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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546



REPLY TO
ATTN OF: GP

MAY 18 1979

NST-44
TO: ~~KXX~~/Scientific & Technical Information Division
Attn: Miss Winnie M. Morgan

FROM: GP/Office of Assistant General
Counsel for Patent Matters

SUBJECT: Announcement of NASA-Owned U.S. Patents in STAR

In accordance with the procedures agreed upon by Code GP and Code KSI, the attached NASA-owned U.S. Patent is being forwarded for abstracting and announcement in NASA STAR.

The following information is provided:

U.S. Patent No. :

3,359,568

Government or
Corporate Employee :

United Aircraft Corp., *C. Hartford, Conn.*

Supplementary Corporate
Source (if applicable) :

NASA Patent Case No. :

9653

NOTE - If this patent covers an invention made by a corporate employee of a NASA Contractor, the following is applicable:

YES

NO

Pursuant to Section 305(a) of the National Aeronautics and Space Act, the name of the Administrator of NASA appears on the first page of the patent; however, the name of the actual inventor (author) appears at the heading of column No. 1 of the Specification, following the words "...with respect to an invention of ..."

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Enclosure

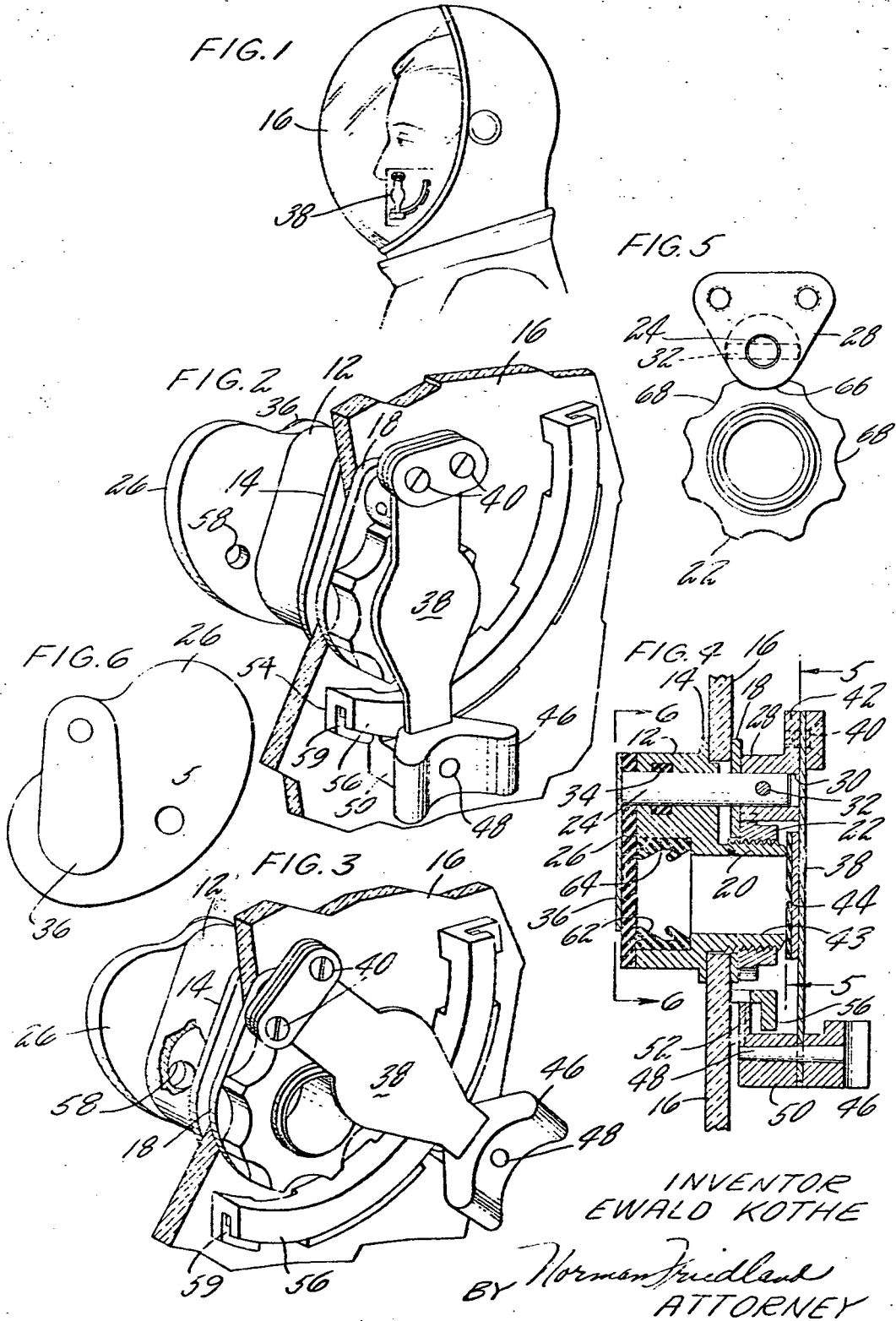
Dec. 26, 1967

E. KOTHE

3,359,568

HELMET FEEDPORT

Filed March 30, 1966



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3,359,568

HELMET FEEDPORT

Ewald Kothe, East Hartford, Conn., assignor to United Aircraft Corporation, East Hartford, Conn., a corporation of Delaware

Filed Mar. 30, 1966, Ser. No. 538,863

7 Claims. (Cl. 2-6)

This invention relates to helmets adapted to encapsulate the head of the wearer and capable of being pressurized and particularly to means for gaining access internally thereof. The invention described herein was made in the performance of work under a NASA contract and is subject to the provisions of Section 305 of the National Aeronautics and Space Act of 1958, Public Law 85-568 (72 Stat. 435; 42 U.S.C. 2457).

In order to feed the wearer of a pressurized suit, it is the customary practice to insert a tube through a hole formed in the helmet which tube is adapted to communicate with the wearer's mouth. When not in use, the hole in the helmet is then plugged up by a plug which in the heretofore practice was wired to the feedport in order not to get lost when not inserted in the feedport. Also, in order to purge the inside of the helmet which is done for several different purposes like expelling CO₂, another plug with a small hole (the "purge plug") is provided. When not in use, the purge plug is stowed in a bracket which was attached to the suit. The purge plug was, for safety reasons, also attached to a wire. Obviously, it was cumbersome for the wearer to insert and retract the plugs for gaining communication internally of the helmet.

I have found that I can obviate the problems that are attendant the type of feed and purge ports that have been heretofore incorporated in helmets of the type that are pressurized by providing a mechanically actuated valve that combines the purging and feeding operation by a simple movement of a mechanical lever.

It is therefore an object of this invention to provide in a helmet as described means for allowing access into a pressurized helmet for allowing tube feeding of the wearer and purging of the helmet yet assuring that the pressurized fluid does not escape when not in use.

It is still a further object of this invention to provide means for admitting a feed tube into and purging a helmet which means are characterized as being self-locking, easy and convenient to operate, economical to build and yet capable of rugged use.

Other features and advantages will be apparent from the specification and claims and from the accompanying drawings which illustrate an embodiment of the invention.

FIGURE 1 is an elevated view illustrating the invention adapted to a helmet.

FIGURE 2 is a perspective view in elevation illustrating the invention in the closed position.

FIGURE 3 is a perspective view in elevation illustrating the invention in the purge position.

FIGURE 4 is a sectional view taken along the centerline of the valve while in the closed position.

FIGURE 5 is an end view taken along lines 5-5 of FIG. 4.

FIGURE 6 is an end view taken along line 6-6 of FIG. 4.

Referring next to the details of this invention as can be seen in FIGURES 1 through 6, the combined feedport and purge port valve mechanism is illustrated in FIGURE 1. As can be seen it is attached to the side of the helmet in a position which is in proximity to the mouth of the wearer. FIGURES 2 and 3 show the combined feedport and purge port valve arrangement as comprising housing 12 carrying an end flange 14 adapted to bear against the

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inner surface of the helmet 15. A complementary flange 18 bears against the outer surface of helmet 16 sandwiching the helmet so as to support the rotating mechanism to be described hereinbelow.

As best seen from FIGURE 4, housing 12 carries an integral outwardly projecting hollow cylindrical element 20 that projects through an opening formed in helmet 16.

The end of element 20 is threaded for accommodating nut 22 which serves to secure the assembly to the helmet. Housing 12 also supports rotary shaft 24 which extends through an opening formed in helmet 16 and projects therebeyond for carrying on the inner side of the helmet rubber seal 26 and on the outer side collar 28. The end of shaft 24 fits into bore 30 formed in collar 28 and is suitably secured thereto by pin 32. An O ring 34 is inserted between the rubber seal 26 and helmet 16 to prevent pressure from escaping along the shaft. A backup plate 36 may be suitably mounted to the end of shaft 24 by a rivet or other suitable means to assure that rubber seal 26 adjacent thereto firmly bears against the adjacent outer wall of housing 12.

Fastened to the forward end of collar 28 is the combined actuator lever and sealing member 38 and suitably retained in place by bolts 40 which mate with threaded holes formed in the upstanding portion 42 of collar 28. An important feature of this invention is to provide lever 38 so as to allow it to move both circumferentially and radially. To this end it is made from a suitable flexible and resilient material that will permit it to travel toward and away from the end of the element 20 and yet actuate shaft 24. It will be noted that adjacent the through opening 43 lever 38 flares outwardly so that it is sufficiently wide to enclose the opening thereof. A rubber face sealing element 44 is suitably bonded to the inner face of lever 38 so as to engage the outer edge of element 20 to seal off opening 43 when in the closed position.

Handle 46 is attached to the lower end of lever 38 and suitably secured thereto by pin 48. An inwardly projecting portion 50 extending inwardly toward the helmet is secured to the handle and lever 38 at its outer end. Lug 52 formed on the end of element 50 fits into a channel 54 formed in detent 56 which serves as a guide when lever 38 is positioned. At predetermined locations the back wall 59 of detent 56 is recessed for receiving lug 52. Owing to the flexibility of lever 38, when lug 52 registers with the various openings formed in the back wall 59, it will force the lug to fall into the opening. In order to be shifted to the next position the operator must then pull the lever arm 38 outwardly away from the helmet and then move it along the channel to the desired position. Thus, for the three positions desired, closed, feedport opened, and purge opened, the lug and detent will mechanically lock the lever in position.

The rubber seal 26 is kidney-shaped and as noted above is carried with the shaft 24 and hence moves upon movement of lever arm 38. An aperture 58 is formed in the lower center portion of seal 26 and is in communication with the bore 43 defined by element 20 and casing 12. From the foregoing it is obvious that in two positions the valve 44 is displaced from the through opening 43 and in the third position it overlies the end of bore 43. In this position the seal adjacent the backup plate 36 is in alignment with respect to the opening 43 assuring that leakage will not create a back pressure against lever 38 to unseat valve 44. Movement of lever 38 to the intermediate position places aperture 58 in communication with bore 43 and allows fluid to escape externally from the inside of the helmet for purging the same. This can best be seen by referring to FIG. 3 and the breakaway portion of housing 12.

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In the next position the kidney-shaped seal 26 is in position to block the inward end of bore 43 and prevent escaping of fluid.

In order to feed the wearer, a tube is inserted through opening 43, bears against seal 26 which is flexible enough to move aside and be positioned further to engage the wearer's mouth. A lip seal 62 fitted into recess 64 formed in the inside diameter of casing 12 hugs the outer periphery of the tube to prevent fluid from escaping while the tube is in the feed position.

Referring to FIGURE 5 it will be noted that the outside peripheral diameter of nut 22 carries a series of circumferentially spaced arcuate milled out recesses. It will also be appreciated that the bottom of collar 28 is complementary in shape. This is to assure that the unit is locked to the helmet and will not inadvertently become loosened or disassembled as will be more apparent from the description to follow hereinbelow.

In assembling the valve mechanism, housing 12 is inserted so that flange 14 bears on the inner side of the helmet and element 20 fits through the complementary opening formed in the helmet. Shaft 24 having seal 26 and plate 35 already mounted thereon is inserted through the complementary openings in housing 12 and the helmet. Nut 22 is fastened to element 20. The collar 28, which already has mounted thereon lever 38 and handle 50, is inserted on the end of shaft 24 and pinned. The bottom wall 66 obviously must fit into recess 68 of the nut when mounting the collar on shaft 24. From the foregoing it is apparent that collar 28 prevents nut 22 from rotating, yet is capable of rotating with shaft 24.

It should be understood that the invention is not limited to the particular embodiments shown and described herein, but that various changes and modifications may be made without departing from the spirit or scope of this novel concept as defined by the following claims.

I claim:

1. A combined feeding and purging means for a helmet adapted to encapsulate the head of the wearer so as to be pressurized, said means including a casing having a projection extending from the inside to the outside of the helmet, and defining a through-passage permitting access internally of the helmet, attaching means attached to said projection for securing said casing to said helmet, valve means including a valve element movable both angularly and axially relative to the external end of said through-passage and pivotally mounted to said casing, a shaft carried by said casing extending through said casing and into said helmet, a flexible seal member attached to the internal end of said shaft, said flexible seal extending radially from said shaft and having a flat inner surface adapted to cover the inner end opening of said through-passage and sufficiently wide to extend over said opening throughout the entire range of angular movement of said valve element, said flexible seal having an aperture communicating with said through-passage in one angular position of said valve element, and locking means secured to the outer surface of said helmet and connecting said valve element in slidable relation thereto, for locking said valve element in closed, purging or feeding positions.

2. A combined feeding and purging means as claimed in claim 1 wherein said valve means includes a lever having the other end secured to said shaft and a handle mounted on one end thereof, said locking means includ-

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ing an arcuate-shaped detent, a radial projecting element attached to the lever for sliding in an arcuate groove formed in said detent, spaced slots adapted to receive said projecting element formed in said detent for locking said lever in desired positions whereby said lever is axially positioned relative to the external end of said through-passage for unlocking.

3. A combined feeding and purging means as claimed in claim 2 including means for locking said feeding and purging means to said helmet, including a collar disposed between the outer surface of said helmet and said lever mounted on said shaft, a projection having an arcuate-shaped end carried by said collar and adapted to fit into a complementary shaped groove formed in said attaching means.

4. A combined feeding and purging means as claimed in claim 1 wherein said attaching means includes a nut having a plurality of circumferentially spaced arcuate-shaped slots formed about the peripheral edge thereof.

5. A combined feeding and purging means as claimed in claim 1 including a backup plate mounted on the inner end of said shaft adjacent the end of said flexible seal, said backup plate extending a sufficient distance from said shaft to overlie said internal end of said through-passage in only one position of said lever.

6. For a helmet adapted to encapsulate the head of the wearer so as to be pressurized, a combined feeding and purging means, including a casing having a projection extending from the inside to the outside of the helmet through an opening therein, and defining a through-passage permitting access internally of the helmet, means attached to said projection for securing said casing to said helmet, valve means including a valve element movable both angularly and axially relative to the external end of said through-passage and pivotally mounted to said casing, a shaft secured to said valve element extending into said helmet and rotatable therewith, a radially extending flexible seal member attached to the internal end of said shaft, said flexible seal being elongated and having a flat inner surface adapted to cover the internal end of said through-passage and sufficiently wide to extend over said internal end throughout the entire range of angular movement with respect to the adjacent opening of said valve element, and an aperture in said member located with respect to the angular movement such that it aligns with said through-passage when said valve element is spaced angularly from said through-passage.

7. A combined feeding and purging means as claimed in claim 6 wherein said valve means includes a face seal secured to the inner surface of said valve element adapted to cover the external end of said through-passage.

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