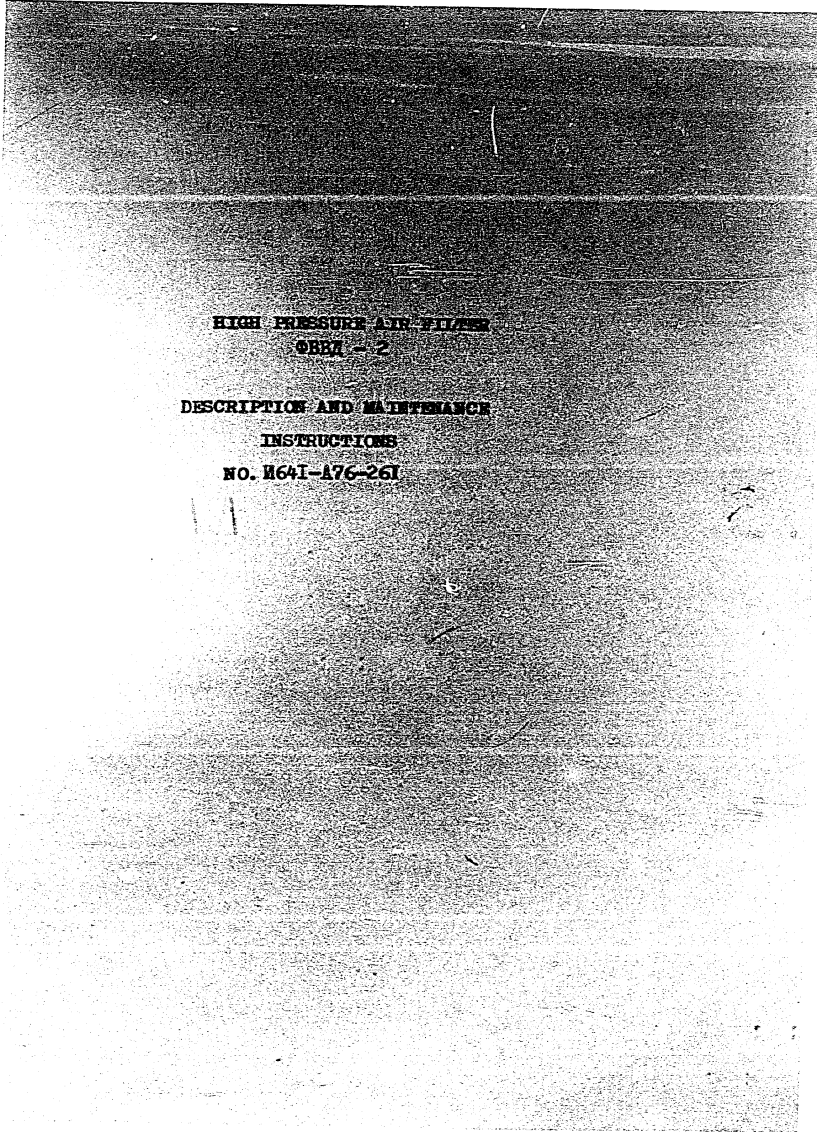


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HIGH PRESSURE AIR FILTER
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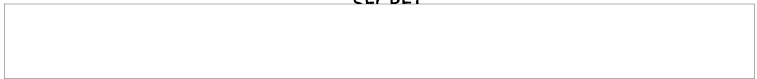
DESCRIPTION AND MAINTENANCE
INSTRUCTIONS
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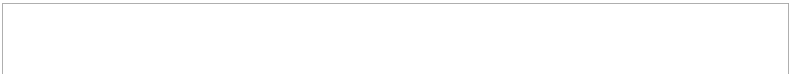
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I. DESCRIPTION

A. Purpose and Main Technical Data

Type Φ BRM-2 high pressure air filter is intended for cleaning high pressure air of oil, moisture and solid particles.

- 1. Index Φ BRM-2
- 2. Type vertical type, 15° inclination in direction of boss for blowing off can be tolerated.
- 3. Medium and pressure air at a pressure of 160 to 200 kgf/cm², and temperature, not in excess of 40°C.
- 4. Throughput at a pressure of 160 to 200 kgf/cm² not more than 2 lit./min
- 5. Protection effect, without re-charging, conditions of items 3 and 4 regarded max. 40 hrs. in operation
- 6. Permissible air pressure drop within the range of 160 to 200 kgf/cm² max. 15 kgf/cm²

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- all mist, 0.1 mg/lit.
- 8. Charge:
 - (a) absorbent cotton 40 g
 - (b) cardboard, special 7 layers
 - (c) silica gel 3 lit.(2.1 kg)
 - (d) activated carbon 3 lit.(1.5 kg)
 - (e) glass cloth 6 layers
 - (f) chamois leather 1 layer
- 9. Weight of charged filter appr.92 kg
- 10. Overall dimensions:
 - max.diameter 225 mm
 - height 945 mm

B. General Description

The high pressure air filter (see Fig.1) consists of housing (7), cartridge (8) and two covers: outside cover (1) and inside cover (2).

Installed between the covers is gasket (16) made of 5 mm dia. copper wire. Tightening the covers with bolts (34) and the inside air pressure will compress the gasket thereby ensuring gastightness of the filter.

The filtering cartridge is installed in the housing upon aluminium gasket (18); twenty-four screws secure the cartridge by its flange to the neck. This connection must be absolutely gastight, otherwise dirty air may pass past the filter.

Fitted in the bottom of the housing cylinder are three special welded pads (20) into which thrust screws (19) and stops (22) are screwed to secure the lower part of the filtering cartridge. To eliminate air leaks through the welded pads, the latter are provided with copper gaskets (21) compressed with special bushes (23) and nuts (24).

The impure air is supplied to the filter through union (25) welded to the filter housing bottom. Installed in the union are seven brass throttle plates (26),(27) with 1 mm dia. holes which are compressed by screw bush (28). The throttle plates limit the air supply to the filter to comply to the specified air consumption, thereby providing for proper opera-

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tion of the cartridge charge.

Drops of liquid entering the filter along with impure air are baffled by the cones of water separator (14) screwed into the bottom of the housing.

The air is cleared of solids and oil mist by passing through a layer of cotton (4) packed in a container welded to the screen, through cardboard (33) and glass cloth (32) held between two screens. The water vapour present in the air is trapped in a layer of silica gel (5); then the dehumidified air passes through a layer of carbon (9) for the oil vapour to be caught therein.

The second layer of silica gel (5) serves to entrap the remainder of water vapours.

The layers of silica gel and activated carbon are supported by screens (6).

After it has been cleaned of oil and water admixture, the air passes through a layer of cotton (4) and a pack consisting of one layer of glass cloth (31), five layers of sandpaper (30) and one layer of chamois leather (29), which prevents the air from carrying away particles of the filter charge and other foreign matter.

Welded to the bottom of the housing is boss (15) to connect the blowing off pipe line.

To secure the filter to the foundation plate, two brackets (17) are welded to the cylindrical part of the housing by which the filter rests on four dampers of AKCC-25 type.

The upper part of the filter housing is protected from dust by a film of vinyl plastic, 0.3 mm thick, fastened to the housing and pipe line with wire.

C. Description of Main Units

(a) Filter housing

The filter housing (see Fig.2) is of three-piece welded construction. It consists of neck (1), cylindrical container (2) and bottom (4).

The stainless steel neck is threaded to receive the outside cover and has twenty-four tapped holes for the screws securing the filtering cartridge. The rest of the housing parts are

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of carbon steel.

Two brackets (2) and three special welded pads (7) are welded to the cylindrical part of the housing.

The bottom is provided with a threaded socket to receive the water separator, welded underneath are union (5) to supply air and boss (6).

The housing is zinc-plated inside (up to the neck), and painted outside.

(b) Filter cover

The filter cover (Fig.3) consists of outer cover (3) and inner cover (1).

The outer cover is made of carbon steel; its outer cylindrical surface is threaded to be screwed into the housing neck. The cover has 8 through holes for bolts (4) threaded into the holes of the inner cover.

The stainless steel inner cover is provided with welded union (5) to connect the filtered air pipe line. Copper ring (2) packs the joint between the covers and the housing wall.

(c) Cartridge

(see Figs.4,5 and 6)

Cartridge body (13) is a stainless steel cylinder. Flange (7) also made of stainless steel, is welded to the upper part of the cylinder. The flange has a recess to mount cartridge cover (1) wherein a pack consisting of a layer of glass cloth (5), five layers of cardboard (4) and a layer of chamois leather (3) is placed between two screens (2) and held tight in place by pressing ring (28).

The cover is fastened to the cartridge by screws (6). Welded to the upper part of the cylinder is stainless steel screen (9) separating the cotton from the filtering charge. A brass gauze (27) is laid underneath to protect the screen from being choked with silica gel grains.

Twin brass screens (26), made of 3 mm brass, are installed between the layers of the filtering charge (silica gel and activated carbon) and secured with screws (25). A layer of glass cloth (11) is placed between the screens to prevent

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the screen meshes from being choked with charge particles, brass gauzes (29) are provided next to the charge. The gauzes are soldered to the screens.

The lower separating screen consists of two screens (22,23) between which two layers of cardboard (15), one layer of glass cloth (14) and rubber gasket (16), 2 mm thick, are fitted. The diameter of the gasket is 3 to 4 mm larger than the diameter of the screens.

When the screens are placed in position, the protruding edges of the gasket bend to form a collar which prevents the air from passing along the cartridge walls past the bottom.

The cotton is packed into a casing welded to the lower screen. The casing also serves as guide for spring (17). The pre-compressed spring maintains compact packing of the cotton.

Placed on the spring is screen (18) which prevents the cotton from falling out of the casing and transmits the thrust of the screws when compressing the spring. To facilitate removal of the screens from the cartridge, they are provided with special eyes (30).

The lower part of the cartridge cylinder is threaded on inside and outside. Thrust ring (19) with screws (20) for compressing the spring is screwed in. And a plug (21) is used during transportation of a charged cartridge in order to

During storage and transportation the filter cartridge should be kept in a closed case, with a plug removed from the threaded hole of the cartridge cover. Then the cartridge is installed in the filter, the plug should be unscrewed and stored in the S.T.A. box.

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II. MAINTENANCE INSTRUCTIONS

A. Performance Requirements

1. The air coming from the high pressure air main to be cleaned in the filter, type Φ BBJ-2, should first pass through the water-and-oil separator, and after the filter, through the pressure regulating valve.

The valve maintains the pressure in the filter (160 to 200 kgf/cm²) and air flow through the filtering elements within the limits specified which ensures thorough purification of the compressed air. Schematic connections of the filter to the system are shown in Fig.7.

2. The filter should be installed vertically. It can be inclined up to 15° only in the direction of the hole for connecting the blowing off pipe line.

3. The air is supplied to the filter from underneath.

4. The number of operating hours of the filter should be registered accurately and in due time in the Φ BBJ-2 Filter Service List.

5. The cartridge fitted in the filter installed on board ship must be replaced after a total of 40 hours of operation or 90 days after it is placed in the filter.

B. Starting and Maintenance during Operation

To supply filtered air to the consumers, proceed as follows (see Fig.7):

1. Check to see that valves (1),(6) and (7) are closed.
2. Slightly open valve (1) and slowly raise the air pressure in the filter up to 20 kgf/cm².
3. Open filter blow-off valve (7) and blow off the filter for 5 to 10 seconds, after which close valve (7).
4. Further rise in pressure, up to 160 kgf/cm², should also be reached slowly; see that the difference of pressure against pressure gauge (2) mounted before the filter and pressure gauge (4) mounted after the filter does not exceed 15 kgf/cm².

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1	2	3	4
		(d) Cover bolts are not tightened properly	(d) tighten the bolts evenly
2	Air leaks through union connections	(a) Improper tightening of blind nut; (b) the gasket does not provide for proper tightness.	(a) Tighten the nut; (b) replace the gasket
	Air does not pass through the filter	Throttle plates fouled	Disconnect the union connection, remove and clean the throttle plates
	Air leaks through welded joints of the housing	(a) Slack tightening of nuts; (b) gaskets do not provide for proper tightness.	(a) Tighten the nuts; (b) replace the gaskets

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D. Transportation, Storage and Re-charging
of Cartridge

The charged cartridge is stored in a special airtight case in a dry room.

During transportation the case with cartridge is packed in a box with rubber dampers.

The case with cartridge should be protected against sharp impacts which may lead to dents, notches, etc. on its cylindrical surface, which may reduce the tightness of the case, and the charge will lose its efficiency through absorbing moisture.

On board the ship spare cartridges packed in cases are stored in or without boxes. In the latter case the cases are secured to four spring dampers of AKHO-4 type.

It is strictly forbidden to employ cartridges whose cases have been broken off, cartridges whose cases are not airtight and/or bear traces of impacts.

E. Instruments

These include pressure gauges MTK 1005x+00/200 of accuracy 1.5.

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INSTRUCTIONS FOR DISMANTLING AND
RE-ASSEMBLING

A. Dismantling

Make sure that there is no pressure in the system. In the presence of pressure bleed the excess air through the blow-off valve.

To dismantle the filter, proceed as follows:

1. Remove the vinyl plastic film from the filter neck, blow the cover with compressed air and loosen the nut of the cover union connection.
2. Slacken the cover bolts.
3. Unscrew the outside and inside covers with round copper gasket as an entire assembly from the filter housing.
4. Screw out the twenty-four screws from the cartridge flange.
5. Unscrew the three nuts from the welded pads, remove the special bushes and gaskets.
6. By applying a special screw-driver available in the S.T.A. box unscrew the lock screws.
7. Give the thrust screws three turns back.
8. Screw the plug into the cartridge cover (the plug is available in the S.T.A. box).
9. Remove the cartridge from the filter housing and take off the aluminium gasket.

B. Re-assembly

(see Fig.1)

Prior to installing the cartridge in the filter, proceed as follows:

1. Examine the case by visual inspection for the presence of the seal and absence of damage which may have affected the air-tightness of the case.
2. Install a special gasket in the filter housing recess.
3. Open the case, unscrew the cover from the lower part.

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4. Install the cartridge in the filter, install the four screws and tighten them uniformly.
5. Lightly press the cartridge with thrust screws.
6. Screw lock screws (22) home.
7. Install gaskets (21) and special bushes (23) in the filter housing, install the gaskets in the filter housing and tighten nuts (24).

To check on the tightness of the cartridge-to-filter connection, proceed as follows:

- (a) Dismantle the filter cover. Replace copper gasket by a rubber one. Re-assemble the cover, screw in the filter and tighten the bolts. Install the special union nut with the gasket and rubber tube on the union.

NOTE: The round rubber gasket, special union nut and rubber tube can be found in the S.T.A. box.

- (b) Supply air at a pressure of 10 kgf/cm² to the union of the filter housing and check the tightness of the cartridge flange-to-housing-and-plug cover by placing the end of the rubber tube in a glass of water 5 mm deep for at least 5 min. If air bubbles testify to inadequate tightness of the connection. In this case the cover should be removed and the cartridge flange and cover, also the threaded plug (or gaskets replaced) till absolute gastightness is reached, and air bubbles disappear.

When obtaining absolute gastightness, proceed as follows:

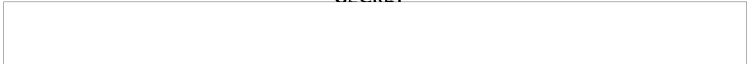
- (c) Remove the cover and dismantle it.
- Replace the rubber gasket by an annealed copper gasket.
- Re-assemble the cover and wipe the upper union nut.
- (d) Remove the plug with the gasket from cartridge flange and place it in the S.T.A. box.
- (e) Check to see that the neck cavity and the lower part of the cover are clean; screw the cover with the gasket in place and tighten the bolts uniformly.
- (f) Cover the upper part of the filter housing with plastic film; secure the film to the housing and pipe with wire.

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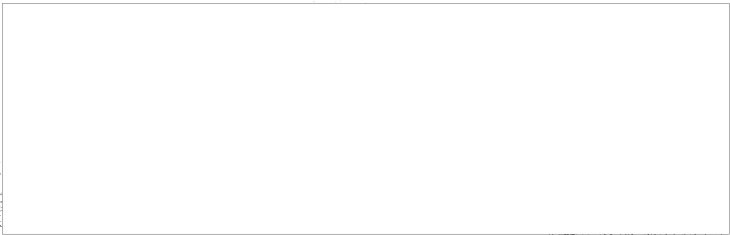
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NOTE (to subsections A and B of Section III):

In dismantling or re-assembling the filter every precaution should be taken to protect the filter and cartridge surfaces against dirt, moisture and oil.

The filter covers should be immediately placed in position after dismantling and installation of the cartridge in the housing. The tools employed for dismantling and re-assembling and the filter parts to be installed (covers, gaskets, bolts and screws) should be degreased, for which purpose their surfaces should be wiped with clean cotton gauze soaked in dichloroethane or carbon tetrachloride.

It is strictly forbidden to wipe the filter parts with waste. The hands and coveralls of the servicing personnel should also be clean.



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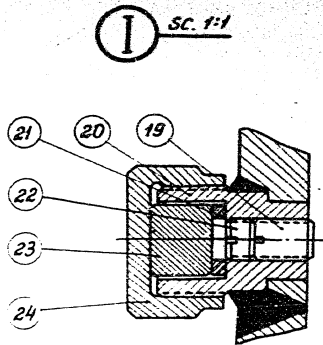
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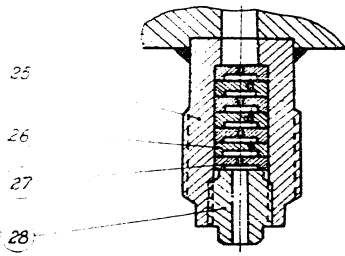
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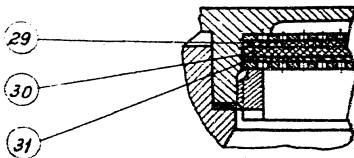
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SECTION THROUGH-A-A
SC. 1:1



II SC. 1:1



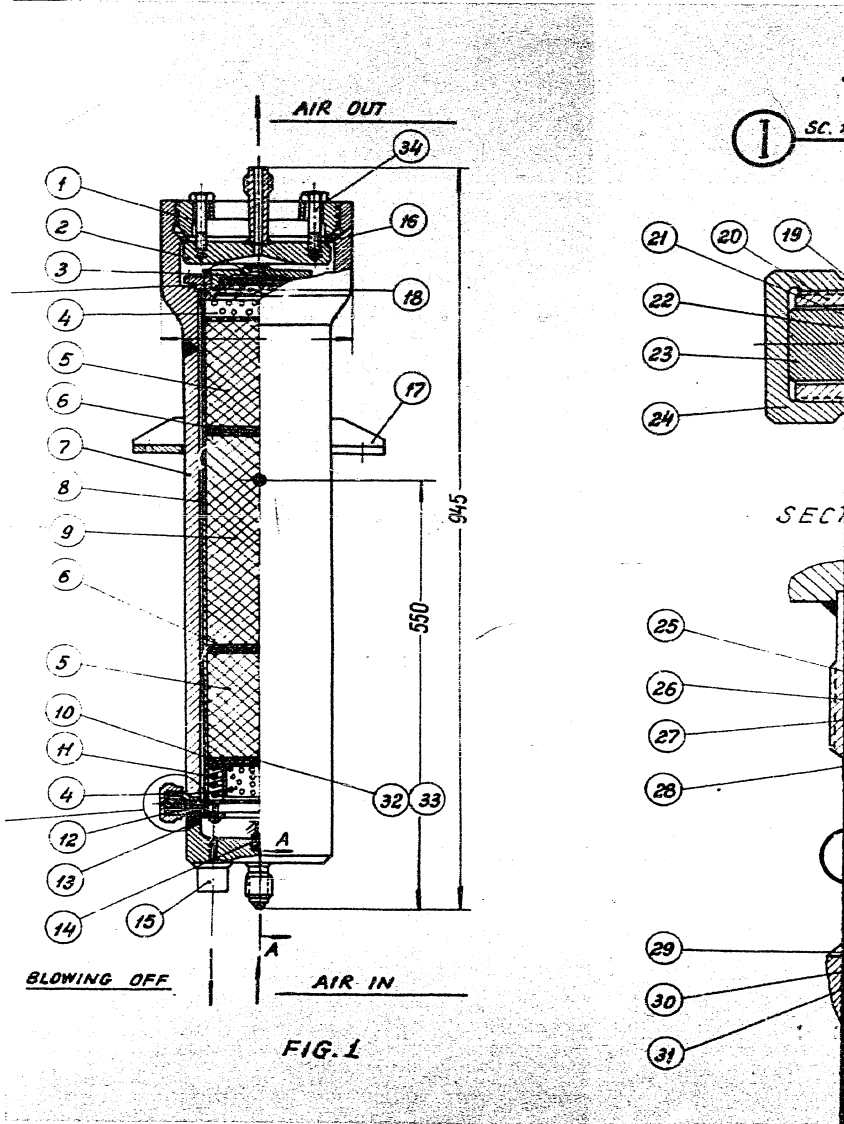
34	BOLT
33	CARDBOARD
32	GLASS CLOTH
31	GLASS CLOTH
30	CARDBOARD
29	CHAMOIS LEATHER
28	SCREW BUSH
27	THROTTLE PLATE
26	THROTTLE PLATE
25	UNION
24	BLIND NUT
23	BUSH
22	STOP
21	GASKET
20	WELDED PAD
19	THRUST SCREWS
18	GASKET
17	BRACKET
16	GASKET
15	BOSS
14	WATER SEPARATOR
13	RING
12	SCREEN
11	SPRING
10	SCREEN WITH CASING
9	ACTIVATED CARBON
8	CARTRIDGE
7	HOUSING
6	SEPARATING SCREEN
5	SILICA GEL
4	ABSORBENT COTTON
3	CARTRIDGE COVER
2	INSIDE COVER
1	OUTSIDE COVER
ITEM NO.	NAME

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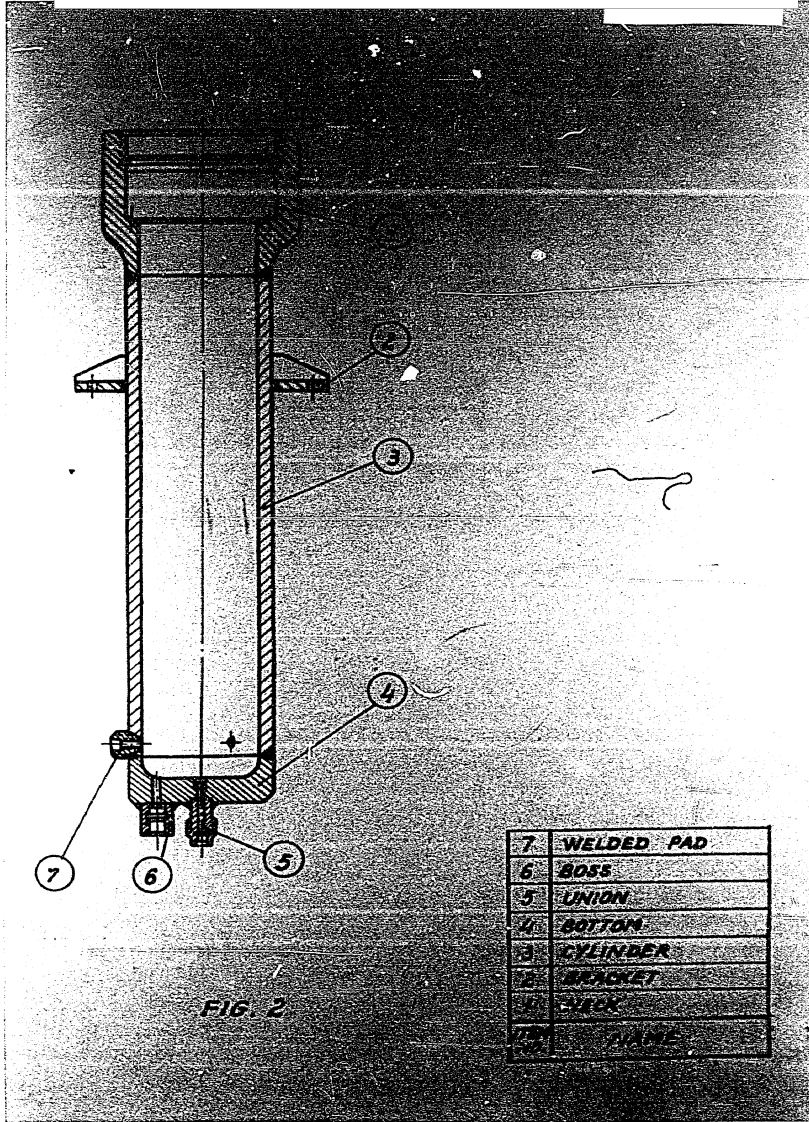


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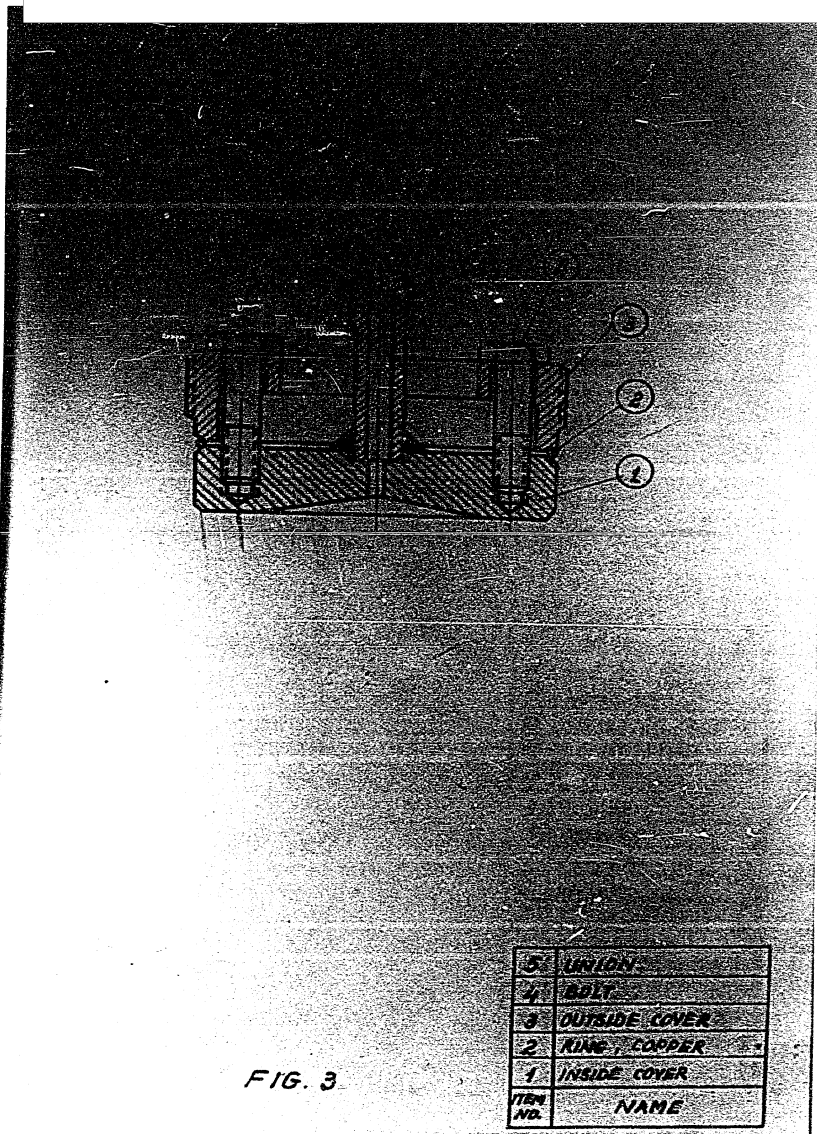


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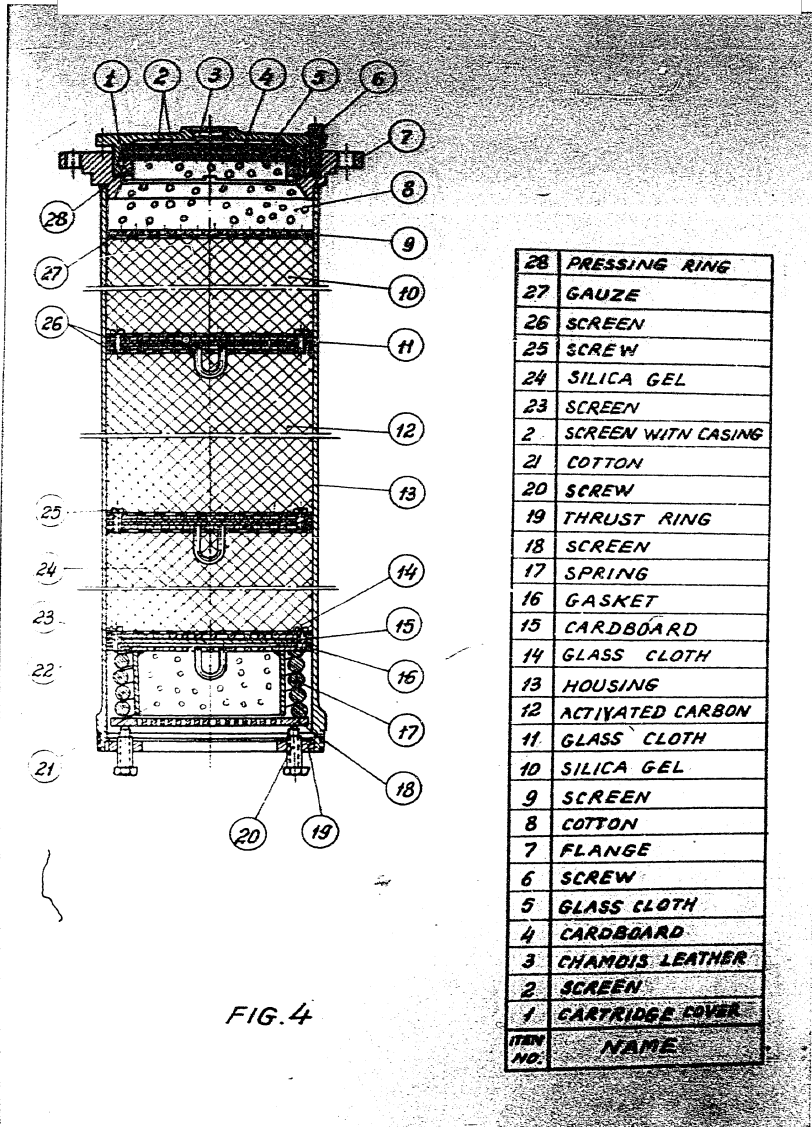


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28	PRESSING RING
27	GAUZE
26	SCREEN
25	SCREW
24	SILICA GEL
23	SCREEN
2	SCREEN WITH CASING
21	COTTON
20	SCREW
19	THRUST RING
18	SCREEN
17	SPRING
16	GASKET
15	CARDBOARD
14	GLASS CLOTH
13	HOUSING
12	ACTIVATED CARBON
11	GLASS CLOTH
10	SILICA GEL
9	SCREEN
8	COTTON
7	FLANGE
6	SCREW
5	GLASS CLOTH
4	CARDBOARD
3	CHAMOIS LEATHER
2	SCREEN
1	CARTRIDGE COVER
ITEM NO.	NAME

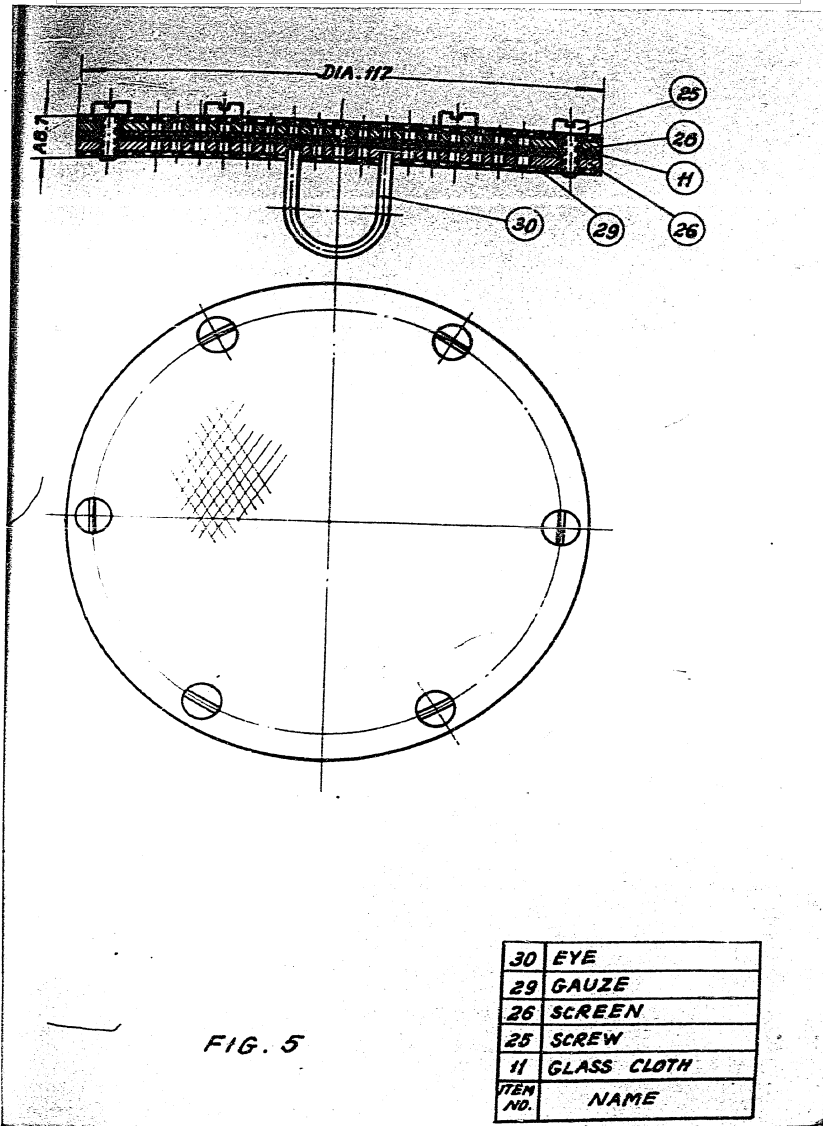
FIG. 4

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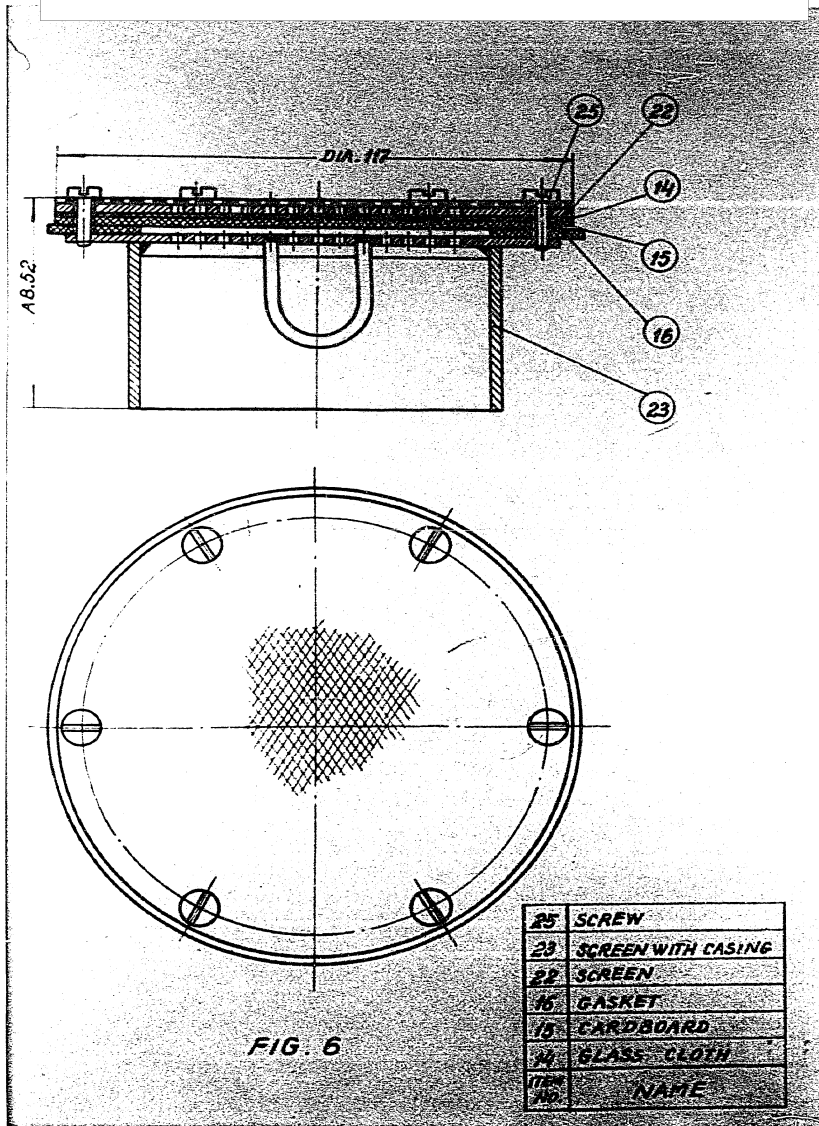


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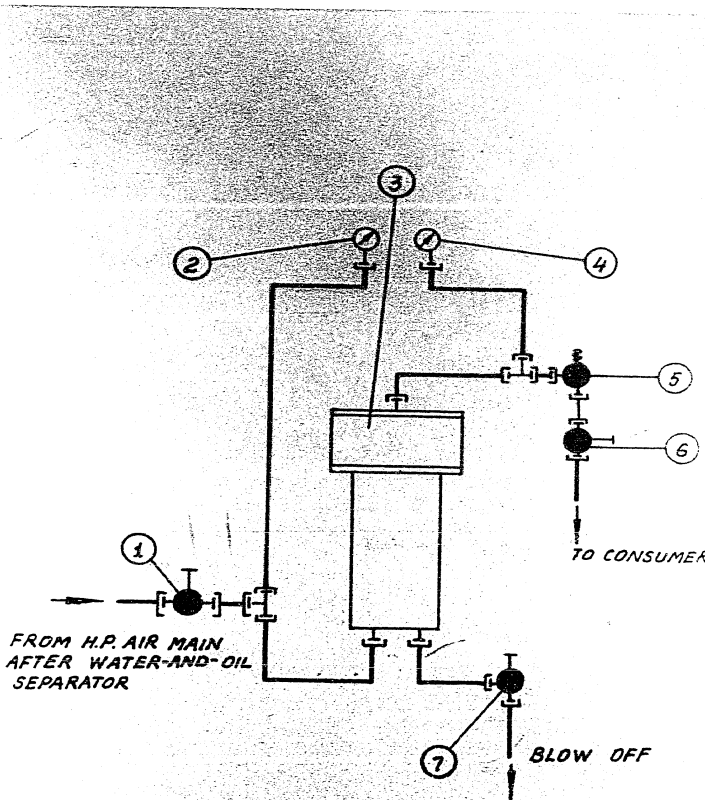


FIG. 7

7	ANGLE STOP VALVE
6	AIR SUPPLY VALVE
5	PRES. REGULATING VALVE
4	PRESSURE GAUGE
3	FILTER QDBBA-2
2	PRESSURE GAUGE
1	STRAIGHT-WAY STOP VALVE
ITEM NO.	NAME

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