

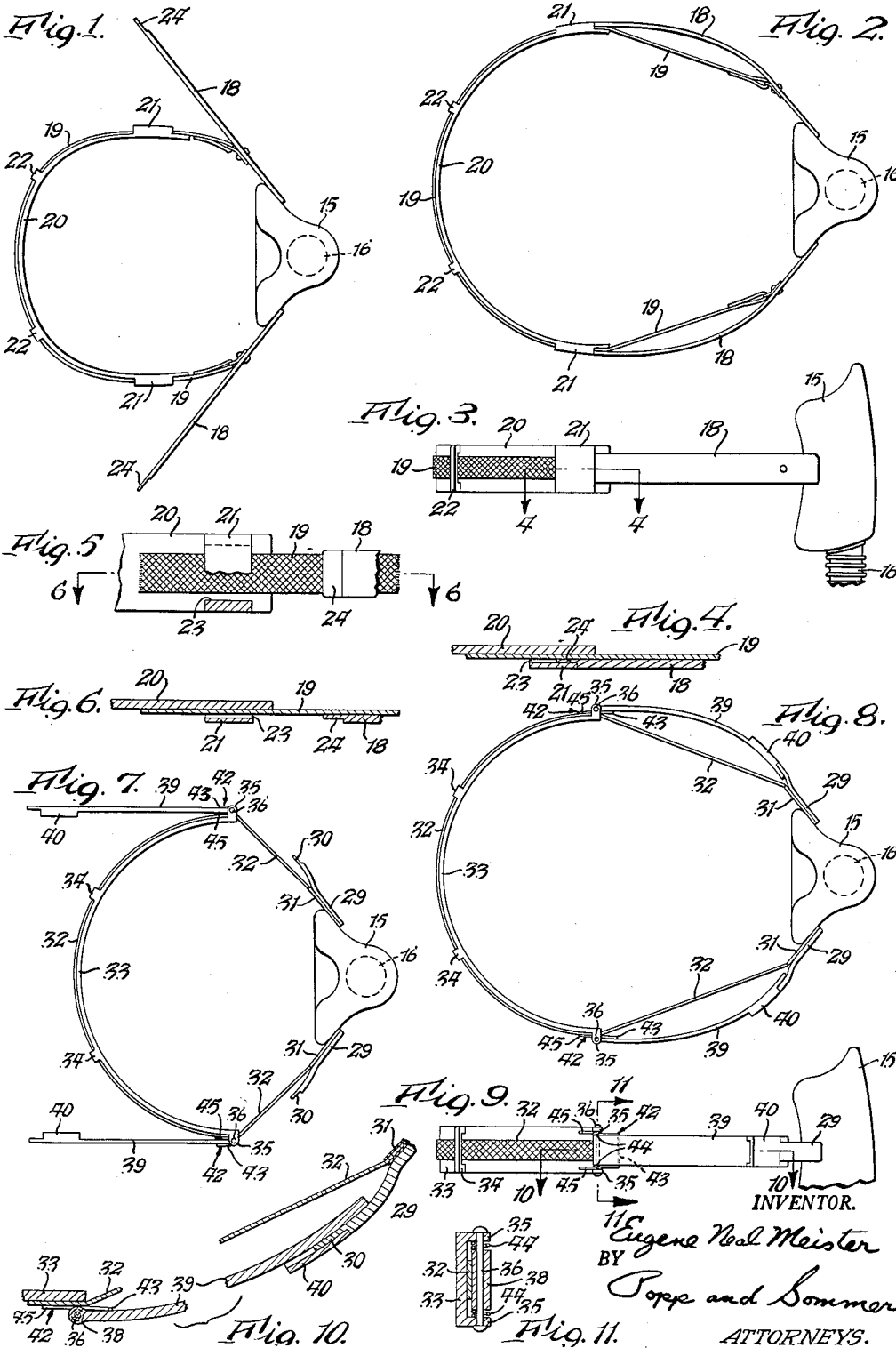
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E. N. MEISTER
QUICK DONNING MASK

3,095,876

Filed March 22, 1961

2 Sheets-Sheet 1



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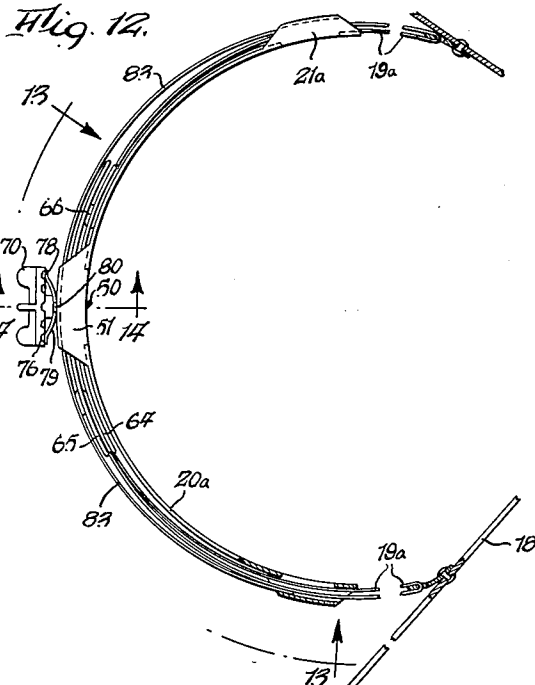
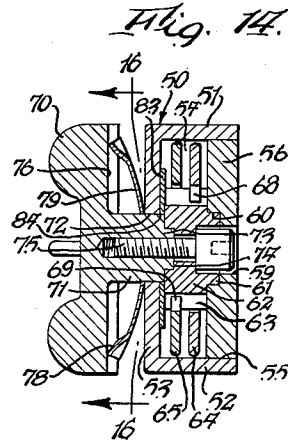
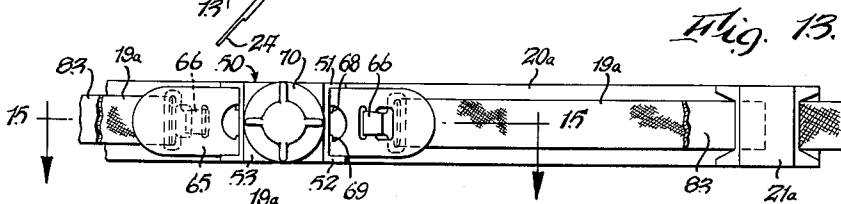
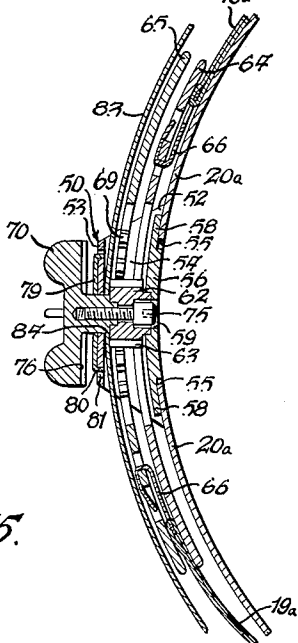
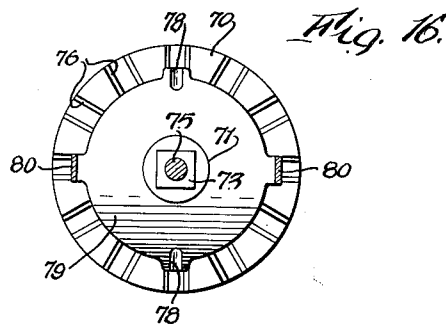
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QUICK DONNING MASK

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9 Claims. (Cl. 128-146)

This invention relates to a quick donning mask and more particularly to such a mask which is mounted so as to be held away from the face of the user but on manual release instantly springs to operative position against his face. While not limited to any particular use, such a quick donning mask has particular utility as a mask for supplying oxygen to high altitude aviators where an emergency may require oxygen to be instantaneously available for breathing purposes.

It is one of the objects of the invention to provide such a self-donning mask which is securely mounted so as to be held away from the face of the user but which on manual release springs to the face of the user ready for immediate use.

Another object is to provide such a quick donning mask which is easily released and adapted for emergency use where the principal attention of the user may be required on other matters.

Another object is to provide such a quick donning mask which is extremely simple in construction and reliable in operation and will stand up under conditions of service and constant use without getting out of order or requiring repairs.

Another object is to provide such a quick donning mask which is readily adjustable to different head sizes.

Another object is to provide such a quick donning mask which is biased to a distended condition when not in use so that it does not interfere with or annoy the aviator when it hangs inoperatively from his neck and also so that it can become quickly positioned when the aviator draws the mask to his face.

Other objects and advantages of the invention will be apparent from the following description and drawings in which:

FIG. 1 is a top plan view of a quick donning mask embodying the present invention and showing the same in its operative position in which the mask is held against the face of the user so as to supply oxygen for breathing purposes.

FIG. 2 is a view similar to FIG. 1 but showing the quick donning mask in its inoperative position in which it is mounted so as to be held away from the face of the user.

FIG. 3 is a side elevation thereof showing the position of the parts as illustrated in FIG. 2, that is, with the mask held away from the face of the user.

FIG. 4 is a horizontal section taken generally on line 4-4, FIG. 3.

FIG. 5 is an enlarged fragmentary view similar to FIG. 3 and illustrating the first step in releasing the inoperative mask to spring into operative position against the face of the user.

FIG. 6 is a fragmentary horizontal section taken generally on line 6-6, FIG. 5.

FIGS. 7, 8 and 9 are views similar to FIGS. 1, 2 and 3 respectively, and illustrating a modified form of the mask.

FIG. 10 is a horizontal sectional view taken generally on line 10-10, FIG. 9.

FIG. 11 is an enlarged vertical section taken generally on line 11-11, FIG. 9.

FIG. 12 is a view similar to FIG. 1 and illustrating a mechanism for adjusting the quick donning mask to dif-

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ferent head sizes, and also a means for biasing the gear to distended position when inoperative.

FIG. 13 is a fragmentary side elevational view viewed from the line 13-13, FIG. 12.

FIG. 14 is an enlarged vertical section taken generally on line 14-14, FIG. 12.

FIG. 15 is a fragmentary horizontal section taken generally on line 15-15, FIG. 13.

FIG. 16 is a fragmentary vertical section taken generally on line 16-16, FIG. 14.

While the invention is adapted for various uses, it is shown in conjunction with a nose and mouth oxygen mask 15 of an aviator which can be supplied with oxygen from a supply line 16 and which mask is cup-shaped to receive the nose and mouth of the aviator with its rim shaped to fit his chin, cheeks and the upper part of his nose. The mask 15 can be made of any material, hard or resilient, to which spring arms or struts 18 can be secured in cantilever relation, these arms shown as being in the form of strips of spring metal secured at one end to opposite sides of the mask 15 and projecting outwardly therefrom in a horizontal plane in rearwardly diverging relation with reference to the face of the user.

To the inner or anchored end of each of these spring arms 18 is secured the corresponding end of an elastic band 19 which is adapted to embrace the head of the user and hold the mask 15 in pressure contact with his face. The elastic band is held by a semi-circular head band 20, which can be of plastic or metal, the elastic band 19 bearing against the exterior semi-cylindrical face thereof. In order to prevent displacement of the head band 20 from the elastic band 19, the elastic band passes through a pair of loops or eyelets 21 formed integrally with each end of the head band 20 and is also shown as passing through a pair of loops or eyelets 22 integral with and in spaced relation along the central portion of this head band.

A feature of the invention resides in the space 23 through each of the end loops or eyelets 21 being greater than the cross sectional size of the elastic band 19 and that this excess space can be occupied by a correspondingly shaped tongue 24 provided at the end of each of the spring arms 18.

In use, assuming the parts to be in the position shown in FIG. 1, in order to equip himself with the quick donning mask the user moves the mask 15 away from the semi-circular head band 20, this thereby stretching the elastic band 19. He then springs the outer ends of each of the spring arms 18 toward the center of the assembly and brings the tongue 24 of each into line with the opening 23 of the corresponding end loop or eyelet 21 of the semi-circular head band 20. He then moves the ends of the spring arms 18 and semi-circular head band 20 toward each other and threads the tongues 24 into the excess space 23 left in each loop or eyelet 21 by the elastic band 19. When this is done, the parts are in the position shown in FIG. 2, the mask 15 being held in spaced relation from the semi-circular head band 20 by the spring arms 18, and the spring arms being held against springing outwardly relative to each other by reason of their tongues 24 being caught in the loops or eyelets 21 at opposite ends of the semi-circular head band 20. In this position of the parts, the user can bring the quick donning mask over his head and hang it from his neck.

In this position, neither the mask nor the parts which embrace his neck in any way interfere with his freedom of action. In the event, however, of an emergency requiring an immediate supply of oxygen to him for breathing purposes, all the user is required to do is to pull the face mask 15 away from him. This automatically pulls the tongues 24 out of the openings 23 through the loops or eyelets 21 and releases the spring arms 18 so that they

spring to the unlatched, divergent position illustrated in FIG. 1. In this position of the parts, the elastic band 19 is fully effective and hence draws the mask 15 into pressure contact with the face of the user. With but slight adjustment, a proper fit can be made by the user to seal against his nose and mouth, and oxygen, which can be made available through other emergency release apparatus, is supplied through the pipe 16 for his use in breathing.

In the form of the invention shown in FIGS. 7-11, the mask 15 is identical with that shown in FIGS. 1-6 and has attached thereto a pair of catches 29, these catches being arranged in a horizontal plane on opposite sides of the mask and diverging rearwardly therefrom with reference to the face of the user. Each catch is formed to provide a tongue 30 projecting rearwardly therefrom. An anchoring member 31 for the corresponding end of an elastic band 32 is interposed between each catch 30 and the mask 15, this elastic band embracing and engaging the outside semi-cylindrical face of a semi-circular head band 33 which can be made of metal, plastic or any other resilient material. The elastic band is held in engagement with the outer face of its semi-circular head band 33 by a pair of loops or eyelets 34 which can be formed integrally with the head band and at each extremity the head band 33 is formed to provide a pair of laterally outwardly projecting ears 35 arranged one above the other and supporting a vertical pivot pin 36, the elastic band 32 being interposed between the pivot pins 36 and the head band 33.

On each pivot pin 36, between its pair of ears 35, is journaled the hub 38 of an arm or strut 39. The outer end of each arm 39 is formed to provide a socket 40 which opens away from the pivot pin 36 and is shaped to receive the tongue 30 at the outer end of the corresponding catch 29.

Each arm 39 is biased to project rearwardly relative to the head of the user, this position being illustrated in FIG. 7. For this purpose a spring 42 is arranged at each side of the quick donning mask and has a central loop or bight 43 which engages the outer face of the corresponding arm 39 when the parts are in the position shown in FIG. 7. The ends of each loop or bight 43 are continued in convolutions 44 which encircle the opposite ends of the corresponding pin 36 and the opposite ends of these convolutions are continued in extensions 45 which engage the outer face of the semi-circular head band 33 above and below the elastic band 32.

In use of the form of the invention shown in FIGS. 7-11, the user spreads the mask 15 away from the semi-circular head band 33. He then swings each of the arms 39, against the resistance of the springs 42, from the rearwardly projecting position shown in FIG. 7 to a forwardly projecting position and threads the tongue 30 of each catch 29 into the socket 40 at the end of the corresponding arm. When this is done with both arms, the mask 15 is held in the forwardly projecting position illustrated in FIG. 8. He then draws the assembly over his head so that it hangs in this cocked position ready for use.

When an emergency arises, the user merely pulls the mask 15 forwardly, this withdrawing these tongues 30 out of the sockets 40 and freeing the arms 39. The springs 42 immediately snap these arms outwardly and rearwardly to the position shown in FIG. 7. The user thereupon guides the mask 15 to embrace his nose and mouth, the mask being drawn to his face by the stretched elastic band 32. Oxygen can immediately be supplied under pressure from the line 16 under the control of other emergency release apparatus.

In FIGS. 12-16 is illustrated a mechanism whereby the quick donning mask can be easily adjusted to the head size of the aviator. While it can be used with either form of the invention previously described, it is particularly illustrated in conjunction with the form of the invention shown in FIGS. 1-6, the spring arms or struts 18 being each shown as having a tongue 24 as with the form

of the invention shown in these figures. Also as shown in FIGS. 1-6, to the inner or anchored end of each of these spring arms 18 is secured the corresponding end of an elastic band 19a, this elastic band being, however, in two separate pieces as compared with the one-piece elastic band shown in FIGS. 1-6. As with the form of the invention shown in FIGS. 1-6, the elastic band ends 19a are held by a semi-circular head band 20a, which can be made of plastic or metal, the elastic band ends bearing against the exterior semi-cylindrical face thereof. As with the form of the invention shown in FIGS. 1-6, in order to prevent displacement of the head band 20a from the elastic band ends 19a, each of these elastic band ends passes through a loop or eyelet 21a formed integrally with the corresponding end of the head band 20a. As with the form of the invention shown in FIGS. 1-6, the space 23a through each of the end loops or eyelets 21a is greater than the cross-sectional size of the corresponding elastic band end 19a and this excess space can be occupied by the tongue 24 provided at the outboard end of the corresponding spring arm 18.

The feature of the form of the invention shown in FIGS. 12-16 resides in adjustably connecting the elastic band ends 19a to the head band 20a so that the tension or pressure which these elastic band ends exert against the head of the aviator can be adjusted to his head size. In the form of the invention shown in these figures, the head band is also biased to a distended position when inoperative both to avoid annoyance of the aviator and also to facilitate positioning of the gear when the aviator draws the mask to his face.

To this end the head band 20a is provided at its center with a rearwardly projecting integral loop or eyelet 50 having top and bottom walls 51, 52 connected by a vertical rear wall 53 to provide a space or horizontal way 54 along the rear side of the head band. At this space the head band is provided with a longitudinally elongated rectangular slot or opening 55 which extends from the top wall 51 to the bottom wall 52 as best shown in FIG. 14. In this slot is loosely fitted a rectangular anchor block or strip 56 having offset marginal portions 58 at its opposite ends which bear against the back side of the head band 20a within the space or way 54. This block has a central through opening 59 having a counterbore or enlargement 60 at its rear end which forms a bearing surface for the hub 61 of a small pinion 62.

The teeth 63 of the pinion 62 mesh with front and rear racks 64, 65, each of these racks being in the form of a metal strip suitably connected to the corresponding elastic band end 19a, as by the hook 66 shown which hooks through openings in the racks as best shown in FIG. 15. Each of these racks has a central rectangular slot, the top edge of this slot of the rack 64 being formed to provide teeth 68 engaging the pinion teeth 63 and the bottom edge of this slot in the rack 65 being formed to provide teeth 69 engaging the pinion teeth 63. It will be seen that turning the gear 62, through the racks 64, 65, moves the opposing ends of the elastic bands 19a together or apart thereby to adjust the tension or pressure exerted by these elastic bands to suit the head size of the aviator.

The means for so turning the pinion 62 to different positions of adjustment and holding the pinion at such position of adjustment are preferably constructed as follows:

The numeral 70 represents knobbed hand adjusting wheel the hub 71 of which is journaled in a bearing opening 72 in the rear wall 53 of the loop or eyelet 50. This hub has a square or out-of-round extension 73 projecting forwardly into a square socket 74 in the rear face of the pinion 62. The pinion and hand wheel are shown as secured together by a screw 75 so that turning the hand wheel turns this pinion.

The front or inside face of the hand wheel 70 is provided with a plurality of radial detent grooves 76 arranged at spaced intervals therearound. These grooves 76 receive detent protrusions or buttons 78 formed in-

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tegrally with the top and bottom edges of a spring disk 79 which surrounds the hub 71 of the hand wheel and is interposed between this hand wheel and the rear wall 53 of the loop or eyelet 50. The top and bottom edges of this spring disk 79 are biased rearward so as to bring the top and bottom detents 78 thereof into pressure contact with the rear face of the hand wheel 70 and thereby progressively enter its radial grooves 76 to releasably hold the hand wheel against turning. The spring disk 79 is held against turning by the provision of integral fingers 80 at its side edge and which project forwardly and anchor in slots 81 in the rear wall 53 of the eyelet or loop 50 as best shown in FIG. 15.

It is desirable that the ends of the head band 20a be biased to a distended or spread apart position so that when not in use it hangs loosely from the neck of the aviator without interference or annoyance to him and so that when he draws the mask 15 to his face the head band automatically rides up his neck to proper position on the back of his head to retain the mask in proper position against his face. To this end a spring strip 83 is provided. The center of this spring strip is housed in the way or space 54 within the eyelet or loop 50 and has its outboard ends fitted in the space 23a within the eyelets or loops 21a of the head band. Within the way or space 54 this spring strip 83 has an opening 84 by means of which it is fitted around the hub 71 of hand wheel 70 to be retained in position.

The operation of the form of the invention shown in FIGS. 12-16 is the same as the form shown in FIGS. 1-6 except that the aviator can preadjust the tension or pressure of the elastic band to suit his head size. He does this by turning the knobbed hand wheel 70 which, through the pinion 62, pulls together or spreads the racks 64, 65 attached to the elastic band ends 19a. The selected position of adjustment is retained by the detents 78 protruding into the radial grooves 76 of the hand wheel, these detent protrusions being on the top and bottom of the spring disk 79 which is held against turning by its fingers 80.

The outboard ends of the head band 20a are biased to a spread-apart position by the spring strip 83 to insure the head band loosely hanging on the neck of the aviator when not in use and to facilitate its self-positioning when the mask is drawn to the face of the aviator.

From the foregoing, it will be seen that the present invention provides a quick donning mask which is very simple to operate, requiring merely a quick pull on the mask 15 to release it, following which it is automatically drawn to the face of the user where it can be easily adjusted. Accordingly, the user is free to confine his attention to other matters involved in the emergency and at the same time is given an immediate supply of oxygen. It will also be seen that the quick donning mask is extremely simple while at the same time is rugged and certain in its operation. It will also be seen that with the modified form of the invention shown in FIGS. 12-16, the quick donning mask can easily be adjusted to the head size of the aviator, and that the ends of the head band can be biased apart to avoid annoyance when not in use and to facilitate self-positioning of the gear.

What is claimed:

1. A quick donning mask, comprising a mask member adapted to engage the face of the user, a head member adapted to engage the back of the user's head, spring means biasing said mask member toward said head member to hold said mask member in pressure contact with the user's face, a laterally biased strut mounted on one of said members and positionable to project toward the other member, a withdrawable tongue and socket connection between the free end of said strut and said other member to hold said mask and head members in spaced inoperative relation to each other, said tongue projecting in the direction of movement of said members toward and from each other whereby upon pulling the mask member

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away from said head member said strut springs away from said other member to permit said mask member to spring into pressure contact with the face of the user.

2. A quick donning mask, comprising a mask member adapted to engage the face of the user, a head member adapted to engage the back of the user's head, extensible elastic bands connecting said members at opposite sides of the user's head and biasing said mask member toward said head member to hold said mask member in pressure contact with the user's face, releasable means holding said members in spaced inoperative relation to each other, a pinion journaled on said head member near the adjacent ends of said extensible elastic bands, a rack secured to each of said adjacent ends of said extensible elastic head bands and meshing with said pinion to be moved in opposite directions in response to rotation of said pinion and means for manually positioning said pinion at different positions of rotation.

3. A quick donning mask, comprising a mask member adapted to engage the face of the user, a head member adapted to engage the back of the user's head, extensible elastic bands connecting said members at opposite sides of the user's head and biasing said mask member toward said head member to hold said mask member in pressure contact with the user's face, a laterally biased strut mounted on one of said members and positionable to extend along the corresponding elastic band toward the other member, a withdrawable tongue and socket connection between the free end of said strut and the other member to hold said mask and head members in spaced inoperative relation to each other, said tongue projecting in the direction of movement of said members toward and from each other whereby upon pulling the mask member away from said head member said strut springs away from said other member to permit said mask member to spring into pressure contact with the face of the user.

4. A quick donning mask comprising a mask member adapted to engage the face of the user, a semicircular head band member adapted to engage the back of the user's head, extensible elastic bands connecting said members at opposite sides of the user's head and biasing said mask member toward said head member to hold said mask member in pressure contact with the user's face, struts mounted on opposite sides of one of said members to extend along the corresponding elastic band toward the other member, and a releasable connection between the free end of each strut and the other member to hold said mask and head members in spaced relation to each other whereby upon release of said releasable connection said mask member springs into pressure contact with the face of the user.

5. A quick donning mask as set forth in claim 4 wherein spring means bias the free ends of said semicircular head band member apart.

6. A quick donning mask, comprising a mask member adapted to engage the face of the user, a head member adapted to engage the back of the user's head, spring means biasing said mask member toward said head member to hold said mask member in contact with the user's face, a spring strip arranged at each side of one of said members generally in a common horizontal plane, means rigidly fixing the corresponding end of each spring strip to said one of said members to be in fixed cantilever relation thereto and in divergent outwardly projecting relation to each other, and releasable latch means interposed between the free end of each strut and said other member to hold said mask and head members in spaced relation to each other.

7. A quick donning mask as set forth in claim 6 wherein each of said releasable latch means is in the form of a tongue and socket connection with said tongue projecting in the direction of movement of said members toward and from each other.

8. A quick donning mask, comprising a mask member

adapted to engage the face of the user, a head member adapted to engage the back of the user's head, spring means biasing said mask member toward said head member to hold said mask member in contact with the user's face, an arm arranged at each side of one of said members generally in a common horizontal plane, means pivotally connecting the corresponding end of each arm to said one of said members to swing about a vertical axis, spring means interposed between each arm and said one of said members and biasing said arm away from the other member and releasable latch means between the free end of each arm and said other member to hold said mask and head members in spaced relation to each other.

9. A quick-donning mask as set forth in claim 8 wherein said releasable latch means is in the form of a tongue and socket connection with said tongue projecting in the direction of movement of said members toward and from each other.

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