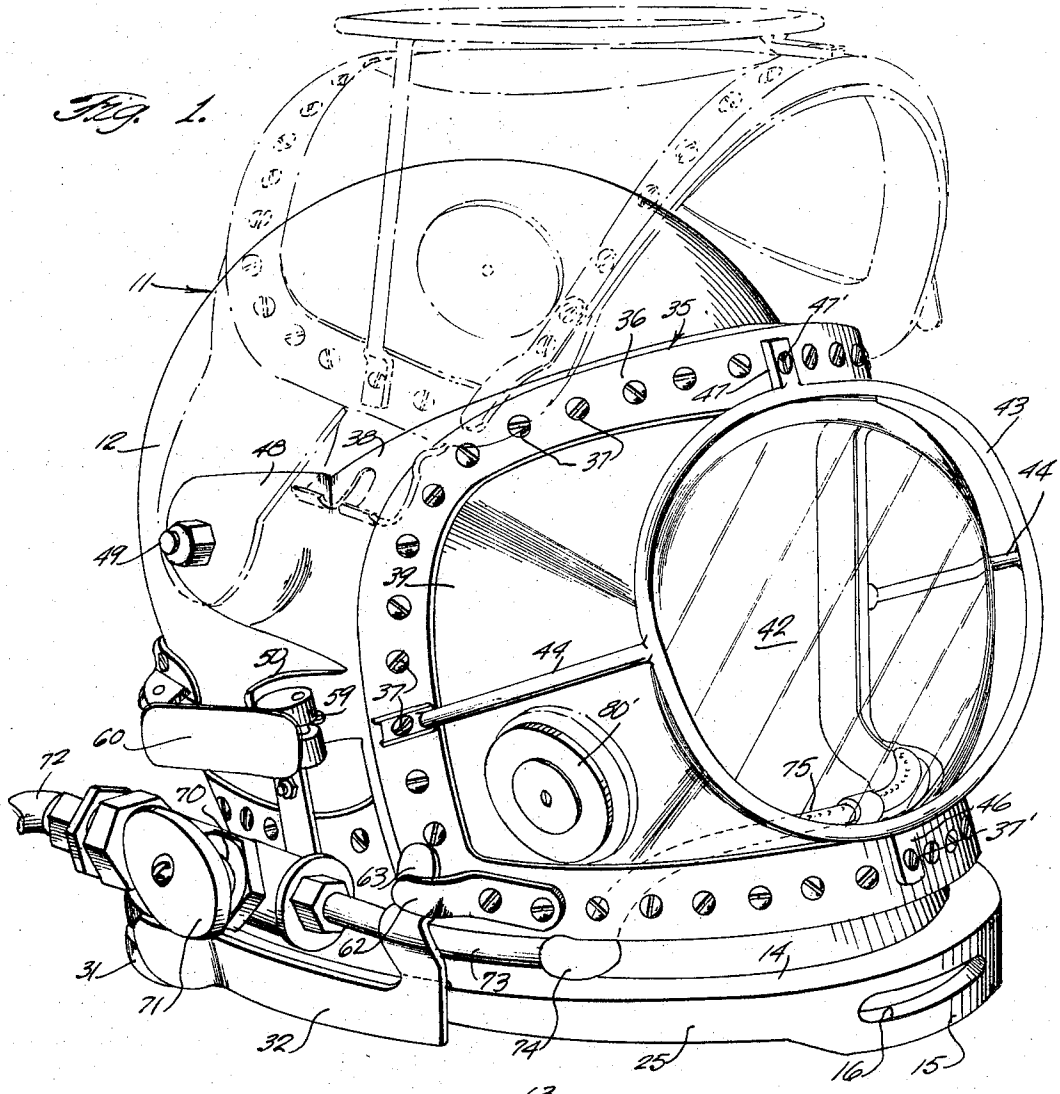
Nov. 21, 1967 H. J. SAVOIE, JR 3,353,534

DIVING HELMET

Filed Oct. 13, 1964 3 Sheets-Sheet 1

Fig. 1.



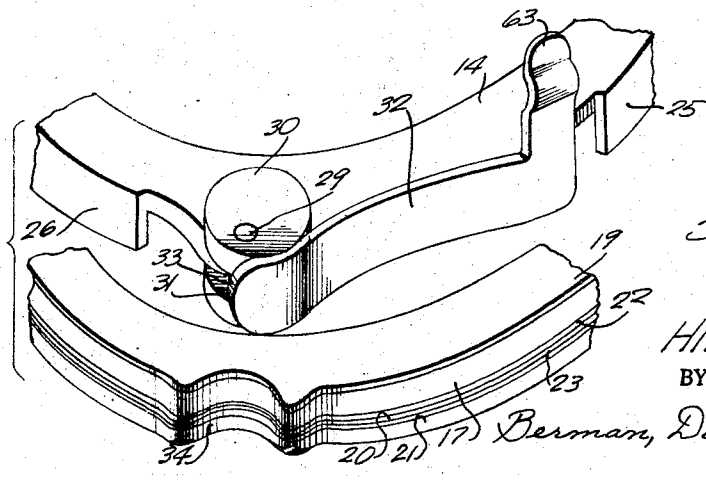


Fig. 7.

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DIVING HELMET

Filed Oct. 13, 1964 3 Sheets-Sheet 2

Fig. 2.

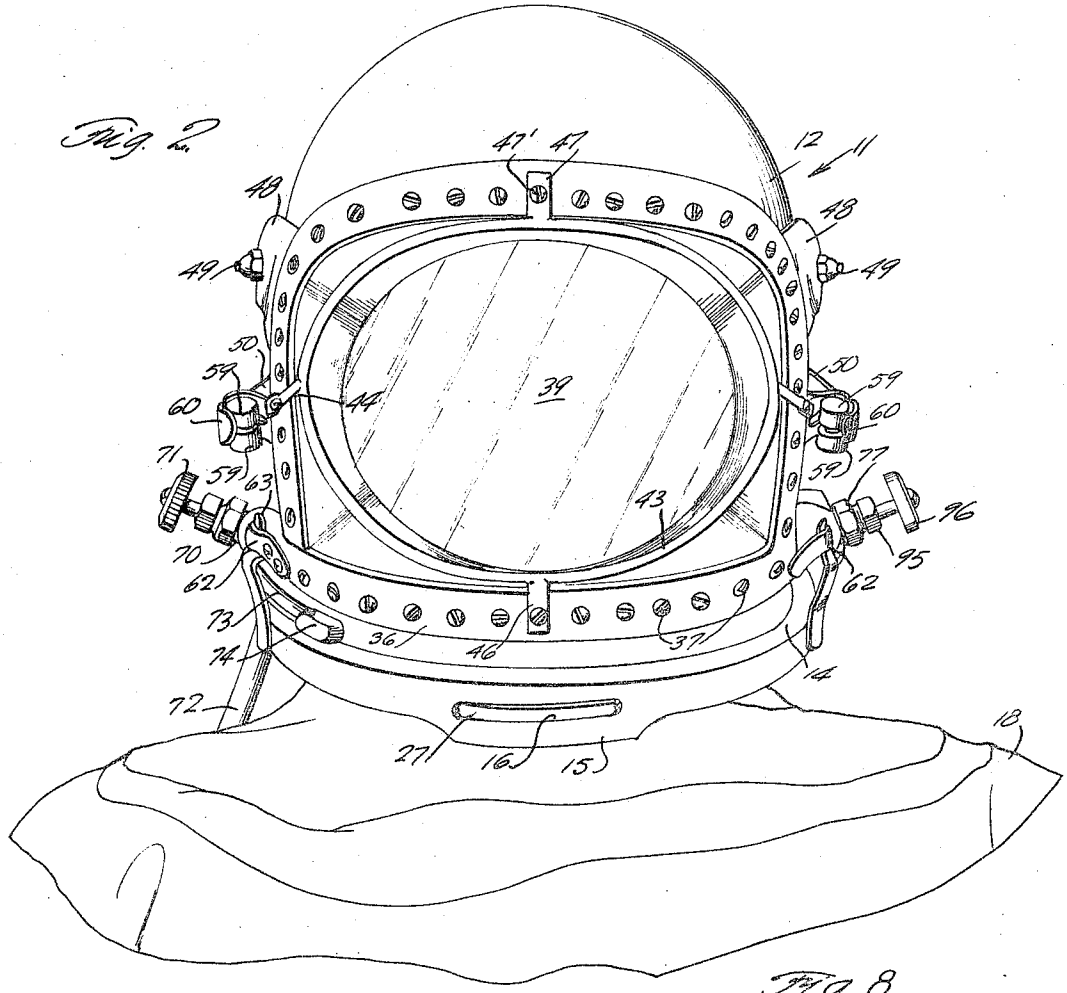


Fig. 8.

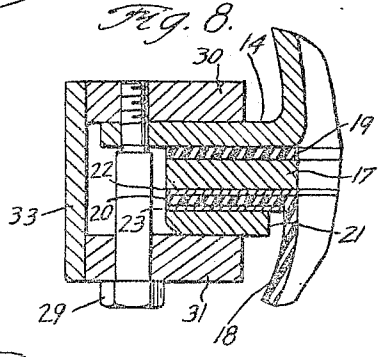
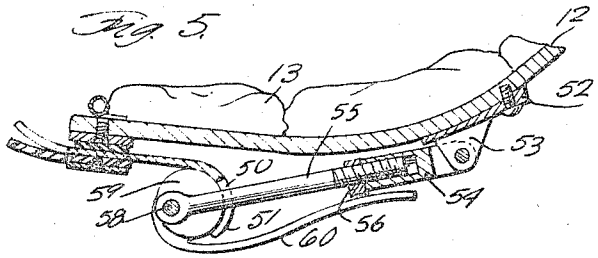


Fig. 5.



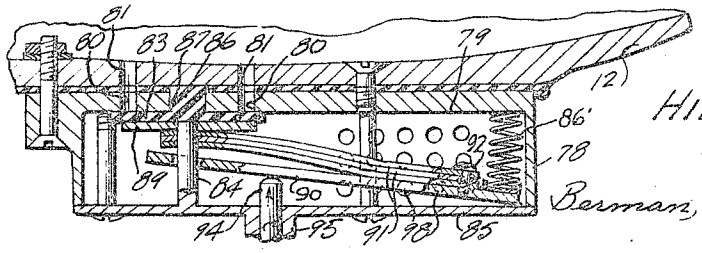


Fig. 6.

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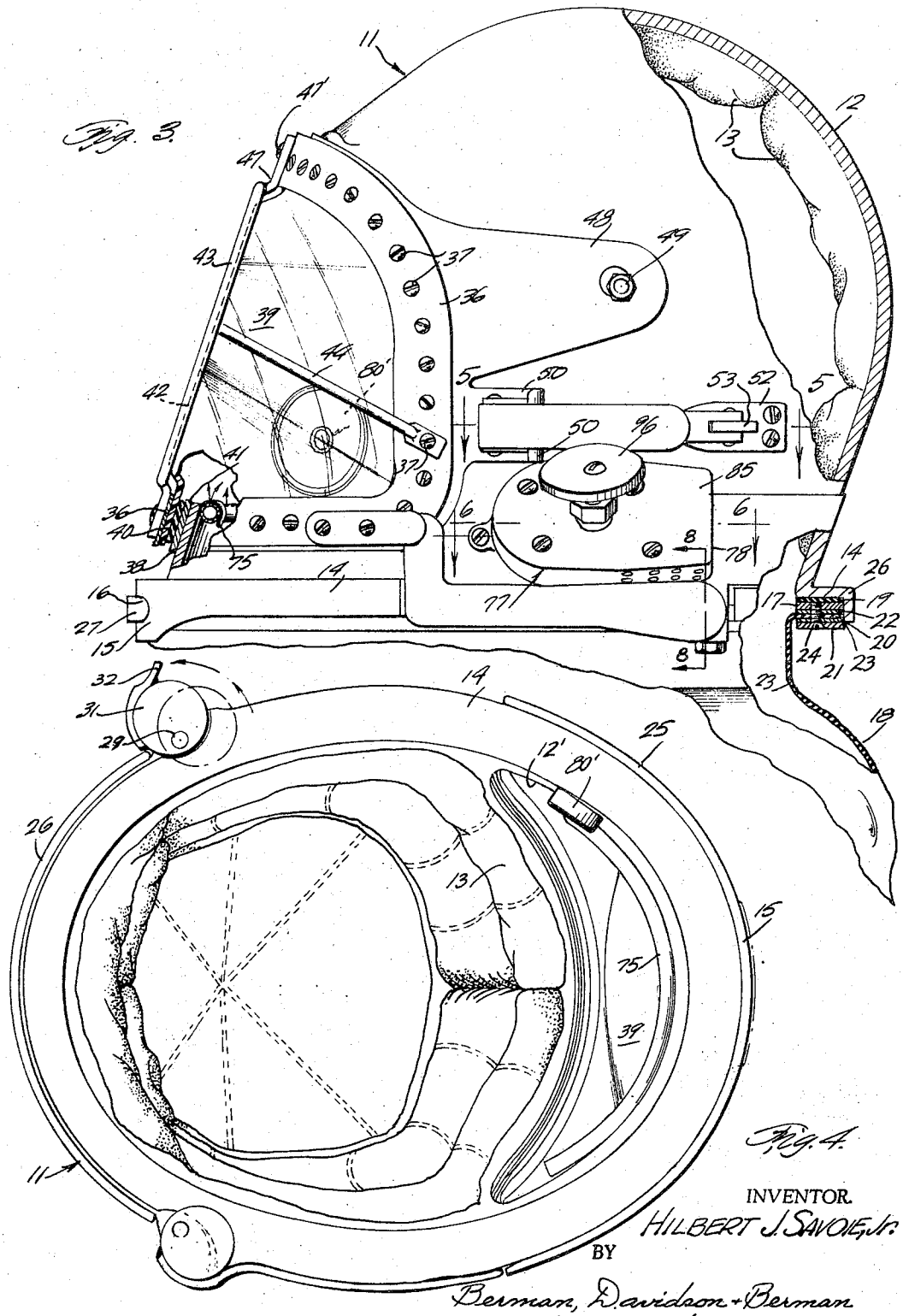


Fig. 4.

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DIVING HELMET

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14 Claims. (Cl. 128—142.3)

ABSTRACT OF THE DISCLOSURE

A diver's helmet formed of transparent plastic material and comprising a rigid main spheroidal body adapted to fit over a diver's head provided with a circumferential bottom flange. The bottom flange is formed with a depending front skirt portion having a locking slot for receiving a projecting tongue of a top ring assembly of the diver's suit. The flange is also provided with a pair of locking clamps vertically pivoted to opposite sides of the flange, each having spaced parallel top and bottom locking arms, the top arm engaging the top surface of the flange, and the bottom arm being engageable beneath the bottom surface of the top ring assembly of the diver's suit upon turning to a locking position. Each locking clamp is provided with an operating arm extending forwardly along the flange when moved to locking position. The helmet body is provided with a large visor aperture and a pivoted visor which may be turned to seal the helmet aperture, there being cooperating means on the visor and the locking clamps to hold the clamps in locking position when the visor is secured in its lowered sealing position. A normally closed, pressure-responsive exhaust valve means is mounted in the helmet body communicating with the interior, said means including a pre-settable resiliently biased member to open at a selected air pressure within the helmet and means accessible from outside the helmet for adjusting the tension of said biasing means.

This invention relates to diver's equipment, and more particularly to a diver's helmet of the type provided with a pivoted visor.

The main object of the invention is to provide a novel and improved diving helmet which is relatively simple in construction, which is light in weight, which is very compact in size, and which allows substantially unlimited visibility to the diver using same.

A further object of the invention is to provide an improved diver's helmet which is relatively inexpensive to fabricate, which is durable in construction, and which is provided with a transparent shield or visor which may be swung upwardly to allow the diver to open the helmet to receive instructions, breathe surface air, to smoke, to eat or drink, and to perform any other necessary purpose requiring exposure when the diver is at the surface, whereby these functions can be perfomed without requiring the helmet to be removed from the diver's suit.

A still further object of the invention is to provide an improved diver's helmet which can be rapidly put on or taken off, which includes improved valve means for air intake and for exhaust, which is protected against leakage, and which is provided with improved latching means for locking the pivoted visor portion thereof in closed position.

A still further object of the invention is to provide an improved diver's helmet which is comfortable to wear, which includes adjustable intake and exhaust valve means located so as to be readily accessible by the user for adjustment, which provides substantially unlimited visibility to the diver without appreciable optical distortion, and which provides substantially more safety in use than previously known diving helmets.

Further objects and advantages of the invention will

become apparent from the following description and claims, and from the accompanying drawings, wherein:

FIGURE 1 is a perspective view of an improved diver's helmet constructed in accordance with the present invention.

FIGURE 2 is a front elevational view of the diver's helmet shown mounted on a rubber diver's suit.

FIGURE 3 is a fragmentary side elevational view, partly in vertical cross section, of the diver's helmet of FIGURES 1 and 2.

FIGURE 4 is a bottom view of the diver's helmet shown in FIGURES 1 to 3.

FIGURE 5 is an enlarged horizontal cross sectional view taken substantially on the line 5—5 of FIGURE 3.

FIGURE 6 is an enlarged fragmentary cross sectional view taken longitudinally through the exhaust valve of the diver's helmet sustantially on the line 6—6 of FIGURE 3.

FIGURE 7 is an enlarged fragmentary perspective view showing one of the bottom latch assemblies employed for locking the bottom rim of the diver's helmet of FIGURES 1 to 6 to the top rim flange of an associated rubber diver's suit.

FIGURE 8 is a cross sectional view taken on line 8—8 of FIGURE 3.

Referring to the drawings, 11 generally designates an improved diver's helmet constructed in accordance with the present invention. The helmet 11 comprises a main helmet body 12 of suitable strong, light, rigid material, such as molded Fiberglas or other suitable rigid material, the inside surface of said main body 12 being provided with suitable padding 13. The helmet body 12 is provided with a forward aperture 12' covered by a pivoted visor to be described, and an integral, outwardly projecting bottom rim flange 14 having an enlarged front portion 15 formed with a horizontal locking slot 16. The flange 14 is adapted to be sealingly secured on the top rim flange 17 associated with a rubber diver's suit 18, a rubber sealing gasket 19 being interposed between the helmet flange 14 and the top rim flange 17 of the suit, as shown in FIGURE 3. As is further shown in FIGURE 3, the top marginal portion 20 of the diver's suit 18 is sealingly secured between the flange rim 17 and a clamping ring 21 located thereunder, suitable sealing gaskets 22 and 23 being provided between the opposite surfaces of the margin 20 of the rubber suit and the rigid ring elements 17 and 21, and the various elements being secured together by means of a plurality of fastening screws 24 engaged upwardly through ring 21, through gasket 23, through the suit margin 20, through gasket 22 and threadedly engaged in the flange rim 17.

The base flange 14 of the helmet body 12 is provided with the front and rear depending skirt portions 25 and 26 adapted to engage over the front and rear marginal portions of the flange rim 17, the enlarged portion of the skirt member 25 comprising the slotted member 15 containing the locking slot 16. The forward portion of the rim 17 is formed with the upstanding forwardly projecting horizontal locking rib or tongue 27 which is engageable in the slot 16, as is clearly shown in FIGURES 2 and 3.

Vertically pivoted to opposite side portions of the flange 14 are a pair of locking clamps each comprising a pivot bolt 29 to which is rigidly secured vertically spaced parallel locking discs 30 and 31, said discs being eccentrically mounted on the pivot bolt 29, as shown in FIGURE 7, and being provided with an actuating lever 32 rigidly secured thereto and being receivable against the the edge of flange 14 when the top and bottom members, or arms, 30 and 31 are in locking position. The disc members 31 are engageable beneath the ring 21 to clampingly

secure flange 14 onto the top rim 17, with the gasket 19 interposed therebetween, and with the locking rib 27 engaged through the slot 16. When the levers 32 are swung outwardly, the bottom locking members 31 will disengage from the ring 21, for example, as shown at the upper portion of FIGURE 4.

It will be noted that when the levers 32 are in their inward, or locking positions, they engage against edge portions of flange 14 with the upper disc member 30 of each pair of locking discs overlying flange 14 and the lower disc 31 thereof underlying ring 21. When the levers 32 are swung outwardly sufficiently to bring their rear ends, shown at 33, substantially into abutting engagement with the adjacent edge of flange 14, the major portions of the associated pairs of disc members 30 and 31 will be swung outwardly sufficiently to allow disengagement of the ring 21, the ring 21, the rim 17 and adjacent elements being arcuately notched out, as shown at 34, to facilitate such disengagement.

Designated generally at 35 is a visor having a rigid marginal frame 36 conforming in peripheral shape to said helmet aperture 12' and formed of "Plexiglas" or similar transparent material, the transparent "Plexiglas" main body of the visor being fastened to the rigid frame 36, which may be of metal, by means of a plurality of fastening screws 37. The visor 35 includes a metal inner frame 38, the margin of the Plexiglas transparent visor body 39 being sealingly secured between the metal frame 36 and the metal inner frame 38 by means of the relatively closely spaced fastening screws 37, a rubber gasket 40 being interposed between the margin of the transparent body 39 and the inner frame 38. The inner frame member 38 is provided with an inner lining gasket 41 of rubber, or similar sealing material, engageable with the helmet body 12 to seal the visor relative thereto when the visor is in closed position, the sealing gasket 41 extending around the transparent window member 39 and being arranged to make continuous sealing contact around the window aperture provided in the helmet body 12.

The transparent window member 39 is provided at its forward portion with a large, centrally located substantially flat viewing portion 42, the remaining portion of the window member 39 tapering toward the generally circular flat front viewing portion 42. A generally circular rigid wire guard frame 43 is mounted forwardly adjacent and substantially circumscribing the flat viewing portion 42, said guard frame 43 being provided with respective supporting arms 44, 44 at its opposite sides which are rigidly connected to the visor frame member 36 by a pair of fastening bolts 37, as is clearly shown in FIGURES 1 and 3. The guard frame 43 is further provided with a depending central supporting lug 46 which overlies the lower central portion of the frame member 36 and is secured thereto by a suitable fastening screw 37'. A central top lug 47 may likewise be provided on the ring 43 which may be secured to the top central portion of the frame member 36, as by a suitable fastening screw 47'.

The inner frame portion 38 of the visor is provided with a pair of rearwardly extending pivot lugs 48, 48 which are pivotally secured to the respective sides of the helmet body 12 by pivot bolts 49, 49. Below the lugs 48 the inner frame member 38 is formed with respective outwardly curved pairs of vertically spaced parallel claws 50, 50, each pair of claws being forwardly concave and the respective claws of each pair being spaced apart by an open-ended slot 51. Secured to the rear portions of the respective opposite sides of the helmet body 12 are brackets 52 formed with outwardly projecting pivot lugs 53 to which are pivotally connected respective hinge elements 54 in which are threadedly secured respective fastener rods 55, the rods being locked in adjusted positions in the hinge elements 54 by a lock nut 56, as shown in FIGURE 5. Eccentrically pivoted at 58 to the outer end of each rod 55 are respective pairs of vertically spaced locking discs 59, 59, the discs 59 being respectively secured rigidly to the upper and lower portions of the vertical shaft elements 58, namely, above and below the associated rod 55, the rod 55 being engageable in the associated slot 51 between a pair of claws 50, 50 when the disc elements 59, 59 are received in said claws in the manner illustrated in FIGURE 5.

A rearwardly extending operating lever 60 is rigidly connected to each pair of locking disc members 59, 59, the lever 60 being disposed substantially adjacent and parallel to the rods 55 when the rods are in locking tension, as shown in FIGURE 5, namely, when the pivot shaft elements 58 are at maximum distance from the locking claws 50, the pivot shafts 58 being movable toward said locking claws responsive to the outward rotation of the arm 60, whereby to reduce the tension in the rods 55 and to allow the disc members 59, 59 to be disengaged from their associated locking claws 50, 50. Thus, when it is desired to release the visor 35 so that it may be swung upwardly, for example, to the dotted view position thereof shown in FIGURE 1, the levers 60 may be swung outwardly as above described, releasing the tension on the locking rods 55 and allowing the disc members 59, 59 to be disengaged from the respective pairs of claws 50, 50. The visor is then free to be swung upwardly, whereby the diver may have access to fresh air when at the surface for breathing, so as to conserve oxygen, or for receiving instructions, smoking, eating or drinking, or other purposes.

Secured on the respective lower corner portions of the visor frame are offset locking lugs 62, 62 which are engageable over upstanding locking arm portions 63, 63 provided on the ends of the helmet clamping arms 32 when said arms are in proper clamping positions, as shown in FIGURE 1, to thereby insure that the levers 32 cannot be swung outwardly when the visor 35 is locked in closed position.

Mounted on the lower portion of the helmet body 12 at one side thereof and adjacent the base flange 14 is a conventional air supply valve 70 provided with a manually operated control knob 71 for regulating supply of air from an air supply conduit 72. The outlet conduit 73 leading from the valve 70 extends sealingly through the helmet wall member 12 at 74 and is connected to an apertured air distributing conduit 75 provided in the forward portion of the helmet adjacent the lower margin of the window opening therein.

Mounted on the opposite side of the helmet body 12 is a manually controlled exhaust valve 77 comprising an apertured housing 78 which is sealingly secured to the helmet body 12 and whose inner wall 79 is provided with circularly arranged apertures 80 registering with similarly arranged apertures 81 in the helmet body 12. A circular flexible rubber valve disc 83 overlies the apertures 80, being supported on a dowel pin 84 integrally formed in the outer cover plate 85 of housnig 78, the rubber disc 83 being secured on the end of the pin 84 and being provided with a central stud 86 which snugly fits into an aperture 87 provided in the housing wall 79. A rigid washer 89 is slidably engaged on the dowel 84, being urged against the disc 83 by spring force provided by a biasing assembly consisting of a plate-like arm 90 to which are secured a plurality of bowed leaf springs 91, the springs being secured to the end of arm 90 at 92 and the opposite ends of the springs and the arm 90 being apertured to receive the dowl pin 84 and to engage against the valve control disc 89. The bowed portion of the assembly of leaf springs 91 engages against the rigid washer 89, and the floating rigid plate member 90 is engaged by the inner end of a valve adjusting shaft 94 which is threadedly mounted in a suitable supporting sleeve assembly 95 provided on the housing outer wall 85. A coiled spring 86' is provided between the housing wall 79 and the end portion of arm 90 adjacent the member 92 fastening the leaf springs to the arm, said

coiled spring acting to bias the end portion of arm **90** into engagement with the cover plate **85**. Secured to the outer end of the shaft **94** is an adjusting knob **96** which may be actuated to vary the position of the inner end of the shaft **94** in a direction parallel to the dowel pin **84**, the shaft **94** being located intermediate the dowel pin **84** and the secured ends of the leaf springs **91**, as shown in FIGURE 6, so that the shaft **94** may be employed to prestress the leaf springs **91** and to establish a biasing force on the rubber valve disc **83** which may be overcome by a predetermined amount of air pressure inside the helmet, to allow axhaust therefrom. When this value of biasing force is overcome, the air escapes from the helmet and passes into the housing **78**, discharging outwardly from the apertures **98** thereof.

A suitable transmitter-receiver **80'** is mounted on a lower corner portion of the visor window **39**, the device **80'** being of conventional construction and being similar to those employed in intercommunication systems, serving both as microphone and receiver. The device **80'** is suitably connected by cable means, not shown, to a master station so as to provide communication between the diver and persons at said master station.

As will be readily understood, since the main body **12** of the helmet is of relatively light material, namely, Fiberglas composition, the helmet is relatively light in weight. Furthermore, since the helmet is adapted for use with a rubber diver's suit **18**, and since the suit is relatively flexible, the diver is easily able to turn his head, as desired, without any special effort. In view of the light weight of the helmet and its ease of maneuverability, the use of the helmet causes a minimum amount of fatigue and thereby enables the diver to work under water for a much longer period of time than when using the more cumbersome helmets of the prior art.

It will be understood that the pivot connections at **49** for the visor supporting frame **38** are water-tight, employing conventional sealing bushings to seal the pivot bolts relative to the rigid main helmet body **12**.

Although the diver's helmet has been illustrated in the drawings and has been described above as being used with a rubber diving suit, it will be understood that the helmet may also be employed effectively with a light funnel-shaped rubber sealing collar instead of with a full diving suit.

While a specific embodiment of an improved diver's helmet has been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. A diver's helmet comprising a rigid main helmet body adapted to fit over a diver's head, a circumferential bottom flange on said body having a depending front skirt portion having a locking slot formed therein for receiving a projecting locking tongue of a top ring assembly of a diver's suit, a pair of locking clamps vertically pivoted to the opposite sides of said flange each provided with respective, spaced parallel top and bottom locking arms, said top arm engaging the top surface of said flange and said bottom arm engageable beneath the bottom surface of the top ring assembly of a diver's suit upon turning to a locking position, each locking clamp being provided with an operating arm extending forwardly along the flange when moved to place said bottom arm in said locking position.

2. A driver's helmet comprising a rigid main helmet body adapted to fit over a diver's head, a circumferential bottom flange on said body having a depending front skirt portion, a pair of locking clamps pivoted to the opposite sides of said flange and each provided with respective spaced, parallel top and bottom locking arms, said top arm engaging the top surface of said flange and said bottom arm engageable beneath the bottom surface of the top ring assembly of a diver's suit, upon turning to a locking position, whereby to lock the helmet on the diver's suit, each locking clamp being provided with an operating arm extending forwardly along the flange when moved to place said bottom arm in said locking position, said main helmet body having a front visor aperture formed therein, a visor pivoted to the sides of said main body and having means sealingly engageable on the margin of said visor aperture, means to releasably secure said visor in sealing position on said margin of the visor aperture, and cooperating means on the visor and locking clamps holding the clamps in locking positions when the visor is secured in sealing position.

3. In combination, a diver's suit having a rigid top ring assembly including a projecting locking tongue and a diver's helmet, said helmet comprising a rigid main helmet body adapted to fit over a diver's head, a circumferential bottom flange on said body having a depending front skirt portion having a locking slot formed therein receiving said locking tongue a pair of locking clamps pivoted to the opposite sides of said flange and each provided with respective spaced parallel top and bottom locking arms, said top arm engaging the top surface of said flange and said bottom arm being engageable beneath the bottom surface of said top ring assembly when turned to a locking position, whereby to lock the helmet on the diver's suit, each locking clamp being provided with an operating arm extending forwardly along the flange when moved to place said bottom arm in said locking position, said main body having a front visor aperture formed therein, a visor pivoted to the sides of said main helmet body and being sealingly engageable on the margin of said visor aperture, said visor having a transparent viewing portion, means to releasably secure said visor in sealing position on said margin of the visor aperture, and cooperating means on the visor and locking clamps holding the clamps in locking positions when the visor is secured in sealing position.

4. A diver's helmet according to claim **2** wherein said cooperating means comprises upstanding retaining members on the forward ends of the operating arms, and respective holding members on the visor engageable over the upstanding retaining members when the visor is in sealing position, whereby to hold the locking clamps in locking positions.

5. A diver's helmet according to claim **2** further comprising air admission valve means mounted on one side of the helmet body, an air supply conduit connected to the outlet of said valve means and extending through said main body and into the interior thereof, normally closed pressure-responsive exhaust valve means mounted on the opposite side of the helmet body and communicating with the interior thereof, and means to allow said exhaust valve means to open at a predetermined air pressure in said helmet body.

6. A diver's helmet according to claim **5** wherein said exhaust valve means comprises an apertured exhaust valve housing secured to the opposite side of said helmet body, said helmet body and housing having registering exhaust apertures formed therein, a sealing member mounted in said housing overlying said exhaust apertures, and spring means holding said sealing member in sealing position and being yieldable to allow said sealing member to uncover said exhaust apertures responsive to a predetermined internal air pressure in said helmet body.

7. A diver's helmet according to claim **6** wherein said exhaust valve means further comprises means to adjustably pre-stress said spring means.

8. A diver's helmet according to claim **2** wherein said means to releasably secure said visor in sealing position comprises respective forwardly concave locking claws on the side margins of the visor, respective locking rods vertically pivoted to the rear side portions of the helmet main body, respective circular blocks eccentrically ver-

tically pivoted to the free ends of the locking rods and being receivable in said locking claws, and actuating arms secured to said circular blocks and extending substantially parallel adjacent to said locking rods when the circular blocks are rotated to positions placing the locking rods under substantially maximum tension.

9. A diver's helmet according to claim 8 wherein each of said claws includes a horizontal open-ended slot formed therein, said locking rods being receivable in said slots, said circular blocks being parallel eccentric discs above and below the rods receivable in the top and bottom portions of the associated locking claws.

10. A diver's helmet according to claim 2 wherein an upstanding retaining member is provided on the forward end of each operating arm, and respective holding members are provided on said visor engageable over the upstanding retaining members when the visor is in sealing position, whereby to hold the locking clamps in locking positions.

11. A diver's helmet according to claim 10, wherein is further provided air admission valve means mounted on one side of the helmet body, an air supply conduit connected to the outlet of said valve means and extending through said main body and into the interior thereof, an apertured exhaust valve housing secured to the opposite side of said helmet body, said helmet body and housing having registering exhaust apertures formed therein, a sealing member mounted in said housing overlying said exhaust apertures, spring means holding said sealing member in sealing position and being yieldable to allow said sealing member to uncover said exhaust apertures responsive to a predetermined internal air pressure in said helmet body, and means to adjustably pre-stress said spring means.

12. A diver's helmet according to claim 1 wherein is further provided upstanding retaining members on the forward ends of the operating arms, and respective holding members on the main helmet body engageable over the upstanding retaining members to hold the locking clamps in locking positions.

13. A diver's helmet according to claim 1 wherein said top and bottom locking arms of each pair of locking clamps comprise horizontal discs having eccentrically fixed thereto to a vertical bolt forming the clamp pivot, said operating arms being respectively secured to the edges of the top and bottom discs of each clamp.

14. A diver's helmet according to claim 13 in combination with a diver's suit having a top ring assembly beneath which the said bottom discs of the clamps engage when the operating arms are moved to extend forwardly along the said flange, said top ring assembly having a pair of arcuate notches extending vertically therethrough which allows passage of said bottom discs and disengagement of the helmet from said diver's suit when the operating arms have been swung outwardly away from said flange.

References Cited

UNITED STATES PATENTS

1,209,223	12/1916	Stelzner	2—2.1
3,024,465	3/1962	Bould	2—2.1
3,030,626	4/1962	Shepard	2—2.1
3,127,616	4/1964	Schueller	2—6
3,149,632	9/1964	Colley	2—6 X
3,239,843	3/1966	Lobelle	2—6

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