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NAVY DEPARTMENT  
BUREAU OF ENGINEERING

Report on

Fire Extinguishers; Foam Fire Extinguishing  
Equipment for Naval Vessels; Test of  
Foam Generator.

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## CONCLUSIONS

(a) The venturi-type water jet eductor foam generator of the Bureau of Construction and Repair's design generates foam satisfactorily. While the foam does not appear to have the body of the chemical foam, it is more effective as a fire extinguisher for oil and gasoline fires than is water.

(b) The Naval Research Laboratory modification of the Bureau design, which does not require compressed air, likewise is a satisfactory foam generator.

(c) From British experimental work it is known that carbon dioxide has no advantage in foam characteristics over air.

## RECOMMENDATIONS

It is recommended:

(a) That the Bureau of Construction and Repair appraise the merits of venturi-type foam generators for fire extinction aboard Naval vessels. If the use of such generators appears feasible then

(b) that the development of these generators to function automatically with proper proportioning of the water-air-saponine be undertaken. This would require:

(c) that the study of the keeping qualities of saponine solution be undertaken and

(d) that the suitability of such systems be tested using sea-water.

## DESCRIPTION OF MATERIAL UNDER TEST

4. To test the principle of the suggested foam generator, the Bureau of Construction and Repair designed a modification of the Schutte-Koerting Bulletin 2-M-3, Figure 248-B, water jet eductor, the Bureau's design being shown in Plate 1 which is taken from the blueprint enclosure to reference (a). The eductor was connected as shown in Plate 2 for the test.

## METHOD OF TEST

5. The test consisted in modifying the proportions of air, fresh water and saponine solution until a foam of satisfactory consistency was produced and then using this foam to extinguish gasoline and oil fires. For comparison, a standard Phomene chemical **powder** foam extinguisher was used.

## RESULTS

6. The foam generated by the test device proved superior in extinguishing fires to water and somewhat inferior to the chemical foam. The action of the generator was satisfactory, though slightly more erratic than the chemical generator. In discussing this device with officers of the Bureau, the objection was raised that it requires a source of compressed air. It was pointed out that the compressed air system might fail at critical times and thus render the system inoperative. This suggested that a modification of the device might be made wherein the venturi principle was used to mix both the saponine solution and air from the atmosphere. Such a modification is illustratively diagrammed in Plate 3. To test this principle the Bureau device was modified as shown in Plate 4 and this modification was used in tests as above. It proved fully as efficient as the compressed air device. A supply of sea-water was not available to test the foam production of salt water. Laboratory tests indicate, however, that sea-water would function satisfactorily.

## CONCLUSIONS

7. The venturi-type water jet eductor foam generator of the Bureau of Construction and Repair's design generates foam satisfactorily. While the foam does not appear to have the body of the chemical foam, it is more effective as a fire extinguisher for oil and gasoline fires than is water.

8. The Naval Research Laboratory modification of the Bureau design, which does not require compressed air, is likewise a satisfactory foam generator.

9. From British experimental work it is known that carbon dioxide has no advantage in foam characteristics over air.

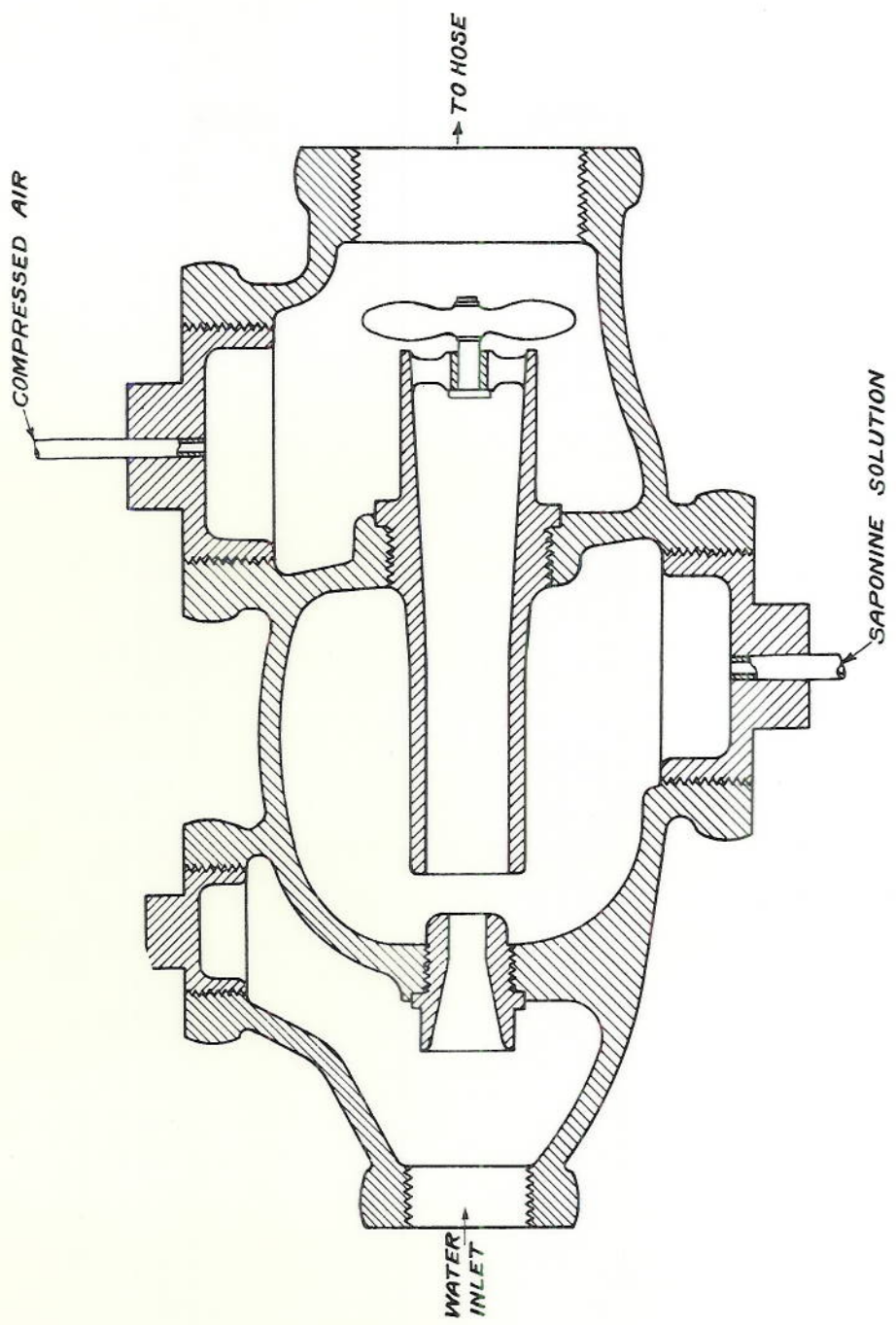


PLATE I

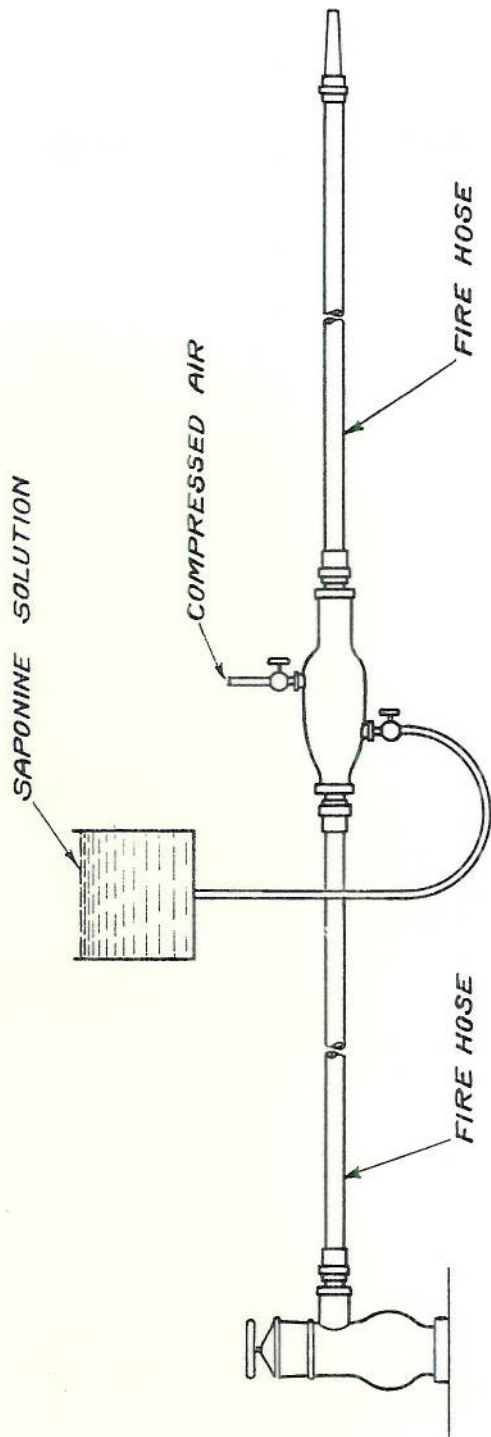


PLATE 2

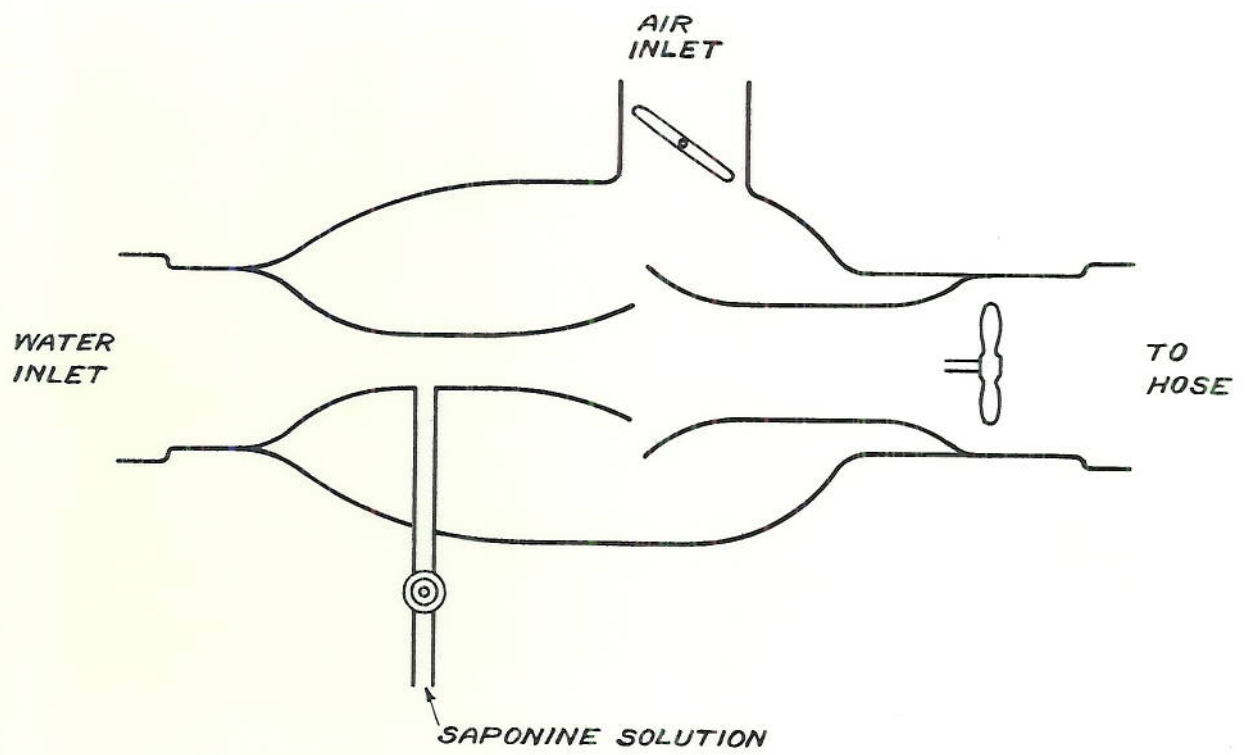


PLATE 3

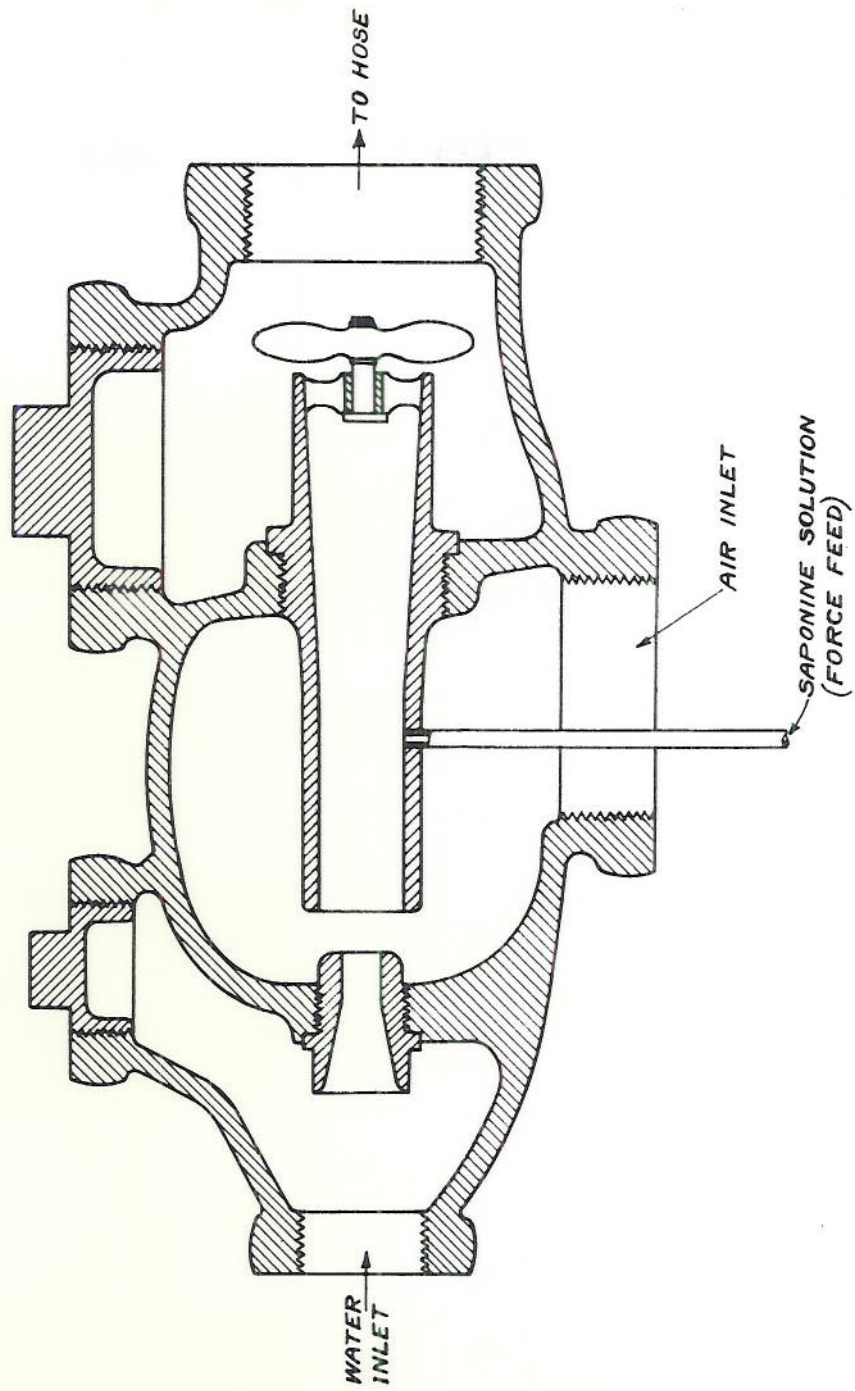


PLATE 4