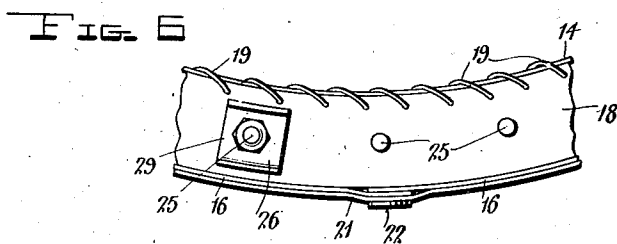
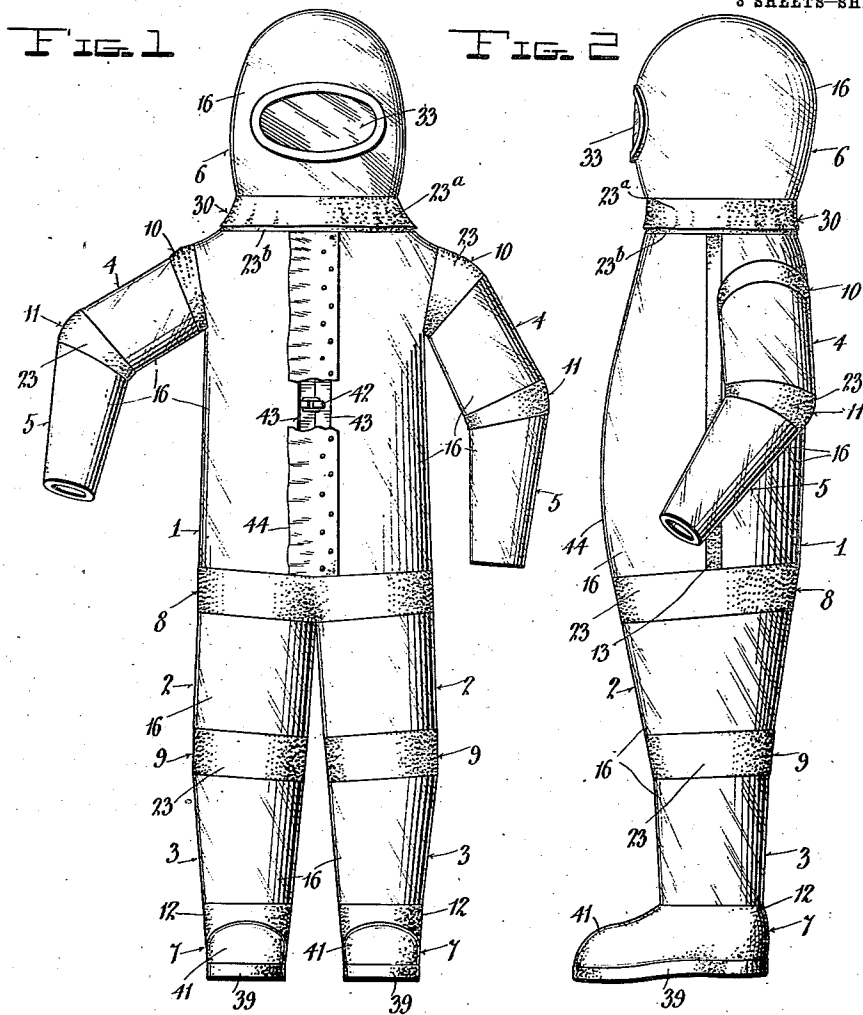


A. G. ROBINSON.
 FIRE PROTECTION SUIT.
 APPLICATION FILED MAY 9, 1912.

1,082,214.

Patented Dec. 23, 1913.

3 SHEETS—SHEET 1.



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 by *James L. Morris*
 Attorney

1,082,214.

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3 SHEETS—SHEET 2.

FIG. 3

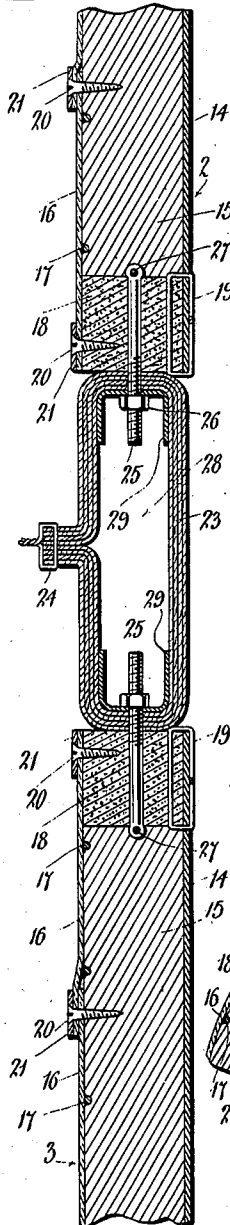
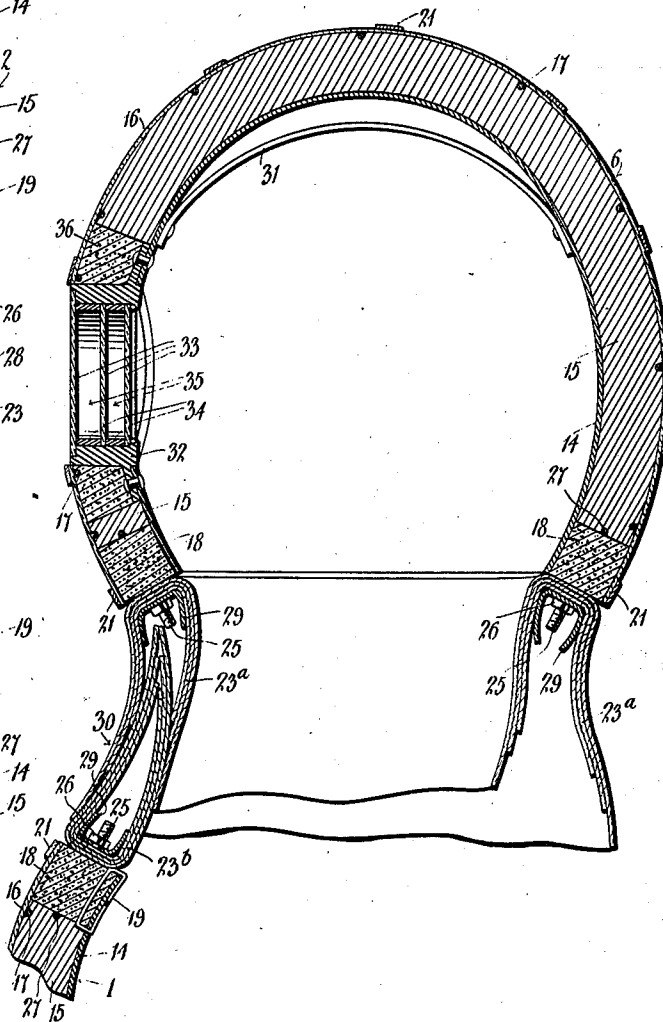


FIG. 4



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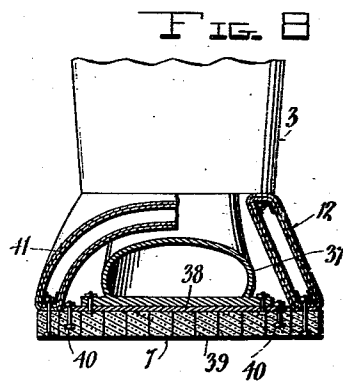
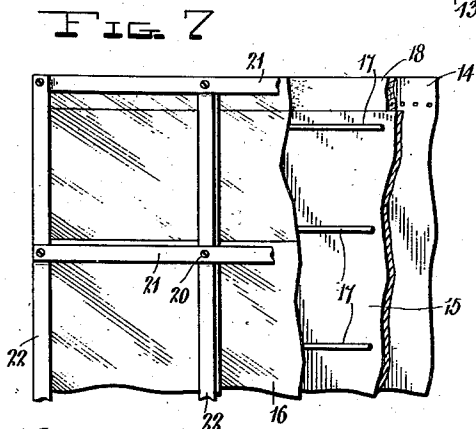
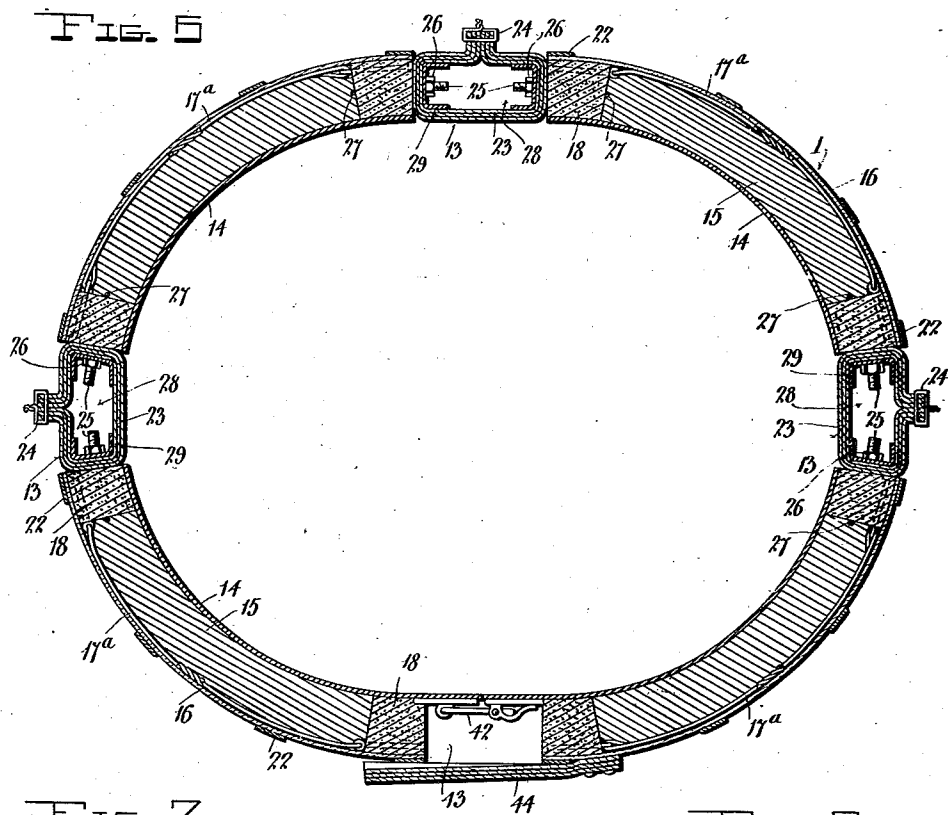
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3 SHEETS—SHEET 3.



Witnesses
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UNITED STATES PATENT OFFICE.

ARTHUR G. ROBINSON, OF BUFFALO, NEW YORK, ASSIGNOR OF ONE THIRTY-SECOND TO CALVIN S. CROSSER AND ONE THIRTY-SECOND TO REGINALD F. PENTON, BOTH OF EAST AURORA, NEW YORK.

FIRE-PROTECTION SUIT.

1,082,214.

Specification of Letters Patent.

Patented Dec. 23, 1913.

Application filed May 9, 1912. Serial No. 696,249.

To all whom it may concern:

Be it known that I, ARTHUR G. ROBINSON, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Fire-Protection Suits, of which the following is a specification.

This invention relates to improvements in fire protection suits of that general type which forms the subject matter of my copending application, Serial No. 578,198, and the invention is to be regarded as an improvement upon the construction shown in the application referred to.

A suit of the type stated is made up of a number of sections to be hereafter identified, and each section comprehends an inner supporting layer, an intermediate insulating layer, and an outer protective layer. The sections thus made up are substantially rigid and are connected by flexible fire resisting joints.

One object of the present invention is to provide a suit which not only has suitable fire resisting qualities, but has great durability, and wherein any disintegration of the intermediate layer, which is preferably of magnesia or magnesia compound, is positively prevented.

A further object of the invention is to provide a suit of the character stated which shall be relatively light and considerably lighter than the construction shown in my said copending application.

A further object of the invention is to improve the construction of the flexible joints between the sections, with regard to greater security of connection, greater simplicity of construction, and better fire resisting quality or property.

A further object of the invention is to provide an improved foot section in the nature of a shoe, and having a refractory sole and upper.

An embodiment of the invention is illustrated in the accompanying drawings, wherein:

Figure 1 is a front elevation of the suit complete; Fig. 2 is a side elevation thereof; Fig. 3 is a detail sectional view, illustrating the construction of the sections and the construction of the joint between adjacent sections; Fig. 4 is a vertical sectional view,

illustrating the helmet or head section; Fig. 5 is a horizontal sectional view, illustrating the coat or body section; Fig. 6 is a detail view, looking at an edge face of a section and showing certain features which form a part of the joint connection; Fig. 7 is a detail elevational view, showing the construction of the sections; and Fig. 8 is a cross sectional view of the shoe or foot section.

Similar characters of reference designate corresponding parts throughout the several views.

As in the construction shown in my copending application, referred to, the improved suit is conveniently and preferably made in sections, these comprising a coat or body section 1, two upper leg sections 2, two lower leg sections 3, two upper arm sections 4, two fore arm sections 5, a head section or helmet 6, and foot sections or shoes 7. The sections are connected to form a properly jointed suit by flexible waist, knee, shoulder, elbow, and ankle joints, the waist joint, as 8, connecting the body and the upper leg sections, the knee joint, as 9, connecting the upper and lower leg sections, the shoulder joint, as 10, connecting the body and the upper arm sections, the elbow joint, as 11, connecting the upper and fore arm sections, and the ankle joint, as 12, connecting the lower leg and foot sections.

In the embodiment shown, the body section is made in four parts, and these are connected by flexible joints, as 13, which extend from the lower to the upper end of the body section, as shown in Fig. 1, and are arranged at the back and at the sides thereof, as shown in Fig. 5. The joints 13 of the body section are preferably similar to the various joints, above referred to, between the several sections.

As in the construction shown in my copending application, each section above identified consists of an inner supporting layer 14, an intermediate insulating layer 15, preferably of magnesia or magnesia compound, and an outer protective layer 16, of refractory material, preferably mica. In the present case, the construction of each individual section differs, however, substantially in respect to details from the construction shown in my said copending application. The inner supporting layer 14 is in

the nature of a relatively light sheet steel shell, and is not directly attached to the intermediate layer 15 of magnesia or magnesia compound, but at the same time, furnishes an ample supporting surface for the latter. The intermediate layer 15 of magnesia is preferably built up, *i. e.* composed of blocks or sections of suitable outline and size, (see Fig. 7) and these are bound in place by copper retaining wires or rings 17. The sheet steel inner layer 14 has the advantage of being relatively light, and at the same time rigid, and consequently, it can have no yielding action which can detrimentally affect the magnesia. The good condition of the magnesia is also preserved by the absence of any positive fastenings, such as bolts, screws, rivets, or the like, for securing the same to the inner layer. Further protection of the magnesia layer 15 is secured by the use of marginal blocks 18, which are arranged at the edges of each section and between which the sections of magnesia are confined. The marginal blocks 18 are of suitable fire resisting material, and are relatively solid. The trade article known as "G. and M. packing" preferably forms the material of the blocks 18. The blocks 18 are not liable to disintegration, and are positively secured to the inner layer 14, for instance, by wire stitching 19 and serve not only to confine the magnesia sections, but also as a means for the attachment of the flexible joint connections. The outer protective layer 16, of mica, is, like the intermediate layer, likewise made in sections (see Figs. 3 and 7). The sections of the layer 14 are arranged in shingle fashion, and are retained in position by relatively short fastening screws 20 which engage in the magnesia sections and in the blocks 18, and which pass through retaining bands 21 which encircle each section. In addition to the retaining bands 21, vertical retaining strips 22 are also employed, these strips 22 being likewise secured by the screws 20, and together with the bands 21, coinciding with the edges of the mica sections of the layer 16.

The flexible joint connections between the sections include a suitable number of superposed layers 23 of asbestos fabric. The layers 23 are arranged to form a hollow ring, (Figs. 1 and 3), their mutually adjacent edges being secured by stitching or otherwise, as at 24. The ring formed by the layers 23 is sufficiently flexible to enable perfect freedom of movement, and at the same time resists both the effects of heat and flame and the transmission of heat to the interior of the garment. The layers 23 are permanently associated with the sections which they connect by suitable fastening devices. Preferably these devices comprise bolts 25, the threaded portions of which project within the hollow ring formed by the layers 23

and carry nuts 26, the shanks of which project through the blocks 18, terminating at their inner ends in eyes through which a retaining wire 27 may be passed. The layers 23 are held in proper relation to preserve a dead air chamber 28 internal to the ring which said layers define, by the nuts 26 and by U-shaped washers 29, surrounding the bolts 25 and held by said nuts to clamp the adjacent portions of the layers 23 against the blocks 18. The U-shaped outline of the washers 29 serve to maintain the layers 23 in the relation stated. The joints 13, between the respective parts of the coat sections 1, are also, by preference, of the construction just described. The joints 13 enable the coat sections to be readily fitted upon or removed from the body.

The magnesia blocks 15 employed in the coat section are held in place by transverse wires 17^a, which are arranged similarly to the bands 17 already referred to, but have their ends anchored, as by bolt connections, in the packing of the adjacent joints between the parts of the coat sections.

The only part of the suit which is dissociable in the head section or helmet 6, and consequently, the joint 30 between the section 6 and the coat section is not in the nature of a connection between these sections, as in the case of the other joints, but is rather in the nature of a yieldable or flexible packing. The joint 30 is, however, similar in the main to the joints above described, but differs in that the asbestos fabric layers do not form a hollow ring and are not continuous. In the case of the joint 30, superposed asbestos fabric layers 23^a are associated with the head section or helmet 6, and similar layers 23^b are associated with the coat section, the layers 23^a and 23^b being associated with the respective sections just as the layers 23 in the construction already explained. The layers 23^a, however, have loose marginal portions which overlie similar loose marginal portions of the layers 23^b, the marginal portions of said layers thus coacting to form a flexible and closed, though not connected, joint.

The inner supporting layer 14 of the head or helmet section 6 is of dome shape and is provided with head engaging straps 31. The section, as a whole, is provided at the front thereof with an opening in which is fitted an oval or rectangular frame 32, held in place by attachment flanges that are riveted or otherwise secured to the inner layer 14. The frame 32 accommodates mica plates 33, which serve as sights and of which a suitable number may be employed. The plates 33 are held in spaced relation by spacing rings 34, and define dead air spaces 35 by which the transmission of heat to the interior of the helmet is prevented. In this connection it may be noted that the frame

32 is fitted within a frame 36, which serves the same purpose and is of the same material as the blocks 18.

The foot sections 6 are shown in detail in Fig. 8, in each instance comprising an ordinary shoe 37, having a relatively wide welt to which is attached, by bolts or otherwise, a plate 38 of thin sheet steel. The tread 39 of each foot section consists of the material known to the trade as "G. and M. packing," and which is arranged in the form of a coil on the under side of the plate 38, being attached to said plate, for instance, by bolt fastenings 40. The upper 41 of each foot section consists of superposed layers of asbestos fabric similar, except as to form, to the layers 23. The upper 41 is joined both to the tread 39 and to the adjacent block 18 of the corresponding leg section 3, bolt and nut fastenings and clips, similar to the parts 25, 26, and 29, above referred to, being employed for the purpose.

The adjacent parts of the coat section at the front thereof are secured together at their adjacent edges by fastenings 42, which are set into recesses or cut away portions 43 of the mica and magnesia layers and are attached to the exposed portions of the layers 14, as shown in Fig. 5. One of the sections of the coat section is provided at its front edge portion with a continuous packing strip 44, consisting of a number of superposed layers of asbestos fabric which overlap the crevices intervening between the front edge faces of said sections and is preferably transversely corrugated throughout its extent.

Any desired means for eliminating or disposing of foul matter in the air or of supplying fresh air may be employed. As such means forms no part of the present invention, and is well known, it is unnecessary to illustrate the same.

In addition to the parts herein shown and described, the suit is completed by gauntlets, which form no part of the invention and are not illustrated. These gauntlets are preferably of the type commonly employed by firemen, and in order that they may have a snug fit, the fore arm sections are preferably of tapering contour, as shown.

Any desired means may be employed whereby the user may lower himself into or raise himself from the suit, for instance, a suitably located horizontal bar may be provided. In getting into the suit, the lockable parts of the fastenings 42 are dissociated and the sections of the section 1 are spread apart, the joints 13 acting, to a certain extent, as hinges for this purpose. In spreading the sections apart, an upwardly flaring opening of suitable extent is presented, the dimensions of which are amply sufficient to enable the user to lower himself into position. Of course, the lower edge

portions of the sections of the coat section do not partake of this spreading apart movement, since they are associated with the joint 8. The three joints 13, however, provide sufficient flexibility to enable the proper spreading of the upper portions of said sections. When the fireman has gotten into the suit in the manner indicated, the sections of the coat section are drawn together and secured by the fastenings 42, after which the helmet is placed in position.

The suit herein described is relatively light and very durable. It affords an absolute protection for the wearer against any degree of heat which may be encountered at a fire, and at the same time has sufficient flexibility to enable the wearer to conveniently make such movements of his body, limbs, or head, as may be required.

Having fully described my invention, I claim:

1. A fire protection suit made up of a plurality of sections, each section comprising an inner supporting layer of relatively light sheet metal, and insulating and refractory layers imposed on the supporting layer.

2. A fire protection suit made up of a plurality of sections, each section comprising an inner supporting layer of relatively light sheet metal, an intermediate layer of magnesia and an outer layer of mica.

3. A fire protection suit made up of a plurality of sections, each section comprising an inner supporting layer of relatively light sheet metal, an intermediate layer of magnesia, wires to bind the magnesia layer upon the supporting layer, blocks of packing arranged at the edges of the section and between which the magnesia layer is confined, and an outer layer of mica.

4. A fire protection suit comprising a plurality of sections, each section consisting of an inner supporting layer and outer layers of protective material and flexible joint connections between the sections, each joint connection comprising layers of fire resisting fabric, fashioned to form a hollow ring and attached throughout its circumference to the adjacent marginal portions of the sections which it connects.

5. A fire protection suit comprising a plurality of sections, each section consisting of an inner supporting layer and outer layers of protective material, flexible joint connections between the sections, each joint connection comprising layers of fire resisting fabric fashioned to form a hollow ring and means for attaching said ring to the sections which it connects and comprising bolts secured in the marginal portions of said sections and having threaded shanks projecting into said ring, nuts on said shanks and V-shaped washers engaged by said nuts.

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6. In a fire protection suit, a foot section comprising a shoe, a relatively light sheet metal plate secured to the sole thereof, a tread layer of fire proof and heat insulating material secured to said plate, and an upper of fire proof and heat insulating fabric also secured to said plate and inclosing said shoe.

7. In a fire protection suit, a foot section comprising a shoe, a relatively light sheet metal plate secured to the sole thereof, a tread layer of fire proof and heat insulating material secured to said plate, and an upper of fire proof and heat insulating fabric also secured to said plate and inclosing said shoe, and a lower leg section to which said upper is attached.

8. In a fire protection suit, a helmet comprising a relatively light sheet metal layer, a layer of magnesia imposed thereon, a protective layer of mica inclosing the magnesia layer, the helmet having an opening at the front thereof, a frame composed of fire proof and heat insulating packing fitted in the opening to protect the magnesia, and a second frame fitted in the packing frame and equipped with transparent sight plates.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ARTHUR G. ROBINSON.

Witnesses:

HENRY L. DECK,
CHAS. KIPP.