F. STERN.

HELMET.

APPLICATION FILED JAN. 5, 1916.

Patented May 30, 1916.

1,184,785.

Fig. 1.

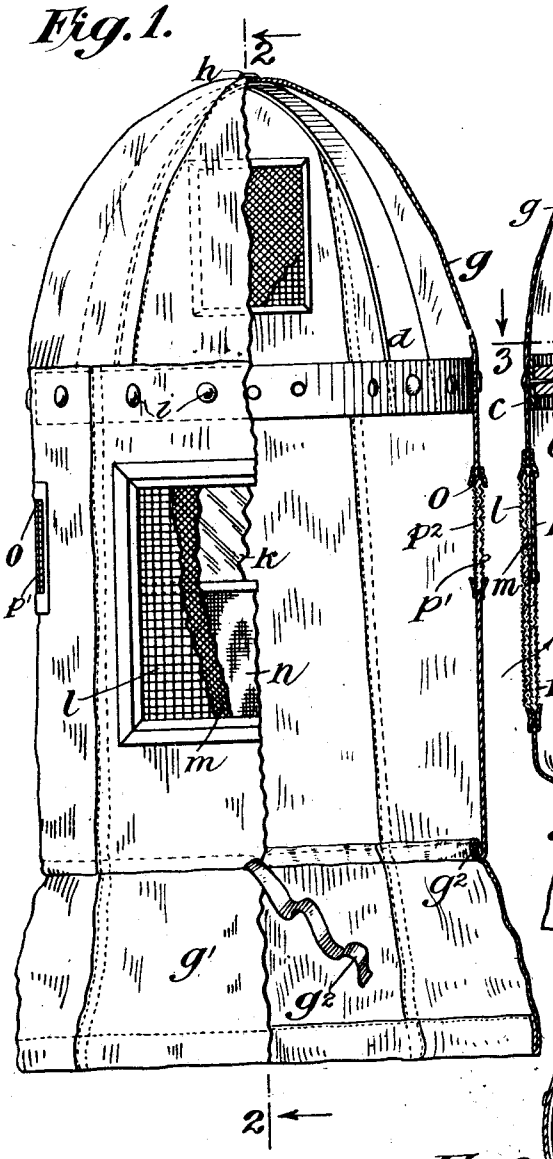


Fig. 2.

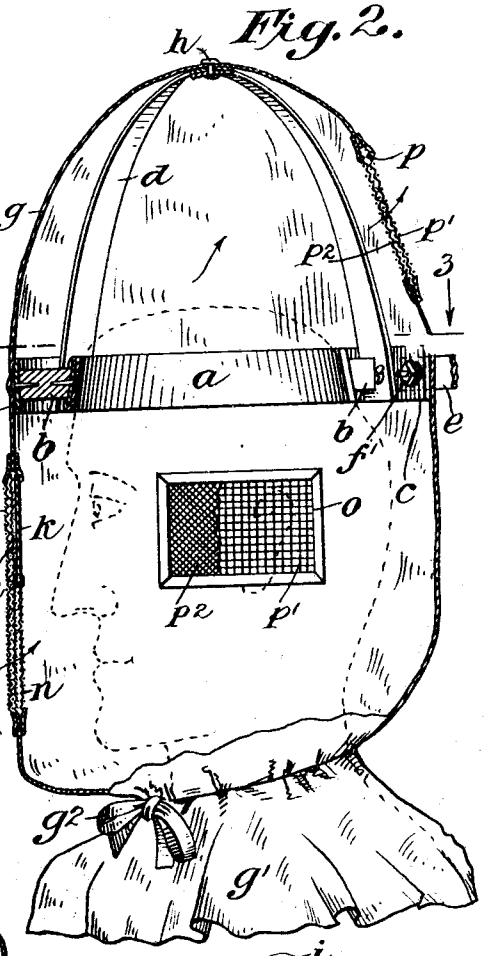
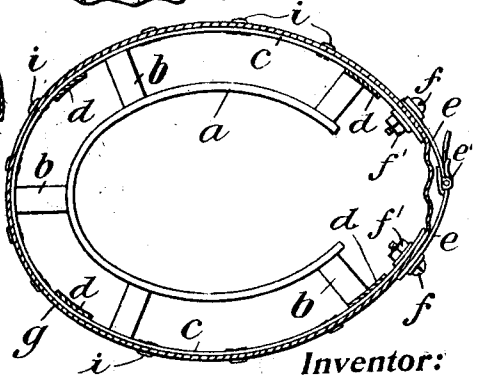


Fig. 3.



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UNITED STATES PATENT OFFICE.

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HELMET.

1,184,785. Specification of Letters Patent. Patented May 30, 1916.

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To all whom it may concern:

Be it known that I, FREDERICK STERN, a citizen of the United States, and a resident of New Rochelle, in the county of Westchester, in the State of New York, have invented certain new and useful Improvements in Helmets, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

This invention relates to helmets intended generally for workers in dusty trades and particularly for sandblasters, grinders and others employed in carrying on work in which the air is laden with foreign particles and a continuous stream of such particles is directed against the workman. In the operation of sandblasting, for instance, the rebound of the foreign particles from the surface against which the blast is directed results in a constant bombardment of the worker with both light and heavy particles, the force of the blows of which is not inconsiderable. The need for protection has always been recognized, but the devices hitherto provided have been of a makeshift character and so utterly ineffective for the intended purpose as to attract the general attention of State legislators throughout the country. The present invention seeks to meet the conditions in a highly scientific manner and to provide a helmet which shall be light, durable, inexpensive and thoroughly effective in its primary purpose of protecting the throat and lungs of the wearer against dust.

A further object of the invention is to provide in such a helmet thorough ventilation so as to insure a constant supply of uninhaled air for the wearer and, generally, maintain the head of the wearer and the interior of the helmet in a sanitary condition.

A further object is to provide such a helmet which shall be readily adjustable to fit heads of varying sizes, and shall be formed of a plurality of members connected detachably one to another to permit the ready disassembling of such parts for purposes of replacement, cleansing and repair.

Other improvements in the details of construction will be described more particularly hereinafter with reference to the accompanying drawings, in which—

Figure 1 is a view in perspective showing a helmet embodying the present improvements, part of the hood being broken away to show details of construction and part of the ventilator coverings being broken away to show the composition of such coverings. Fig. 2 is a view in section taken through the helmet shown in Fig. 1 along the plane indicated by the line 2—2 and looking in the direction of the arrows, the skirt of the hood being shown in snug engagement with the neck of the wearer as intended during use. Fig. 3 is a view in horizontal section through the hood taken on the plane indicated by the line 3—3 of Fig. 2 and looking in the direction of the arrows.

Before describing the helmet as a whole and particularly the improved features of the hood, the supporting frame for the hood will be considered inasmuch as this frame itself embodies many improved structural details, all of which are of importance in realizing the general objects of the invention. The frame is made up of an open head band *a* which is secured to rigidly extending supports *b* therefor, which may be made cheaply from wood, these supports being fastened in turn to a flexible band *c* which conforms generally in outline to the flexible head band. The inner ends of the spacing blocks *b* are beveled, as appears in Fig. 2, so that when the flexible head band *a* is fastened thereto, this head band will assume a substantially conical form and, accordingly, conform readily to the shape of the head of the wearer. This feature is of particular importance in a head gear of the bulk and weight of a helmet inasmuch as it is essential that the helmet receive firm and uniform support throughout the head band and not have its entire weight transmitted to the head through a contacting surface of relatively small area, such as the edge of a head band, as would be the case were the head band maintained in a truly vertical position. The curved frame band *c* has secured thereto arched flexible members *d* which are united with one another at the point of intersection at the apex of the supporting frame thus formed, as will appear more fully hereinafter in connection with the description of the application of the hood to the frame. The entire structure thus far described, being made up of several flexible members, fixedly united with one another, it necessarily follows that while this frame is a unitary structure, it is readily adjustable

to the head of the wearer, without disturbing the fixed relationship between the head band *a* and the circular band *c*. The adjustment of the head band may be conveniently effected by securing removably to the free ends of the circular frame band *c*, take-up straps *e*, on one of which may be carried a buckle *e'* arranged to engage the other and hold the two at the desired adjustment, in a manner commonly employed in other connections. The attachment of the take-up straps *e* to the free ends of the band *c* may be effected by any approved means, but, as illustrated, small bolts *f* and nuts *f'* have been found to be most satisfactory under conditions of use. Such connections are strong and durable and yet permit ready removal of the bolts whenever the helmet is to be disassembled in the manner later described.

To the flexible frame is applied a pliable hood *g* of any satisfactory material, such as jean, the crown of which is shaped to conform generally to the dome-shape of the frame and dimensioned in conformity therewith in order that the flexible supporting straps *d* of the frame may be united detachably with the apex of the dome-shaped hood, as by a flexible clip *h*, and the circular frame band *c* may be united at a plurality of points with the hood at the base of its dome, as through removable clips *i*. The relation between the hood and its supporting frame, as regards shape and dimensions, is intended to insure that the hood shall be held in about the same relation to the head of each wearer, no matter what the size of the head. The spacing blocks *b* insure that the hood shall be held away from the head a fixed distance, and no matter whether the frame be expanded or contracted as a whole, the ventilating space between the hood and the head remains the same.

For ample ventilation within the hood and the supplying of a sufficient quantity of uninhaled air for the wearer, there are provided several ventilating openings in the hood each of which is covered by a suitable ventilating covering, the composition of which is such as to exclude effectively, to the greatest possible degree, all foreign substances, such as dust, etc., and yet permit filtration therethrough of air fit to be breathed. This invention is concerned primarily with the disposition of these ventilating openings with respect to one another and with the ventilating coverings therefor. In the first place, it is necessary to form in the front of the hood the main ventilating opening through which air for breathing is permitted to pass and through which the worker may see. This opening must be amply protected since it must exclude all such particles as might injure the eye and interfere with the seeing of the wearer and also exclude to the greatest possible degree, injurious particles which are thrown against the front of the hood on the rebound in a continuous stream and with considerable force. In the illustrated embodiment the opening at the front of the hood is of ample dimensions and is so disposed with respect to the face of the wearer as to have the upper half thereof constitute a sight opening and the lower half thereof merely a ventilating opening. To this end, the upper half has placed across it an impervious transparent plate *k*, preferably of flexible material, such as mica, and in front of this plate is secured a plurality of layers of wire cloth of differing mesh from one another, two such layers being shown in the accompanying drawings, the outer layer *l* being of relatively coarse mesh and the inner one *m*, which lies between the transparent plate *k* and the outer layer *l*, of relatively fine mesh. The lower edge of the sight plate *k* is united with another layer of wire cloth *n*, which is of exceedingly fine mesh and lies behind the two outer layers *l*, *m*, of wire cloth which extend entirely over the opening in the front wall of the hood. From this description, it will appear that the upper half of the opening has two layers of wire cloth disposed in front of the transparent plate *k*, so as to afford adequate protection to the same, while the lower half of the opening is covered by three juxtaposed screens of differing mesh, the coarsest being outermost. Of course, the edges of the screens are united to the cloth of the hood *g* entirely around the edge of the opening in such manner as to prevent positively the passage of dust, etc., at the line of union.

The improved hood, in addition to the combined sight and ventilating opening above described, is formed with other ventilating openings, one such opening *o* being disposed about opposite each ear and another such opening *p* being provided in the dome of the hood *g* and at the rear thereof, whereby free ventilation of air within the hood is insured and the constant inflow of air fit to breathe and the constant outflow of exhaled air brought about. Each of the last named openings may be effectively covered by a screen of substantially the same composition as that used in the front opening of the hood, such screen being formed of a plurality of layers of wire cloth of differing mesh, two such layers being indicated at p' and p^2 in the ventilating opening *p* and also in ventilating openings *o*. Each such screen has the wire of coarsest mesh outermost. It is to be understood that no one of the ventilating coverings described is to be limited in the number of juxtaposed layers of wire cloth employed, provided there be two or more such layers, this phase of the invention residing in the provision of

ventilating screens made up of a plurality of juxtaposed layers of wire cloth of differing mesh.

In order to insure the complete closing of the improved hood, it is formed with a skirt g' on its lower edge which, when the helmet is in use, rests around the neck and on the shoulders of the wearer and is maintained in snug engagement therewith by means of a suitable draw-string g^2 carried in the skirt.

In use the hood is passed over the head of the wearer and the head band a forced into snug engagement with the head. This band may be adjusted readily to the head by manipulation of the buckle c' and draw-tapes e in a manner which will be obvious. These tapes e, it should be noted, are preferably secured at the outer side of the hood g, the securing bolts f for the tapes being passed through the body of the hood and the circular frame band c. Adjustment of the tapes e, in this way, brings about corresponding adjustment of the hood supporting frame and the hood itself, as is most desirable. When the helmet is thus adjusted, the inclined face of the head band a will conform automatically to the shape of the head and rest in snug engagement therewith throughout the length of the band. The draw-string g^2 is drawn snugly around the neck and tied so as to prevent the entrance of dust under the lower edge of the hood. If desired, the skirt g' rests over the shoulders in such manner as to permit an outer garment, such as a coat or sweater, to be drawn on over it and thus form a more effective dust excluding joint. The sight plate k at this time, is disposed opposite the eyes of the wearer. In sandblasting or grinding, the operator must face the stream and this stream produces a rebound of flying particles from the surface which is treated, which particles, for the most part, strike against the helmet. The force with which these foreign particles, both small and large, strike against the helmet is very considerable and the tendency is for them to beat their way through the finest interstices in the helmet, the larger particles serving to hammer the smaller particles through such interstices. This condition is recognized and the improved ventilating screen is intended to meet it. The screen in the front ventilating opening has its outer layer l of very stout, coarse wire cloth and this screen bears the brunt of the blows of the deflected particles and breaks the force of such blows. The larger particles, being coarser than the mesh of this outer screen are turned away and fall from the screen. Finer particles tend to pass inward, but are excluded successively by the inner screen m, n, etc., according to their size. The particles of dust, if any, which pass through the finest screen n, which may be of silk or wire cloth, of perhaps 350 or 400 mesh, are so fine as to be of about the character which is no more disturbing than that commonly inhaled by every one. The air finally admitted through this fine covering is fit to breathe and affords the wearer of the helmet an adequate supply. The screens in the openings o at the side of the helmet, while not subjected to the hammering action of the foreign particles as described in connection with the front screen l, are of such composition as to prevent effectively the passage into the hood of obnoxious foreign substances. The exhaled air passes upward in the hood around the head and between the head band a and the spaced frame band c and is discharged, for the most part, through the ventilating screen p at the rear of the hood. This continuous ventilation is assisted, to some extent, by the side openings o. Not only do the coverings described insure a scientific filtering of the dust-laden air but they are of such composition as to be exceedingly stout and durable. This is of especial importance for the covering in the front of the hood, since, as explained, it is subject to a continuous rain of blows.

It will be understood from the description given that the supporting frame for the hood may be removed as a unit by withdrawing the bolts f for the adjusting straps e and loosening the clips h and i. Upon removal of the frame it may be disassembled for purposes of replacement or repair by detaching the strips d from the cylindrical frame member c. Further, the covering screens for the several ventilating openings in the hood may be replaced by a simple sewing operation, as will be evident, these screens being entirely flexible and formed of what is known as wire cloth. If desired, the transparent sight plate k may be omitted.

Changes in structural details may be made without departing from the spirit of the invention provided the advantages sought are realized by the employment of means which are equivalent to those recited in the appended claims.

I claim as my invention.

1. A dust excluding helmet having a combined ventilating baffle and sight opening opposite the face of the wearer and a covering therefor composed of a transparent plate opposite the eyes at the upper portion of the opening, and a plurality of layers of wire cloth of differing mesh directly superposed upon one another, the outermost layer being of coarsest mesh and directly exposed to the blows of flying particles and serving as a baffle, and each successive layer under this screen serving as a baffle for the flying particles striking it, whereby the face of the wearer is protected from the blows of flying particles and ventilation is afforded, and the

transparent plate being secured behind a portion of the wire section and protected thereby in the manner described.

2. A dust excluding helmet having a hood and a supporting frame therefor, the frame comprising an open head band, a similar open frame band, rigid blocks secured fixedly to the head band and the frame band to hold the two in spaced relationship, and adjustable straps secured to one of said bands to permit adjustment of the head band to the head of the wearer.

3. A dust excluding helmet having a hood and a supporting frame therefor, the frame comprising a head band, a similar frame band, rigid blocks secured fixedly to the head band and the frame band to hold the two in spaced relationship, intersecting arched frame members secured detachably to the frame band, and means to secure the hood removably to the frame, whereby the entire helmet may be disassembled.

4. A supporting frame for the hood of a helmet comprising an open head band, a similar open frame band, spacing devices interposed between the head band and the frame band to hold the two in spaced relationship, and adjustable strips secured to one of said bands to permit adjustment of the head band.

This application signed this 31st day of December, A. D. 1915.

FREDERICK STERN.