sheet 2

Fig. 6

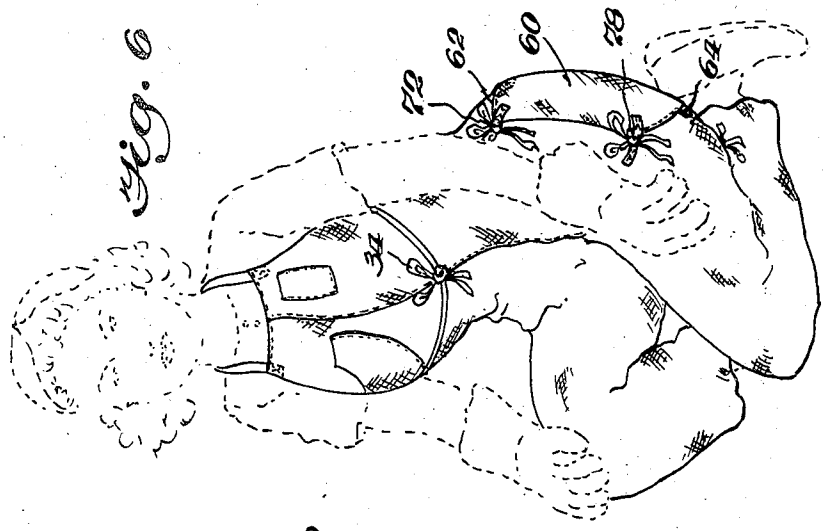
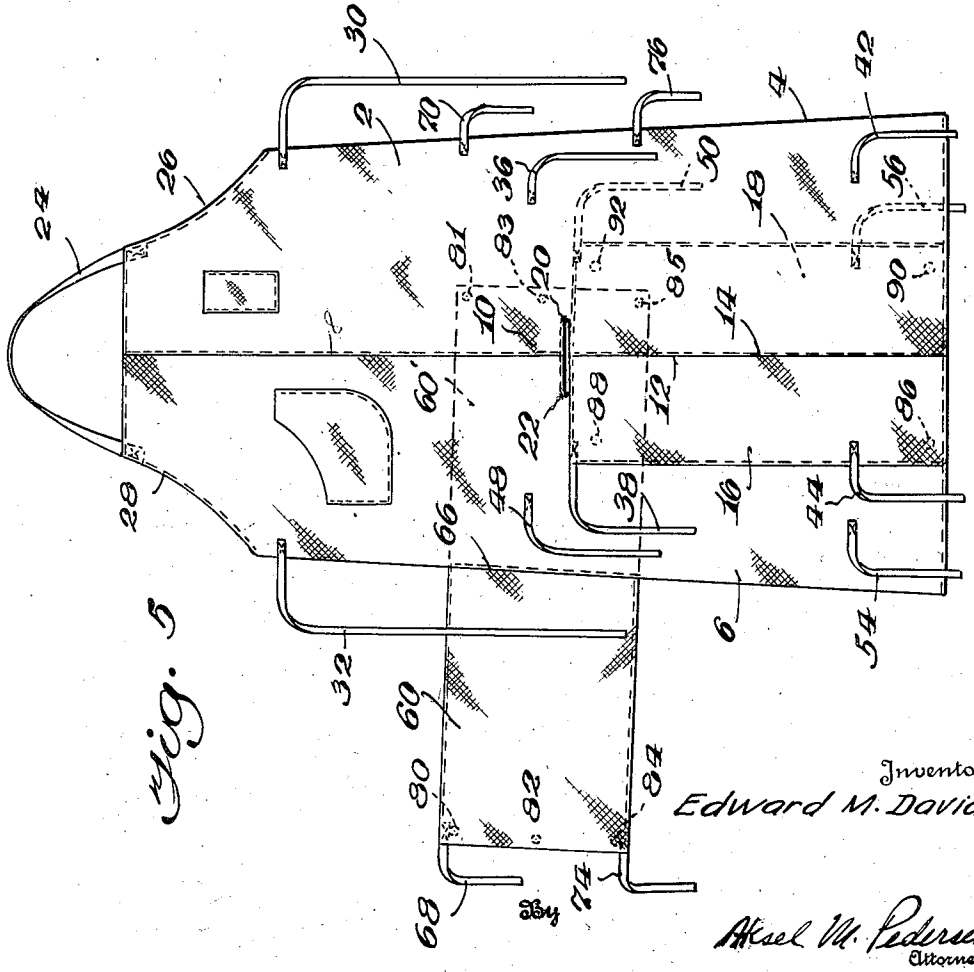


Fig. 5



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CONVERTIBLE PROTECTIVE GARMENT

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Application June 16, 1943, Serial No. 491,077

7 Claims. (Cl. 2—48)

The present invention relates to a protective garment adapted for use by both men and women in occupational work in which clothes are liable to become soiled; in gardening, in work on automobiles and for general work, in which it is desirable to protect the clothes and which necessitates the use of slacks, trousers, overalls or the like.

Because of the recent demands in industry, particularly in defense work, for skilled women to carry out work generally restricted to men, it has become of increasing importance for women to wear slacks or overalls as a protection around machinery or mechanisms in which ordinary dresses would be liable to become entangled and would be a source of danger. Aprons do not give sufficient protection and are liable to become caught in machinery, particularly such machines as cause drafts or strong currents of air. Ordinary trousers are not generally worn by women doing mechanical work for the reason that they believe that they must keep up their morale by reflecting more or less feminine charm in their dress, and men's dress, although practical for use around machinery, in welding, gardening and other work in which dresses are not suitable, has not been adopted.

In work around automobiles, such as lubricating, cleaning, or inspection of the engine, it frequently occurs that the work to be done requires only a few minutes and men are unwilling to change their clothes or to take the trouble to put on overalls. As a consequence their clothes become soiled, whereas if a garment as hereinafter described were available, which could be put on with little effort, which would not be binding, and which would not prevent access of air to the body, or in other words, so that the person would not become overheated by the use of the additional garment, considerable laundering would be saved, and clothing would not be damaged or ruined as now frequently occurs.

Many attempts have heretofore been made to provide a form of protective garment combining in effect an apron with extensions similar to overalls but covering only the front portions of the legs, but none of the devices have stood the test of commercial acceptance. These devices have had the drawback of binding in the crotch, and in general have followed the same form of construction by which such binding action could not be avoided, resulting in discomfort and consequent disapproval of this form of garment.

One of the objects of the present invention is to provide a form of protective garment serving the function of both an apron and overalls and which have no binding action in the crotch.

Another object of the invention is to provide a form of protective garment which is adapted for use by either men or women, which is sufficiently closely fitting so that it may be worn with safety around machinery and which is sufficiently neat and attractive in appearance to satisfy the aesthetic tastes of persons who are generally critical of their appearance.

Another object of the invention is to provide a form of protective garment which may be readily modified slightly in construction to provide additional protection for workers, whose occupation is sedentary and whose clothes require protection against oil, grease or dirt which is generally present on stools, benches or other places on which a person is liable to sit.

Another object of the invention is to provide a form of protective garment which may be further modified to suit specialized occupations by the use of synthetic rubber or combined synthetic rubber and a modified rubber, such as neoprene and chlorinated rubber, for example, so as to withstand contact with oil or other material, or which may be otherwise modified to suit special requirements. In chemical industries, or in laboratories, for example, a worker may be liable to be sprayed with a chemical through a minor accident, such as with sulphuric acid in the testing of certain materials, or with ferric nitrate in concentrated nitric acid, as in the testing of steel, for example, against which suitable protection may be provided by the use of an inert sizing. Or where there is danger of fire from sparks or a spray of particles of molten metal, the protective garment may be provided with a suitable coating, or the fabric may be impregnated with a solution of sodium tungstate, or other fire-resistant chemical, to render the material incombustible.

Another object of the invention is to provide a form of protective garment which is of a form as not to be dependent upon specific fastening means, so that whatever forms which are available on the market may be used. The garment may be provided with tape which may be tied together to hold the garment in place, or straps or metal snaps or snap fasteners may be used if obtainable.

With these and other objects in view, which will be apparent from the following description, the invention comprises the following features which may be modified to some extent, as will be apparent to those skilled in the art, without departing from the spirit or scope of the invention as defined in the annexed claims.

The invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a view in elevation of the preferred form of the invention, in which certain underlying parts of the garment are indicated in dotted lines;

Fig. 3 is a cross sectional view of a part of the garment taken on the section line 2—2 of Fig. 1;

Fig. 3 is a front view of the garment as it appears when worn by a man;

Fig. 4 is a rear view of the garment when worn by a man, showing the preferred form of fastening means and the relative positions thereof;

Fig. 5 illustrates a slightly modified form of the protective garment which is particularly adapted for women in sedentary occupations, and

Fig. 6 illustrates the appearance of the garment shown in Fig. 5 when worn by a woman in the act of kneeling, as in gardening, for example.

Referring more in detail to the drawings, the numeral **2** designates the protective garment of the invention, which may be of any suitable fabric material, such as canvas, for example, or other desired material suitable for the purpose. The garment is preferably made in a plurality of sections and then sewing or otherwise joining the sections together. A length of the material is first selected which will reach substantially from the neck to the ankles of the person for whom the garment is to be made. Two of these sections, as **4** and **6**, are preferably first sewed together along the line **8**, so as to be united from the neck portion to the crotch **10** of the wearer. At the point **10**, the material in each section is slit inwardly from the line **8** about two inches on each side, and the edges of the slits are slightly overlapped to prevent fraying. At this stage, the downwardly extending edge **12**, on the left side of the right section, and the edge **14**, on the right side of the left section are free. In order to provide a width of fabric which is sufficient to extend substantially around the legs of the wearer, an extension or section **16** is sewed to the edge **12**, and an extension or section **18** is sewed onto the edge **14**, so that the section **4** with the extension **16** is adapted to pass around the left leg of the wearer, and the section **6** below the crotch portion **10** with the extension **18** is adapted to pass around the right leg of the wearer. The V portion **20** on the right side of the garment and the V portion **22** on the left side of the garment permit the fabric material to closely follow the curvature of each leg at the crotch portion so as to permit free movement of each leg without any binding action around the crotch, and without any strain on the fabric material either at the crotch **10** or the lateral portions of the garment. When the garment is worn, the two V sections and the straight section of fabric at the point **10** are not noticeable, and while providing extreme comfort and flexibility, the construction does not produce an unaesthetic appearance, but the inwardly extending sections of the fabric passing around the legs have the appearance of overlapping with the forward straight section **10**, on the outside.

A neckband **24** may be connected at the upper portion of the garment, which may be narrowed or inwardly curved at the parts **26** and **28** to give the desired "apron" effect. The upper part may be attached under the arms by means of straps or fabric strips **30** and **32**, which may be tied together by a bow knot **34**, in the manner indicated in Fig. 4 of the drawings. The fabric around the left leg of the wearer is adapted to be held in place by means of strap members **36** and **38**, which may be tied into a bow knot **40**, as indicated in Fig. 4, at the top of the leg portion, and by means of straps or fabric strips **42** and **44** at the ankle portions, which may be tied into a bow knot **46**, as indicated in Fig. 4. Correspondingly, the fabric around the right leg of the wearer may be held in place at the top of the leg around the crotch by means of strap members or fabric strips **48** and **50**, the latter being indicated in dotted lines in Fig. 1, and may be tied into a bow knot **52**, as indicated in Fig. 4 of the drawings. Correspondingly also, the fabric around the ankle portions may be held in place by means of strap members **54** and **56**, the latter being indicated mainly in dotted lines in Fig. 1, which may be tied into a bow knot **58**, as indicated in Fig. 4.

In the form illustrated in Fig. 5 of the drawings, which is particularly adapted for use by women in general, particularly in sedentary occupations, the main construction is the same as above described, the parts being designated by the same numerals as the corresponding parts in Fig. 1 of the drawings. In this form of the invention, however, a flap member or section **60** is added which is adapted to cover the area of the person from slightly below the waist, as at **62** in Fig. 6, to below the buttocks, as at **64** of this figure. This section **60** is preferably integrally connected on one side **66** to the garment, and when the garment is worn, the section may be held in the desired position by means of straps or strips **68** and **70**, which may be tied into a bow knot **72**, as indicated in Fig. 6 of the drawings, and by means of straps or strips **74** and **76**, which may be tied into a bow knot **78**, as indicated in Fig. 6. In order that the section or seat-covering member **60** may be retained in an unobstructing and obscured position when the garment is worn without using the seat member, or when it is desired to use the garment merely as an apron, in the manner hereinafter more fully described, fastening means, as snap fasteners **80**, **81**; **82**, **83**; and **84**, **85**, which are composed of the usual sections or halves, may be used to hold the seat section in suspended position behind the front portion of the garment, or in other words, on the back surface of the garment in the position indicated by dotted lines at **60'** in Fig. 5.

Similarly, in order to retain the sections **16** and **18** in secured position, so that the garment may be used as an apron instead of a coverall garment, snap fasteners may be employed both in the form of garment illustrated in Fig. 5, and in that shown in Fig. 1, in which the flap member or seat is entirely omitted. In order to suspend or fasten the section **16** in place, the lower end of the section may be provided with one part **86** of a snap fastener, located on the under side of the section. A corresponding part **87**, of the snap fastener **86**, **87**, is provided on the front face of the section **6** in a corresponding position, so that when the parts of the fastener are snapped together there will be no strain or wrinkling of the garment portions. The upper end of the section **16** may be similarly suspended in position from the underside by means of a snap fastener **88**, as indicated in Figs. 1 and 5 of the drawings. The section **18** may be similarly detachably connected at the free side thereof to the section **4** by means of a snap fastener **90**, **91**, one part **90** of which is connected to the back or under surface of the section **4**, and the other part **91** of which is connected in a corresponding position to the front face of the section **18**, in the manner indicated in Fig. 2 of the drawings. Similarly, the free end of the upper part of the section **18** may be detachably connected to the

section 4 by means of a snap fastener 92, as indicated in Figs. 1 and 5 of the drawings.

By this means, the protective garment above described, which is to be used primarily as a coverall protective garment, may be readily converted into an apron for general use, as for household duties, for use as a laboratory apron, or for other uses in which there is little likelihood of coming into contact with machinery, or moving parts thereof, or in which protection of the front of the clothing only is required.

Pockets, as 94 and 96, may be provided in the front of the garment as illustrated, or other pockets may be provided in the leg portions, or other positions as may be best suited for any specialized use for the carrying of tools, or other implements.

It is to be understood, that although the main fastening means for use of the garment as a coverall protective garment have been shown as the strap or tape type, any suitable form of fastening means may be used, depending on availability on the market, ease of use, and other factors. It may be stated, however, that under ordinary conditions the use of all snap fasteners is preferred for the reason that although with tape or strap fasteners, the donning or putting on of the garment either as an apron or a coverall is a matter of only a few seconds, the use of snap fasteners permits the garment as an overall or coverall protective garment to be put on in about one half the time and requires substantially no effort. However, because of the greater effort required to fasten snap fasteners in the back of a garment, it is preferable to use the upper pair of straps 30 and 32, which are readily crossed over the back of the wearer and brought around to the front to be tied in a bow knot, as 34, at the front.

For certain specialized uses in which greater protection is desired than is afforded by ordinary fabric, I may impregnate the fabric with well known ingredients, as sodium tungstate, for example, to render the fabric fire-proof, and to provide protection against oil, or acids, or other chemicals, I may incorporate special ingredients to provide the desired properties. I may for example, coat the side of the fabric which is to be outermost with a vulcanizable synthetic rubber composition, containing neoprene, carbon black, antioxidant, plasticizer, vulcanizing ingredients and an accelerator, by which vulcanization may be accomplished at ordinary temperatures. It is to be understood that the various compositions required for providing the specialized protection against chemicals, etc., is not a part of my invention, although under certain conditions such additional protection may be used in connection with my invention as above described.

One impregnating and coating composition which has been found of specific advantage where the protective garment is to be used in laboratories and the heavy chemicals industries is a compounded vulcanizable rubber composition containing substantially equal proportions of Neoprene, or other synthetic rubber, with chlorinated rubber, which is far more resistant to the action of chemicals than ordinary rubber, and affords substantially complete protection against spray which would otherwise injure the clothing. When the garment thus coated is used as an apron, by fastening the inner leg protecting portions over the front of the apron in the manner above described, the front of the body is doubly protected by the reinforced sections. This is of special advantage when hot corrosive substances are worked with, as the double layer serves also as a heat insulating medium, and there is thus little danger from burns due to accidental spilling of chemical materials. If the garment is used as an apron in the making of mustard gas, or other dangerously poisonous gases which are produced in liquid form, the openings 20 and 22 are constructed so as to be substantially closed, and in the form of garment as illustrated in Fig. 5 of the drawings the flap portion 60 may be doubled over and attached to cover the opening at 20, 22 so as to give further and substantially complete protection against such dangerous chemicals. In this form of protective garment also, the sections 16 and 18 may be of a width so as to extend to the edges of the adjacent sections 6 and 4, and may be supported not only at the edge portions, but also at one or more intermediate points by the use of snap fasteners or other suitable fastening means. When such metal snap fasteners are not available on the market, buttons and buttonholes may be used in place of the straps or strip fasteners as above described, the buttons being preferred as fastening means particularly when the garment is used around machinery or belts or other moving objects in which the straps might get caught or entangled.

It will be understood that various changes or modifications may be made in the form of the garment either as a coverall or as an apron, or in the combination thereof, or in the coating or impregnating materials employed, if such are to be used, without departing from the spirit of the invention or the scope of the annexed claims. It is obvious, for example, that the garments may be manufactured from fabric that is already treated with the desired coating or impregnating material, or fabric so treated which may be purchased on the market. It is obvious also that the flap or seat-covering portion 60 of the garment may be detachably secured on both sides or lateral edges thereof by means of snap fasteners or the like to permit securing in any desired symmetrical position and so as to be adapted to fit persons of different sizes within certain limits, and additional fasteners may be provided on the back side of the garment adjacent the openings or slits 20 and 22 to permit suspending or securing the flap member in the unexposed position when the garment is to be used as an apron or to provide additional protection when the garment is used in the manufacture of mustard gas or other dangerous gases, or for extra protection in carrying out laboratory work in the handling of corrosive or dangerous chemicals.

In the claims, the term "inner free edges" is used to designate the seams or portions 12 and 14, which in the preferred method of making the garment described are free edges before the laterally extending garment sections have been applied. It will be understood, however, that the method of making the garment may be varied or modified so that no seams occur at the portions 12 and 14, and the term "inner free edges" is to be understood as referring to the portions 12 and 14 in which seams would occur when the garment is made specifically in the manner described. In large scale manufacture, however, it may be advantageous to cut or stamp the garment portion including the parts 4 and 16 with the slit 20 in one operation, and by making a plurality at one time all that is necessary is to select two of such cut or stamped sections and to combine them by stitching along the line 8 in one operation, and

the desired pockets and fastening means may then be applied. Obviously the method of production may be varied as will be apparent to those skilled in the art.

Having thus described the invention, what is claimed as new is:

1. A protective garment comprising a main body portion adapted to extend over the front of the body from the neck to the crotch, a downwardly extending leg portion on each side of the said main body portion integral therewith and adapted to extend substantially to the ankles of the wearer, a transverse linear opening at the crotch portion extending laterally of each side of the center a sufficient distance to provide freedom of movement of the leg portions, laterally extending garment portions connected to the inner edges of said downwardly extending leg portions, a garment portion extending rearwardly so as to cover the seat portion of the wearer's clothes, and fastening means for securing the portions of the garment in place.

2. A coverall protective garment convertible to an apron which comprises a garment made mainly in two sections, one section including a unitary fabric covering one side of the chest and the leg on one side of the body with sufficient lateral extension below the crotch portion to extend fully around the said leg, the other section including a unitary fabric adapted to cover the other side of the chest and the other leg with sufficient lateral extension below the crotch portion to extend fully around the leg, the two sections being united from the neck portion to the crotch portion in a central seam, a horizontally extending slit at the crotch portion extending transversely inwardly from the inner edges of each section, to permit the lateral extension of each fabric section to pass around the leg without drawing the fabric at the central seam portion, fastening means for attaching the said lateral extensions and leg portions in overlapped position when the garment is used as an apron and fastening means for attaching the said lateral extensions and leg portions around the legs of the wearer in supported position.

3. A protective garment comprising a main body portion adapted to extend substantially from the neck of the wearer to the crotch, a downwardly extending portion on each side of the main body portion connected therewith and extending below the said body portion, a horizontally-extending slit at the crotch portion extending transversely inwardly from the inner edges of each of said downwardly extending portions, a laterally extending section connected to each of said downwardly extending portions and coextensive therewith, and fastening means for supporting the garment in place on the wearer.

4. A protective garment comprising a main body portion adapted to extend substantially from the neck of the wearer to the crotch, a downwardly extending portion connected to each side of the main body portion and extending below the said body portion, a horizontally extending slit at the crotch portion extending transversely inwardly from the inner edges of each of said downwardly extending portions, a laterally extending section connected to each of said downwardly extending portions so as to be coextensive therewith, means for fastening each of said laterally extending sections so as to extend around a leg of the wearer when the garment is to be used as overalls, and means for fastening the said laterally extending sections in overlapped position for use of the garment as an apron.

5. A protective garment comprising a main body portion adapted to extend substantially from the neck of the wearer to the crotch, a downwardly extending portion connected to each side of the main body portion and extending substantially to the ankles of the wearer, a horizontally extending slit at the crotch portion extending transversely inwardly from the inner edges of each of said downwardly extending portions, an inwardly extending section connected to each of said downwardly extending portions at the inner edge thereof so as to be coextensive therewith in length, fastening means for fastening each of said inwardly extending sections around the legs of the wearer for use of the garment as overalls, and supplemental fastening means for supporting the said inwardly extending sections in overlapped position at the front of the garment to permit use of the garment as an apron without use of the overalls fastening means.

6. A protective garment comprising a main body portion adapted to extend substantially from the neck of the wearer to the crotch, a downwardly extending portion on each side of the main body portion connected therewith and extending below the said body portion, a horizontally extending slit at the crotch portion extending transversely inwardly from the inner edges of the said downwardly extending portions, a laterally extending section connected to each of said downwardly extending portions and coextensive therewith, fastening means for fastening each of said laterally extending sections and the corresponding downwardly extending portion in place around each leg of the wearer, a garment portion extending laterally from one side of the garment of sufficient length to cover the seat portion of the wearer's clothes and means for fastening the said garment portion in place.

7. A protective garment comprising a main body portion adapted to extend substantially from the neck of the wearer to the crotch, a downwardly extending portion connected to each side of the main body portion and extending substantially to the ankles of the wearer, a horizontally extending slit at the crotch portion extending transversely inwardly from the inner edges of each of said downwardly extending portions, an inwardly extending section connected to each of said downwardly extending portions at the inner edge thereof so as to be coextensive therewith in length, fastening means for fastening each of said inwardly extending sections around the legs of the wearer for use of the garment as overalls, supplemental fastening means for supporting the said inwardly extending sections in overlapped position at the front of the garment to permit use thereof as an apron, a garment portion extending laterally from one side of the garment a sufficient distance to cover the seat portion of the wearer's clothes, means for fastening the said garment portion in place at the other side of the garment and other fastening means for supporting the said garment portion in overlapping position to provide a reinforcement when used as an apron.

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