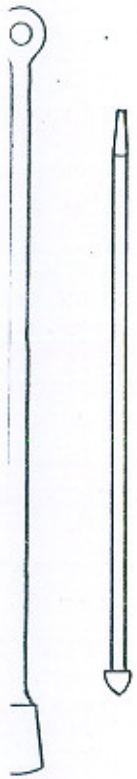
FIRE PLUGS



4. SLUICE
LVE KEY.

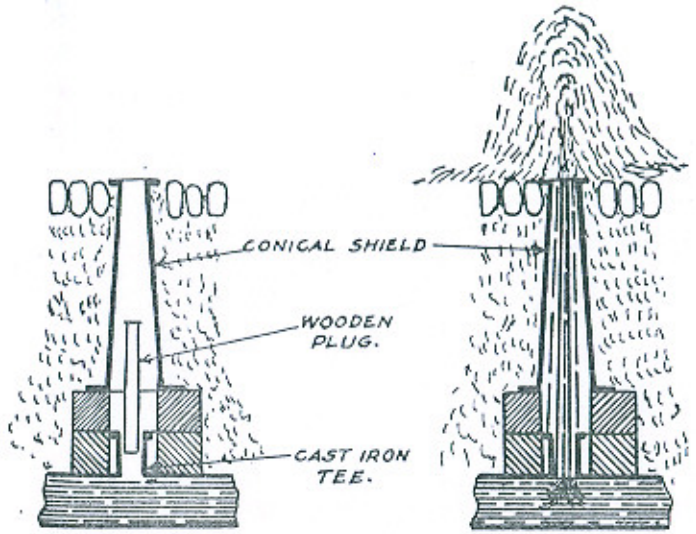


FIG: 6. PLUG IN POSITION. FIG: 7. PLUG REMOVED

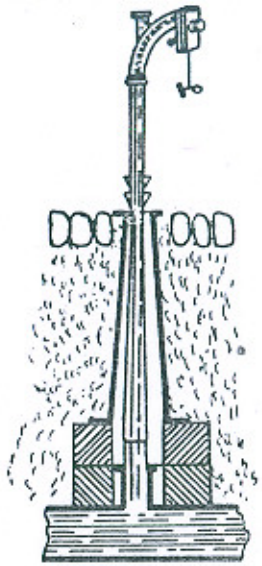


FIG: 8. STAND PIPE FIXED IN POSITION.

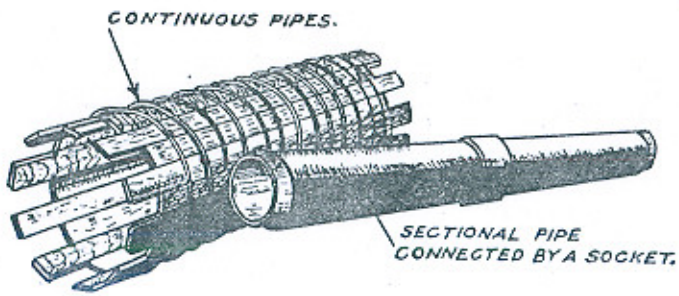


FIG: 5. WOODEN PIPES.

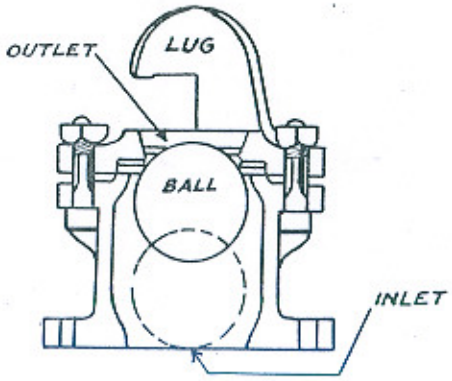


FIG: 9. BALL HYDRANT.

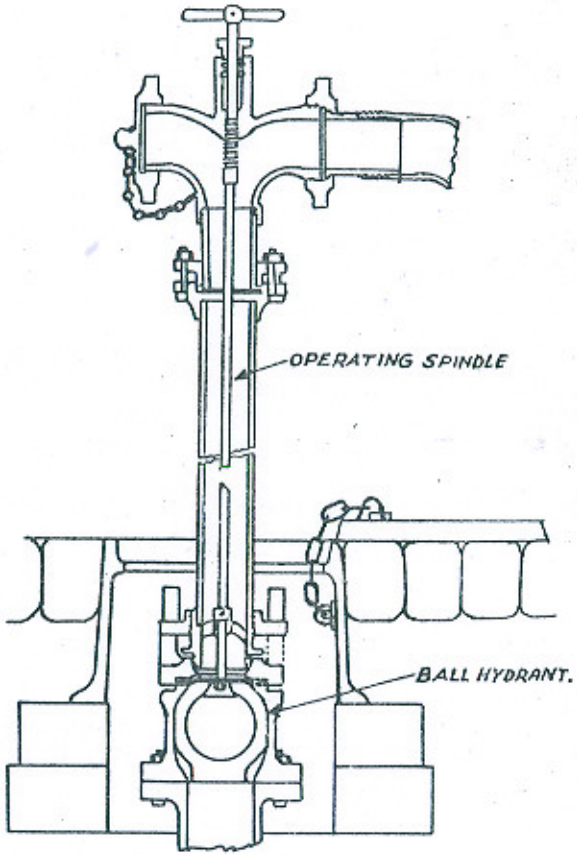


FIG: 10. STAND-PIPE FITTED ON A BALL HYDRANT.

SCREW DOWN HYDRANTS.

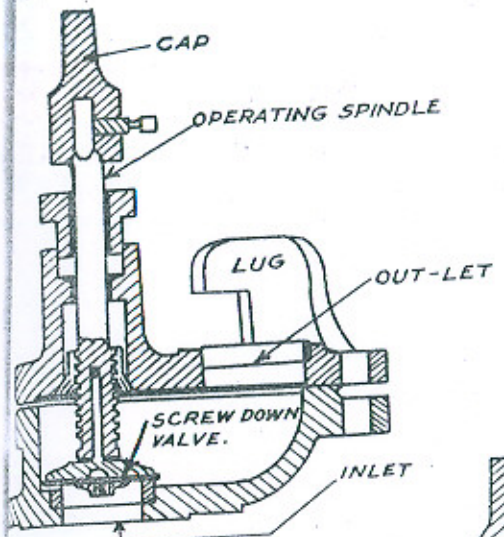


FIG: 11. SCREW DOWN HYDRANT.

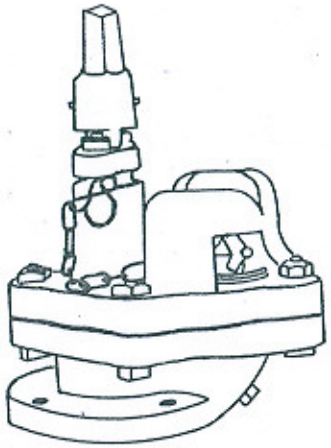


FIG: 12. SCREW DOWN HYDRANT WITH BAYONET LUG OUTLET.

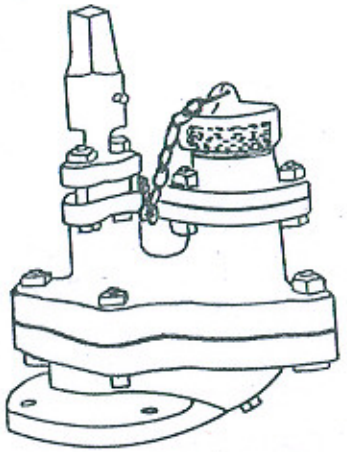


FIG: 13. SCREW DOWN HYDRANT WITH SCREWED OUTLET.

SLUICE VALVE HYDRANTS.

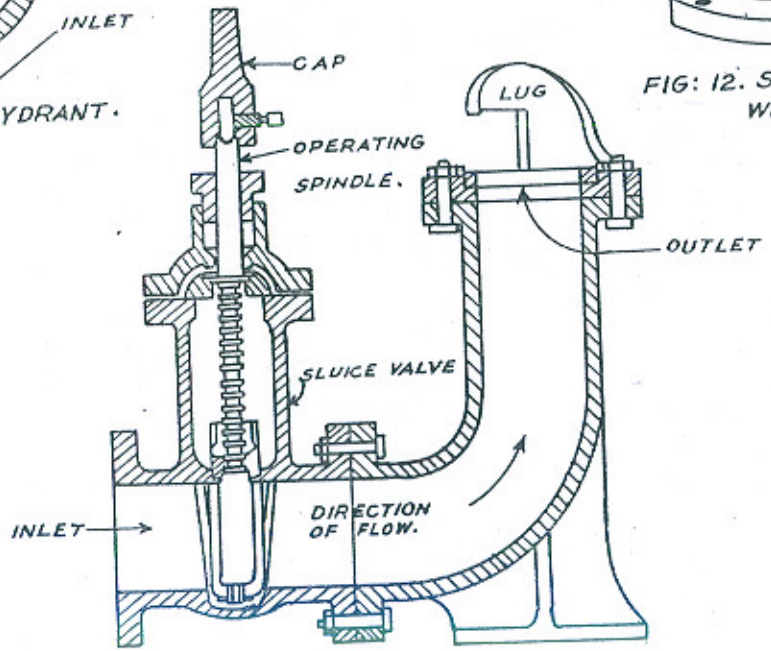


FIG: 16. SLUICE VALVE HYDRANT.

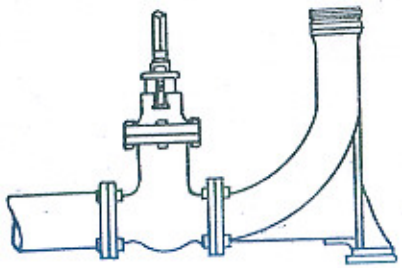


FIG: 17. L.C.C. SINGLE PATTERN SLUICE VALVE HYDRANT.

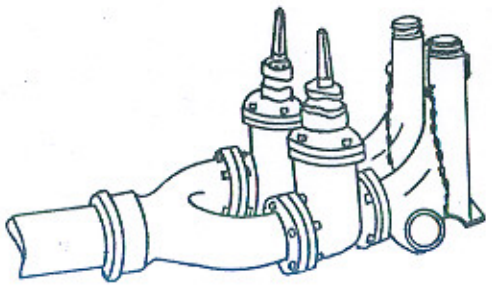
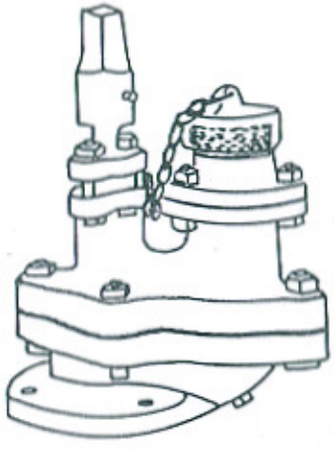


FIG: 18. L.C.C. DOUBLE PATTERN SLUICE VALVE HYDRANT.



T
TLET.

FIG: 13. SCREW DOWN HYDRANT WITH SCREWED OUTLET.

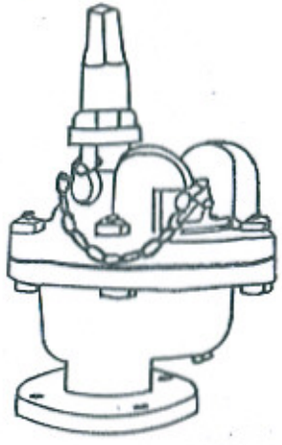


FIG: 14. SCREW DOWN HYDRANT WITH BAYONET LUG OUTLET.

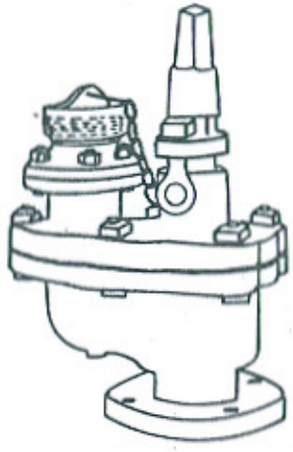


FIG: 15. SCREW DOWN HYDRANT WITH SCREWED OUTLET.

SLUICE VALVE HYDRANTS.

PATTERN
YDRANT.

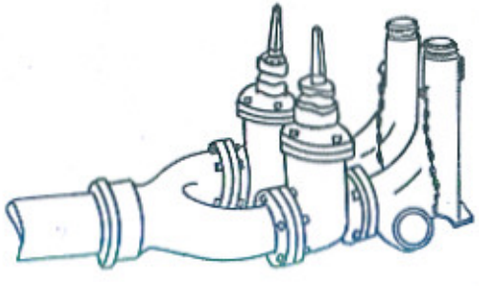


FIG: 18. L.C.C. DOUBLE PATTERN SLUICE VALVE HYDRANT

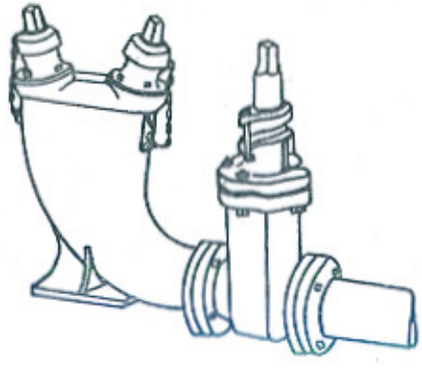


FIG: 19. SLUICE VALVE HYDRANT WITH TWO SCREWED OUTLETS.

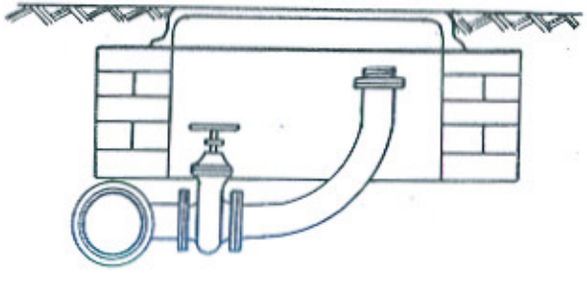
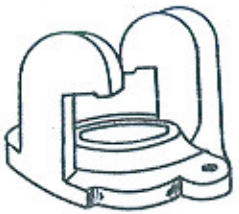


FIG: 20. EMERGENCY SLUICE VALVE HYDRANT.

HYDRANT OUTLETS



G: 21. BAYONET OUTLET WITH LUGS OR HOOKS.

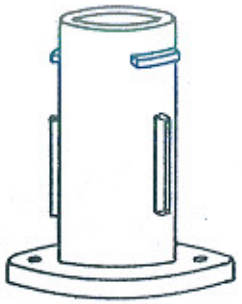
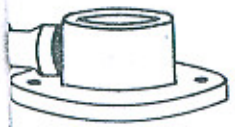


FIG: 22. BAYONET OUTLET WITHOUT LUGS OR HOOKS.

FIG: 23. MORRIS PATTERN INSTANTANEOUS MALE OUTLET.



4. MORRIS PATTERN NTANEOUS FEMALE OUTLET.

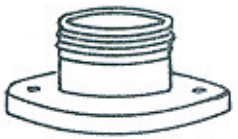


FIG: 25. SCREWED MALE OUTLET.

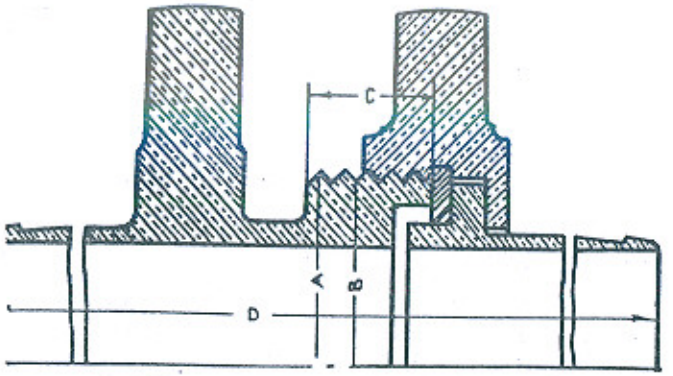


FIG: 26. V THREADED FIRE HOSE COUPLING.

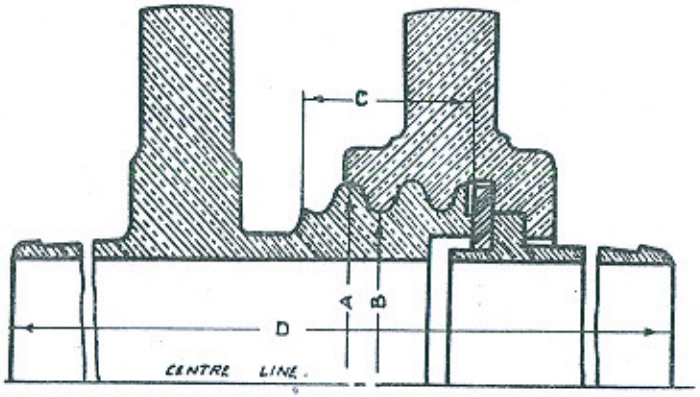


FIG: 27. ROUND THREADED FIRE HOSE COUPLING.

DESCRIPTION	SIZES	THREAD	PITCH	A	B	C	D
BRITISH STANDARD 1928 THREAD	2¼", 2½", 2¾"	ROUND VEE	½" 5½, T.P.I	3·238" 3¼"	2·675" 3"	1⅜" 1"	9 5/16" 8 15/16"
LONDON F. B. THREAD	2¼", 2½", 2¾"	ROUND VEE	½" 5 T.P.I	3¼" 3¼"	2¾" 3"	1⅜" 1 3/16"	9 5/16" 8 15/16"

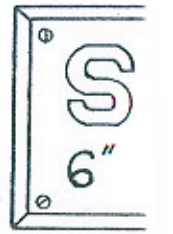
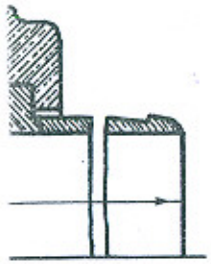


FIG: 28. IND
VALVE FITT
A DISTANCE

FIG: 30. INDIC
PLUG ON 4" MA
OF 19 FEET.

INDICATOR PLATES



HOSE COUPLING.

B	C	D
675"	1 3/8"	9 5/16"
3"	1"	8 15/16"
3/4"	1 3/8"	9 5/16"
3"	1 3/16"	8 15/16"

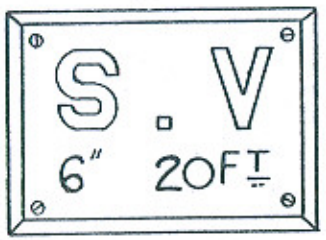


FIG: 28. INDICATING SLUICE VALVE FITTED ON 6" MAIN AT A DISTANCE OF 20 FT.

FIG: 29. INDICATING AIR VALVE.

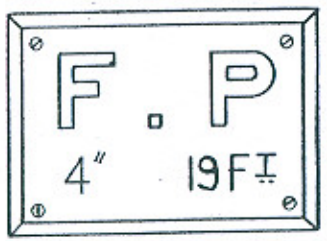


FIG: 30. INDICATING FIRE PLUG ON 4" MAIN AT A DISTANCE OF 19 FEET.

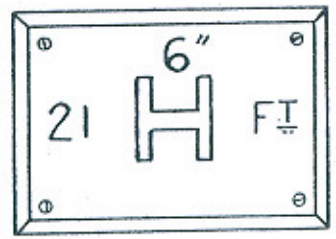


FIG: 31. INDICATING A HYDRANT ON 6" MAIN AT A DISTANCE OF 21 FT:

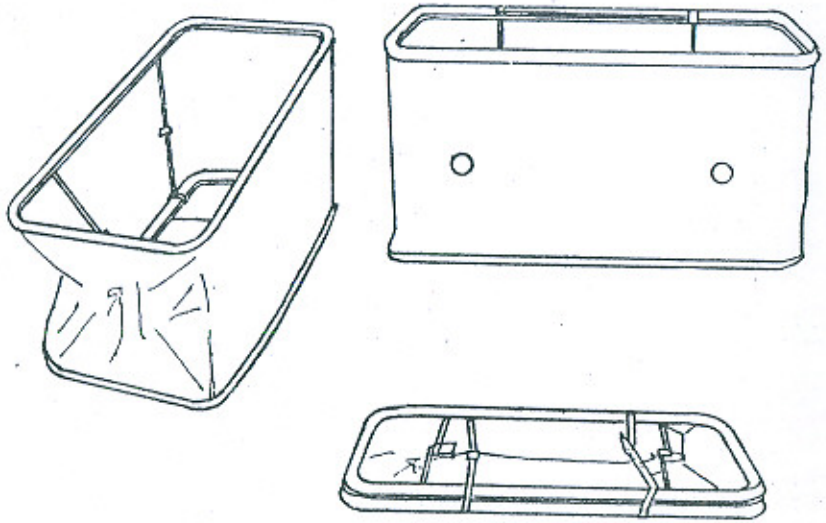


FIG: 32. PORTABLE CANVAS DAM.

STAND PIPES

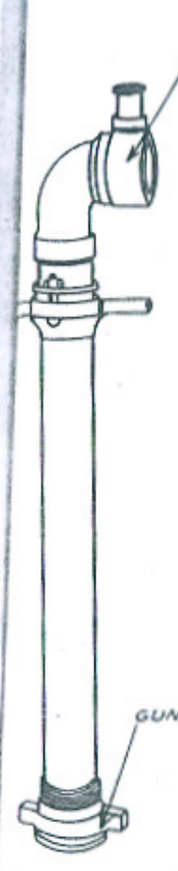


FIG: 33. BAYONET WITH LUGS INLET.

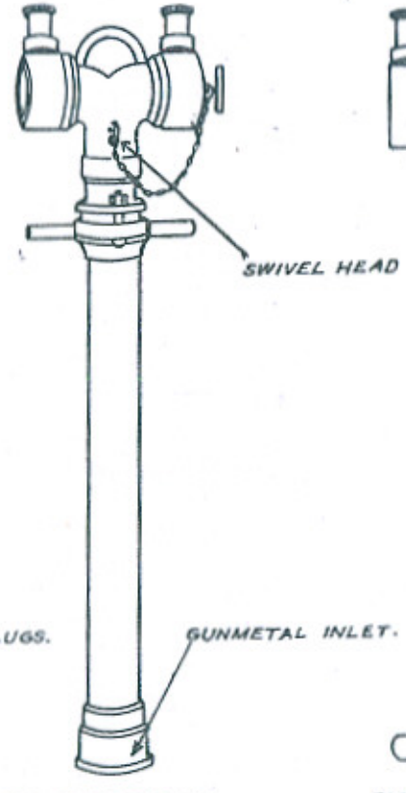


FIG: 34. FEMALE SCREWED INLET.

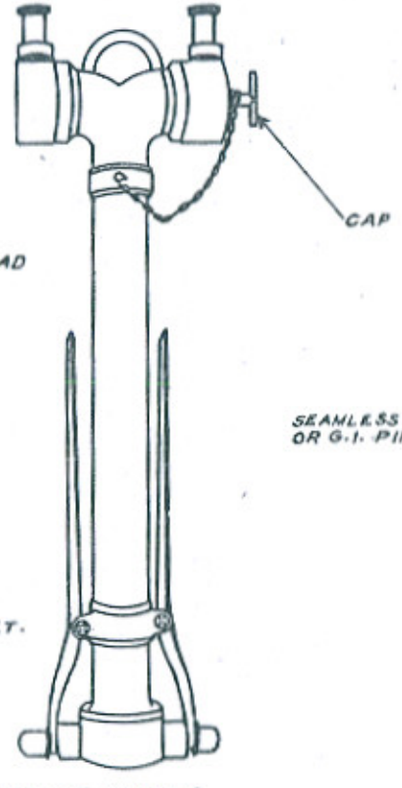


FIG: 35. MORRIS PATTERN INSTANTANEOUS FEMALE INLET.

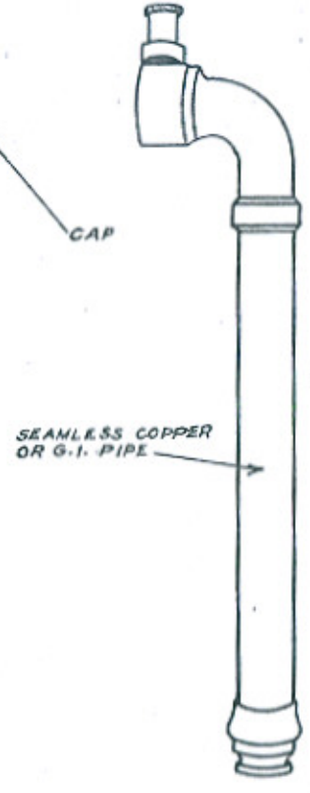


FIG: 36. MORRIS PATTERN INSTAN-
-TANEOUS MALE INLET.

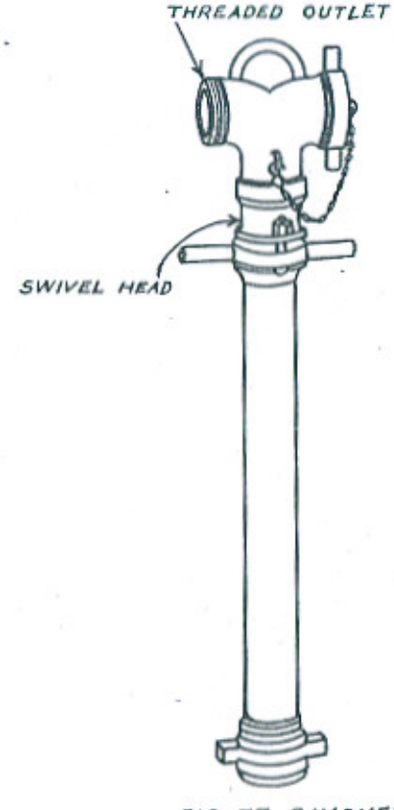
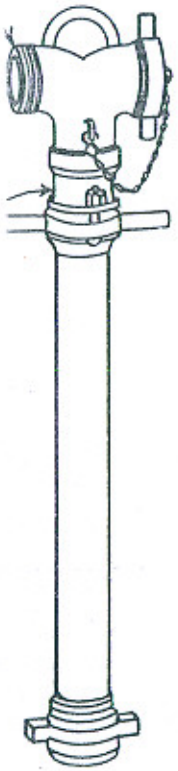


FIG. 37. BAYONET WITH LUGS INLET.

ADAPTORS

READED OUTLET



G. 37. BAYONET WITH LUGS INLET.

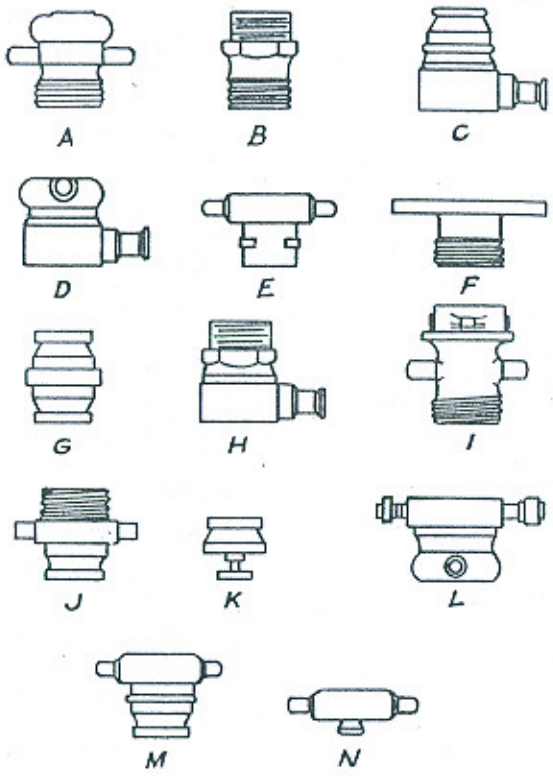


FIG: 38. ADAPTORS

FIG: NO.	DESCRIPTION.
38 A	MALE INSTANTANEOUS TO FEMALE V THREAD
B	MALE GAS THREAD TO MALE V THREAD
C	2½ INCHES MALE TO 2¾ INCHES FEMALE INSTANTANEOUS
D	FEMALE BAYONET TO FEMALE INSTANTANEOUS
E	FEMALE V THREAD TO MALE BAYONET.
F	FLANGE WITH SPIGOT SCREWED V THREAD
G	DOUBLE MALE INSTANTANEOUS SPIGOT
H	MALE GAS THREAD TO FEMALE INSTANTANEOUS.
I	MALE HUDSON PATTERN TO MALE V THREAD
J	MALE INSTANTANEOUS TO MALE V THREAD
K	INSTANTANEOUS BLANK CAP
L	FEMALE HUDSON PATTERN TO FEMALE V THREAD
M	FEMALE V THREAD TO MALE INSTANTANEOUS
N	V THREADED BLANK CAP.

RECIPROCATING PUMP

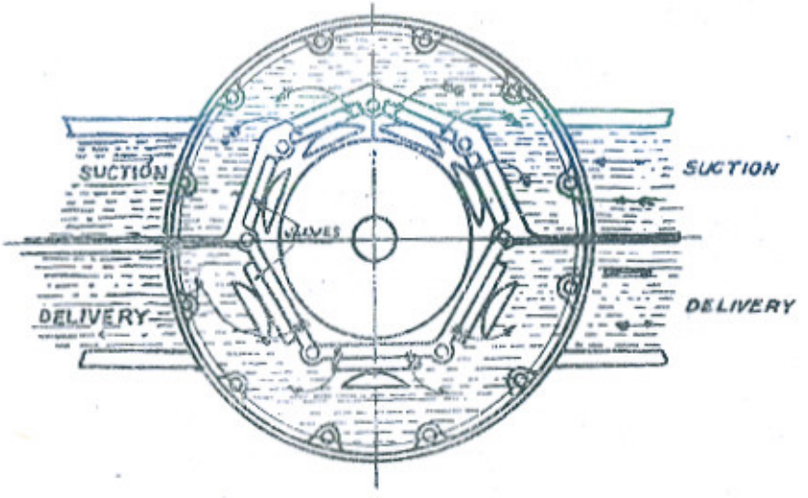


FIG: 40. PLAN OF VALVE CHAMBER

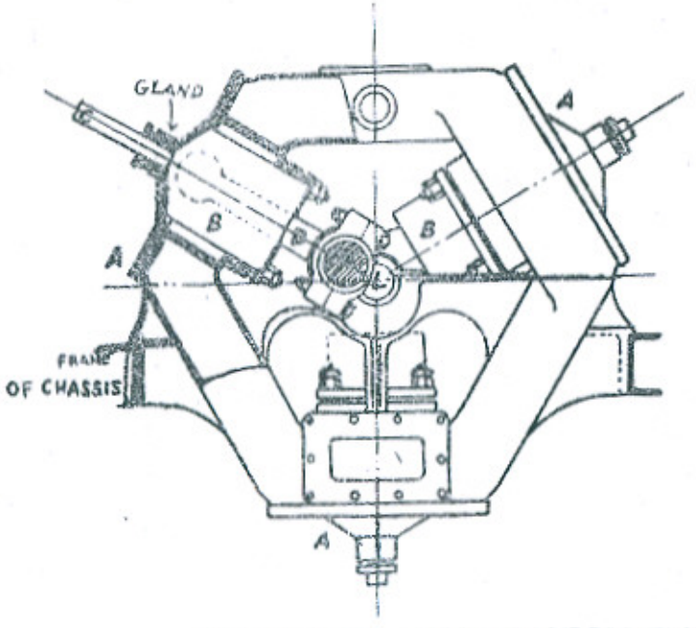


FIG: 39. THREE THROW RECIPROCATING PUMP.

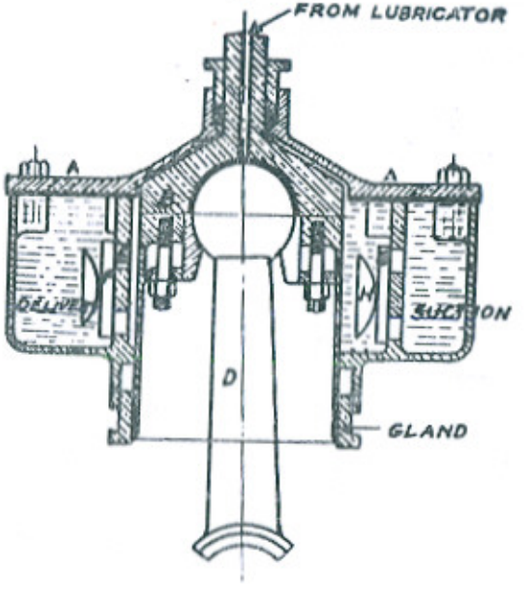


FIG: 41. SECTION THROUGH VALVE CHAMBER.

A. PUMP HEAD.
B. PLUNGER.
C. " GUIDE ROD.
D. CONNECTING ROD.
E. DELIVERY VALVE.
F. DELIVERY VALVE GUARD.
G. SUCTION VALVE.
H. " " GUARD.
K. CRANK.
L " SHAFT.

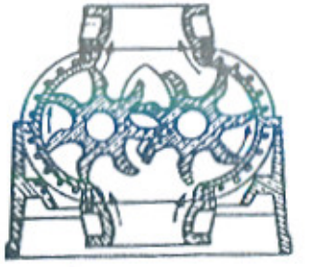


FIG: 42. ROTARY PUMP

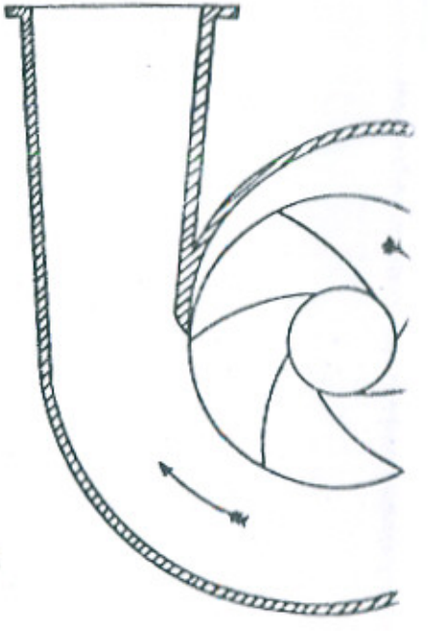


FIG: 43. CENTRIF

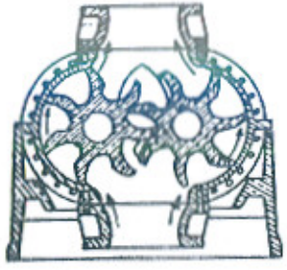


FIG: 42. ROTARY PUMP

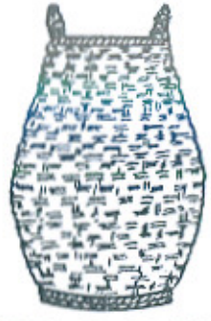


FIG: 45. BASKET STRAINER.

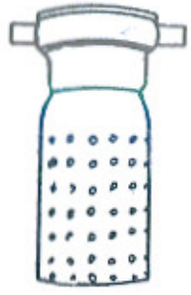


FIG: 46 COPPER STRAINER.

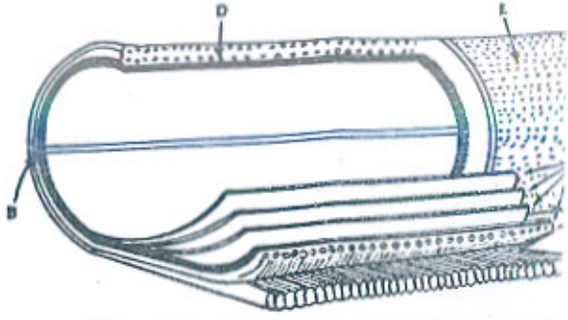
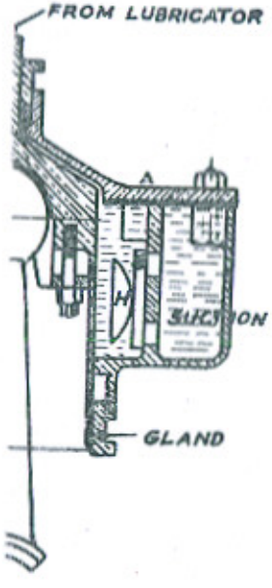


FIG: 48. DOUBLE JACKETTED CC RUBBER LINED FIRE HOSE



CTION THROUGH
VE CHAMBER.

F. DELIVERY VALVE GUARD.
G. SUCTION VALVE.
H. " " GUARD.
K. CRANK.
L " SHAFT.

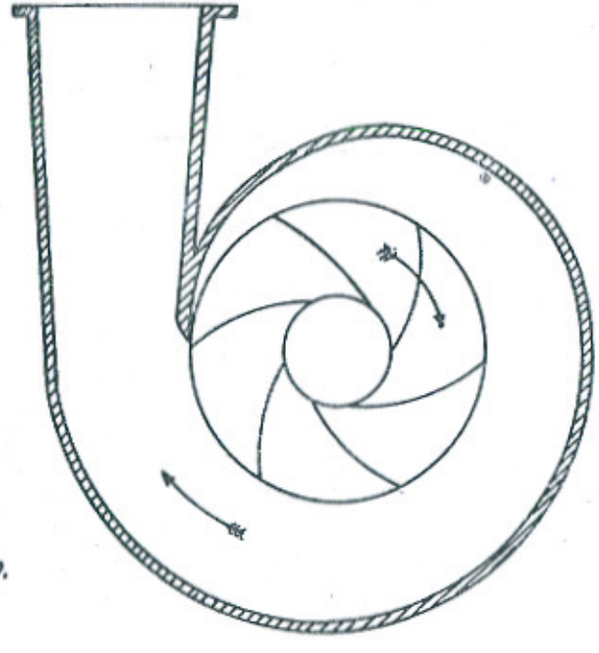


FIG: 43. CENTRIFUGAL PUMP.

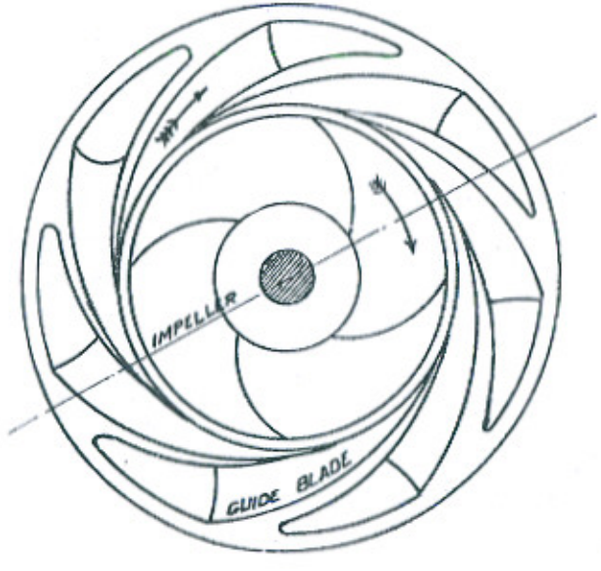


FIG: 44. TURBINE PUMP

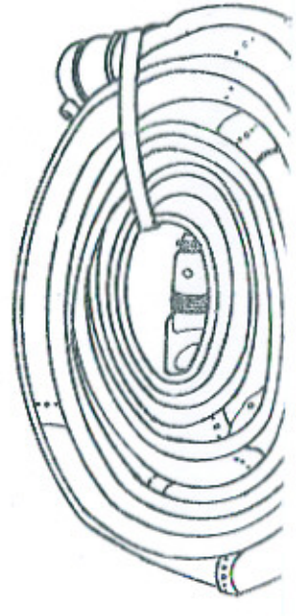
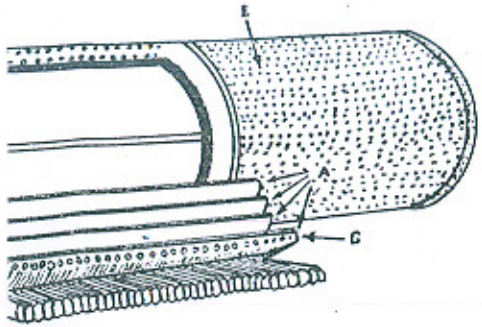


FIG: 47. LEATI



UBLE JACKETTED COTTON
3BER LINED FIRE HOSE.

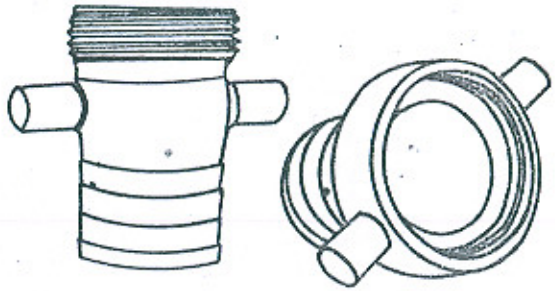


FIG: 50. "V" THREADED COUPLING.

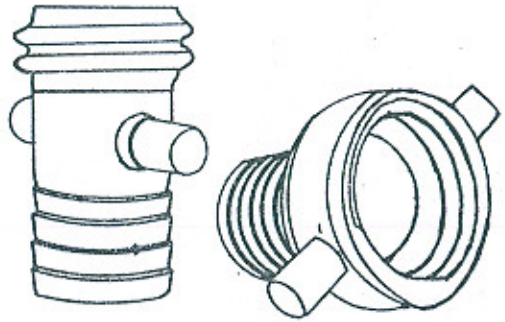


FIG: 51. ROUND THREADED COUPLING

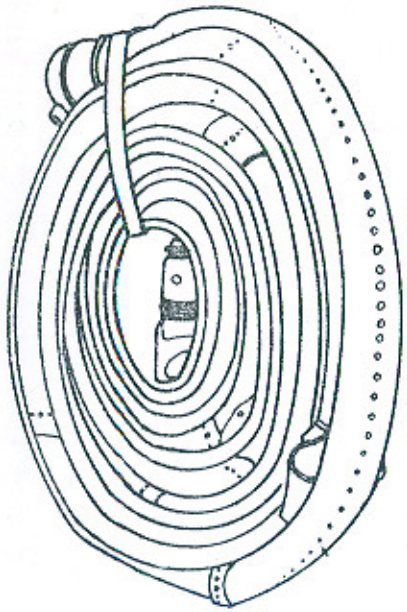


FIG: 47. LEATHER HOSE.

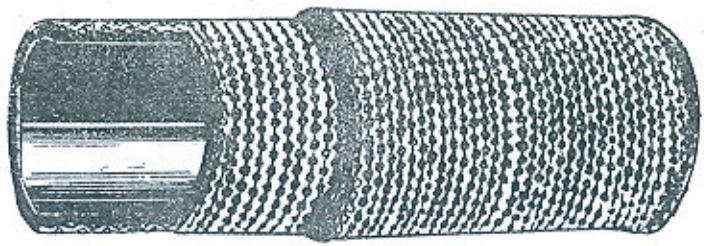


FIG: 49. WAX AND GUM TREATED RUBBER LINED JACKETTED FIRE HOSE.

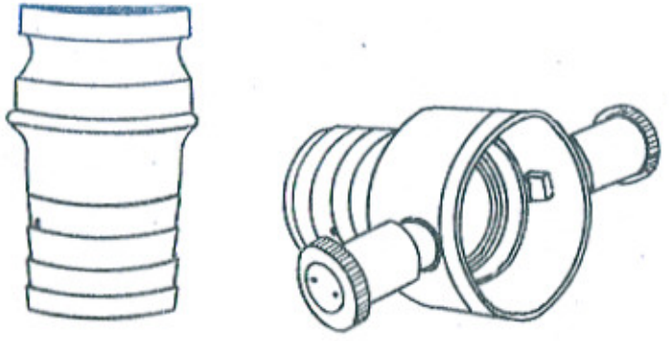


FIG: 52. MORRIS PATTERN INSTANTANEOUS COUPLING.

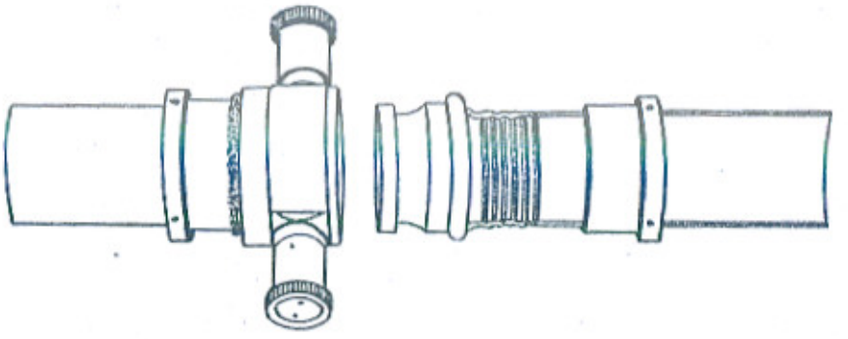


FIG: 54. MORRIS PATTERN INSTANTANEOUS COUPLING WITH FERRULES.

FIG: 55. D

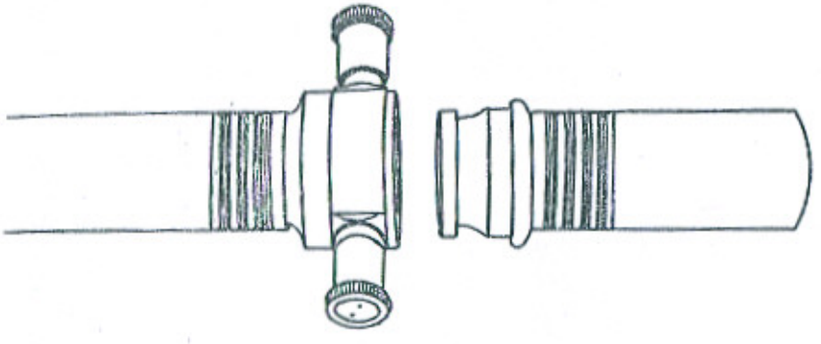


FIG: 53. MORRIS PATTERN INSTANTANEOUS COUPLING TIED WITH WIRE.

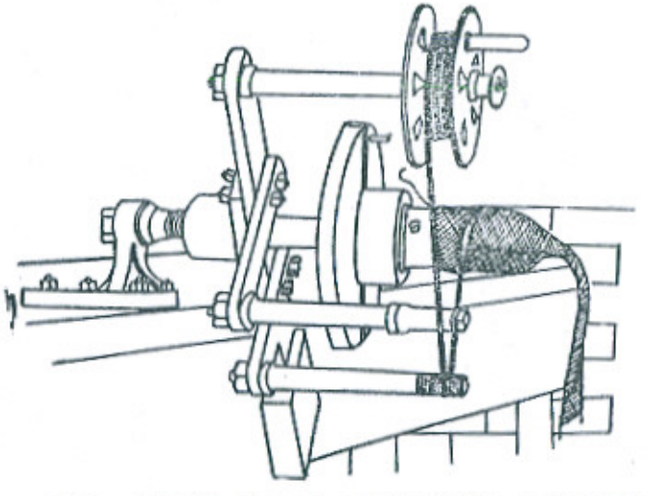


FIG: 55 (A) HOSE COUPLING BINDER.

FIG: 58. HOSE RA

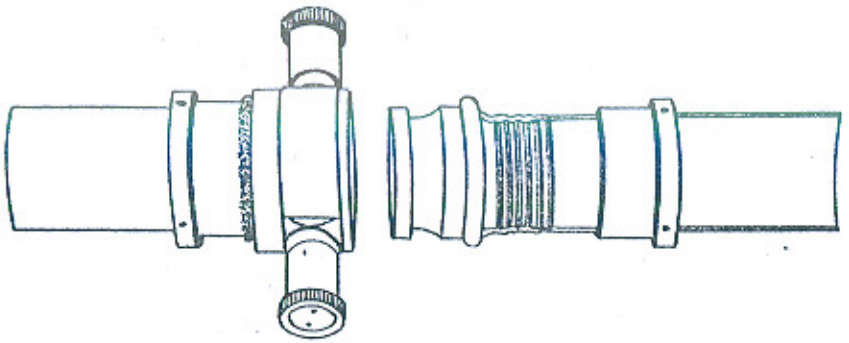


FIG: 54. MORRIS PATTERN INSTANTANEOUS COUPLING WITH FERRULES.

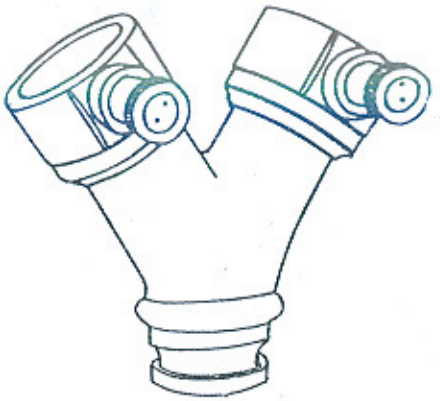


FIG: 55. DIVIDING BREECHING

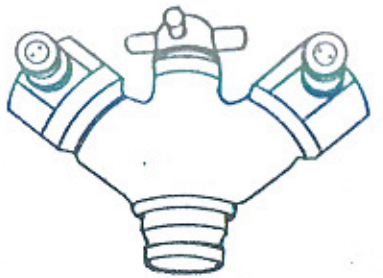


FIG: 56. SHUT OFF & CONTA
DIVIDING BREECHING

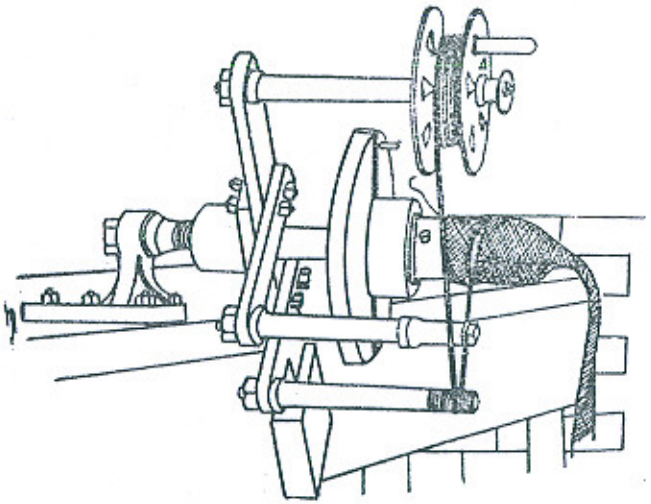


FIG: 55 (A) HOSE COUPLING BINDER.

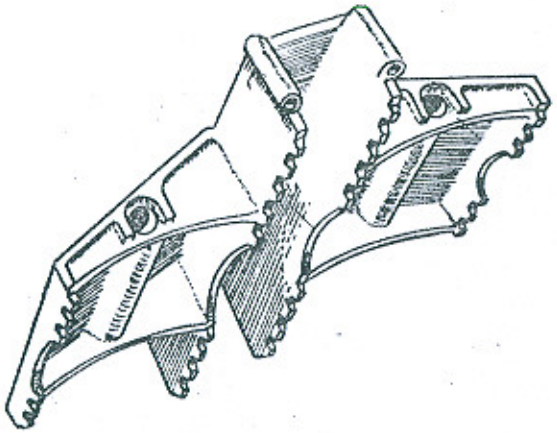


FIG: 58. HOSE RAMPS

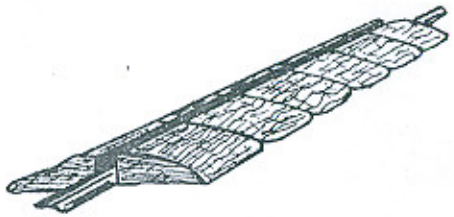


FIG: 58 (A) HOSE RAMP

? CONTROL
ECHING.

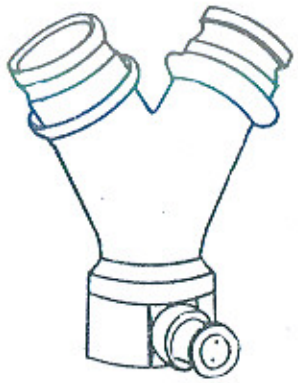
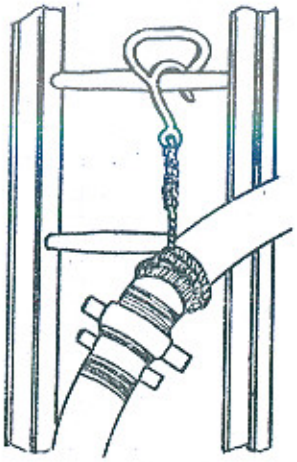


FIG: 57. COLLECTING BREECHING.



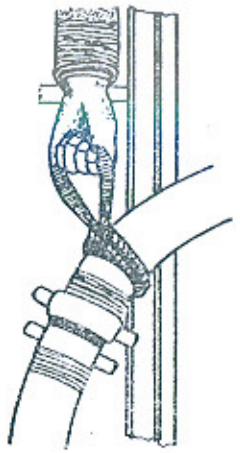


FIG: 60 & 61 HOOKS AND SLINGS FOR CARRYING HOSE.

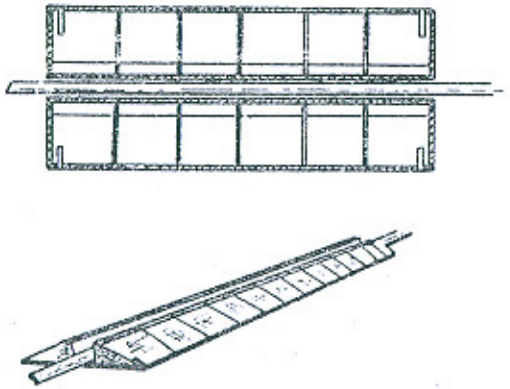


FIG: 59. HOSE RAMPS

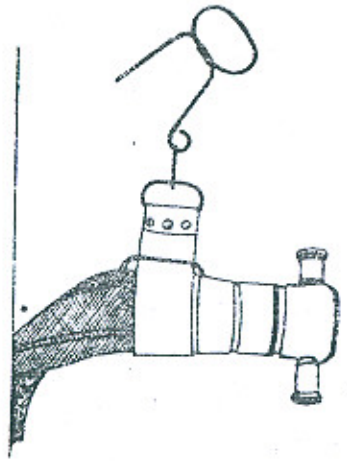
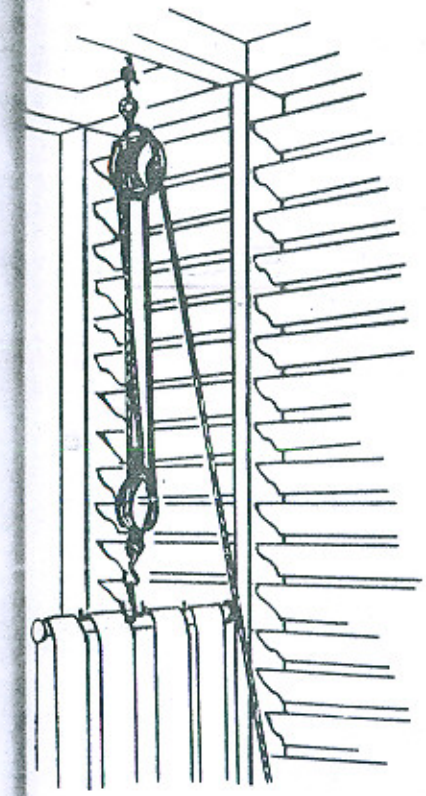


FIG: 62 & 63 HOOKS AND SLINGS FOR CARRYING HOSE.

HOSE CLAMPS AND BINDERS



: 64. HOSE HOIST AND DRYING RACK.

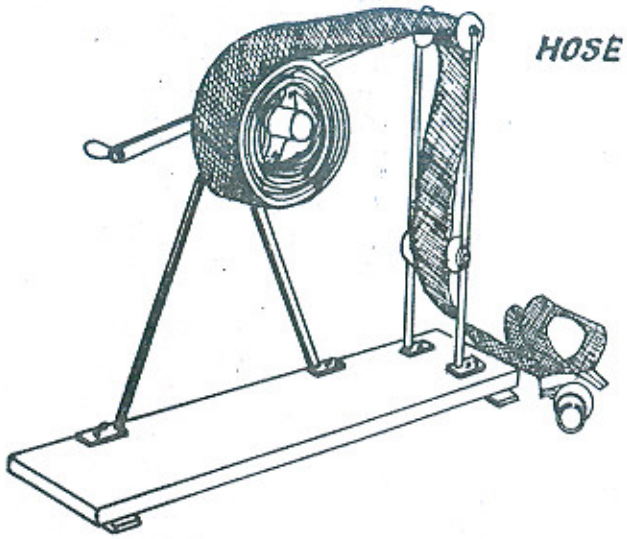


FIG: 65. HOSE WINDING MACHINE

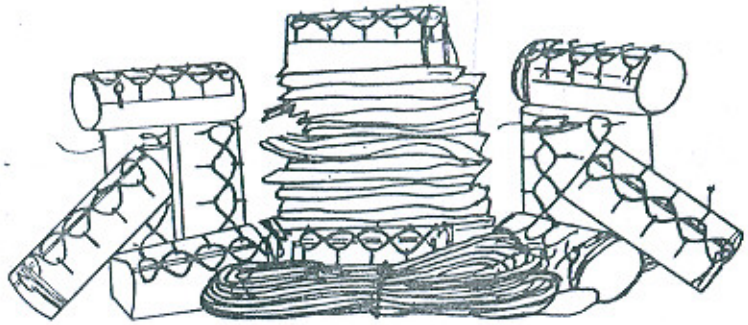


FIG: 67. CANVAS EDGED WITH LEATHER HOSE BINDERS.

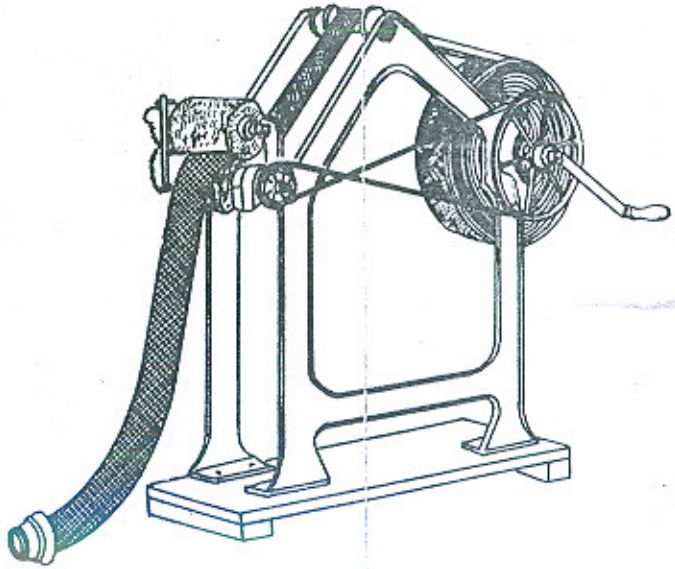


FIG: 66. HOSE WINDING MACHINE, WITH CLEANING BRUSHES.

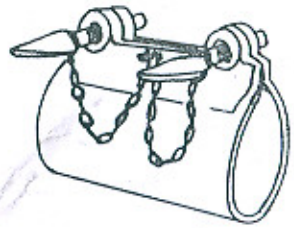
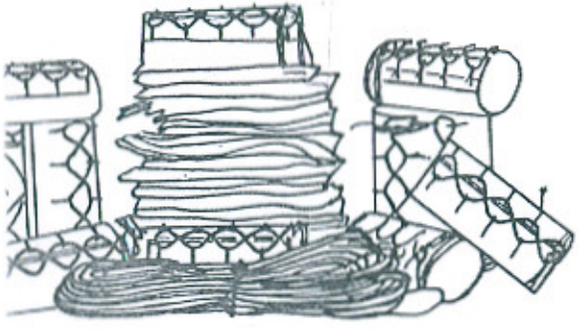


FIG: 69. HOSE CLAMP

FIG: 70. HOSE OF CAN

ND BINDERS



7. CANVAS EDGED WITH LEATHER HOSE BINDERS.

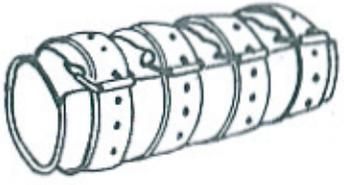


FIG: 68. LEATHER HOSE BINDER WITH STRAPS.

BRANCH PIPES

FIG: 71.

FIG: 72.

FIG: 73.

FIG: 74. HEXAGONAL NOZZLE

FIG: 75. ROUND NOZZLE

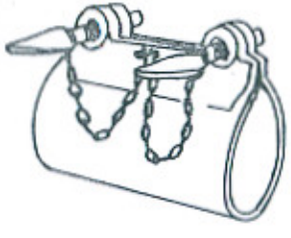


FIG: 69. HOSE CLAMP

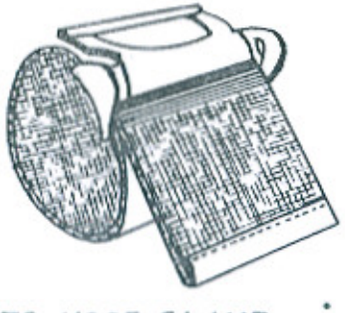


FIG: 70. HOSE CLAMP OF CANVAS.

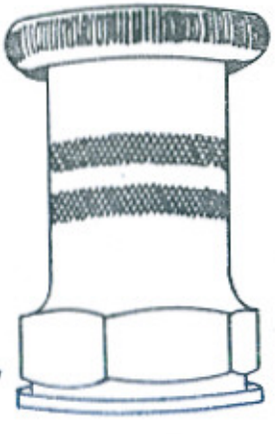


FIG: 76. LONDON NOZZLE.

FIG: 77. POUDEREROUX DIFFUSER.

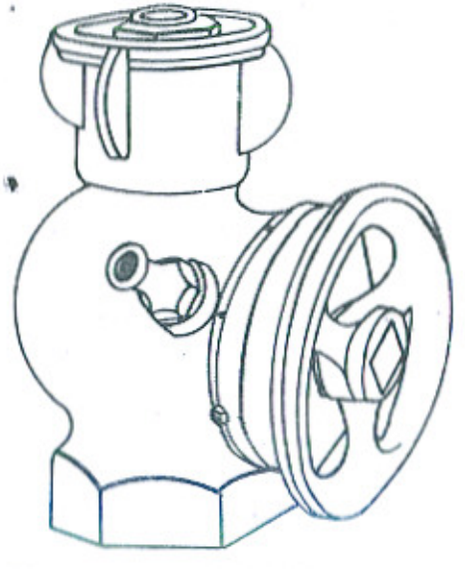
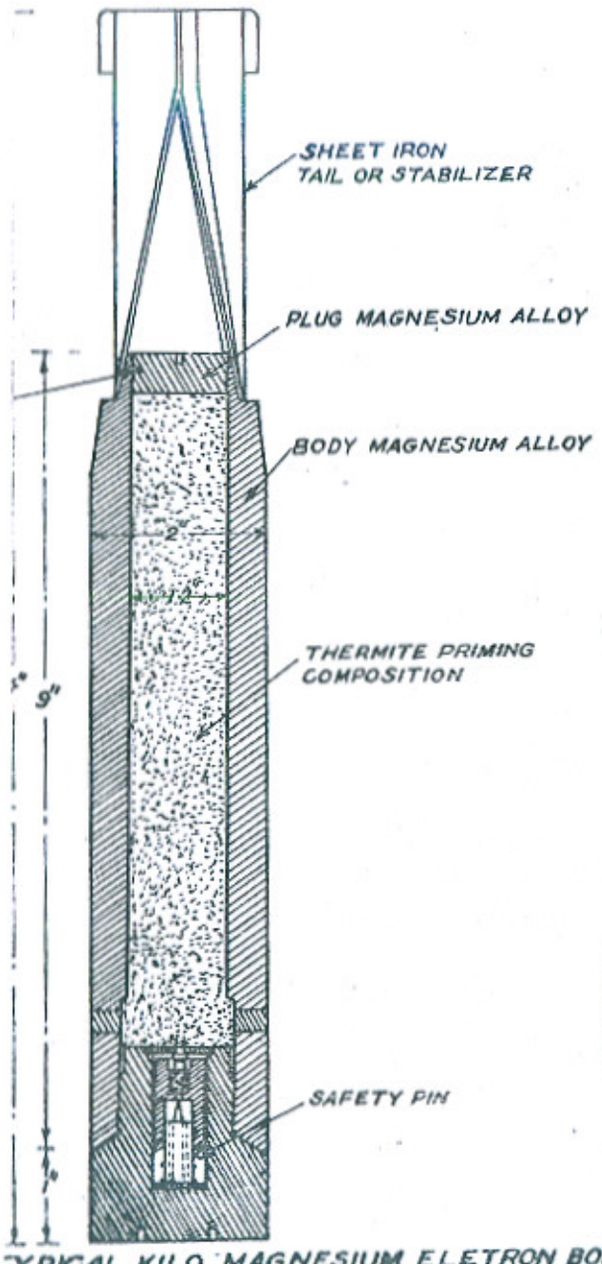


FIG: 78. NELSON NOZZLE



TYPICAL KILO MAGNESIUM ELETRON BOMB.

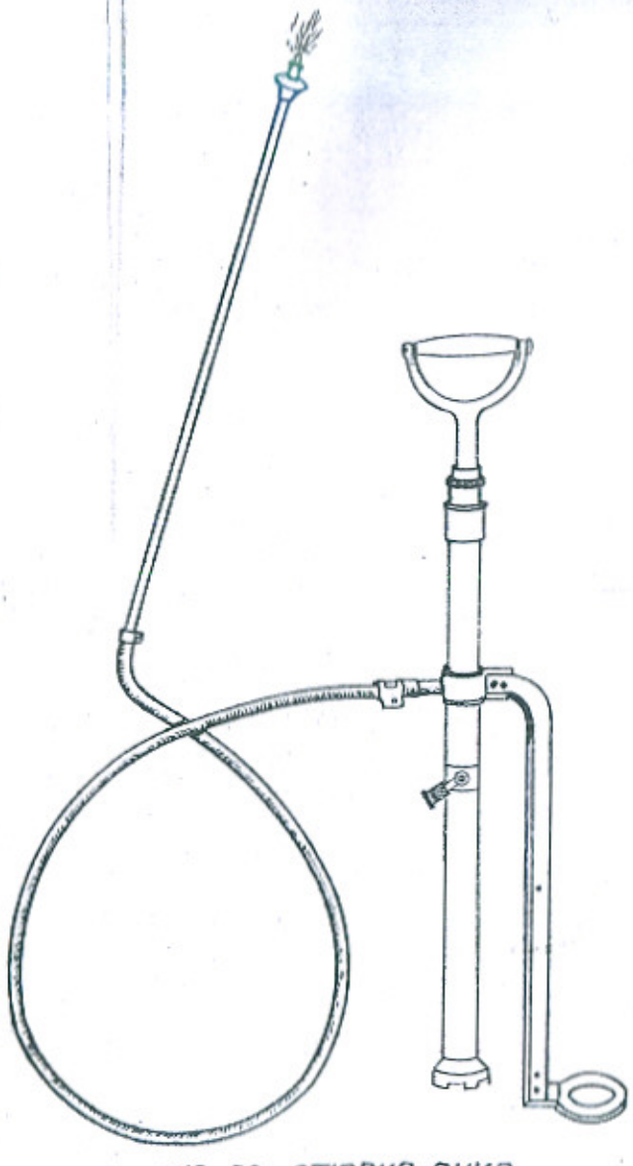


FIG: 80. STIRRUP PUMP

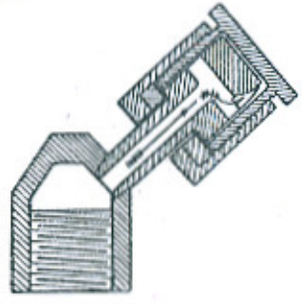
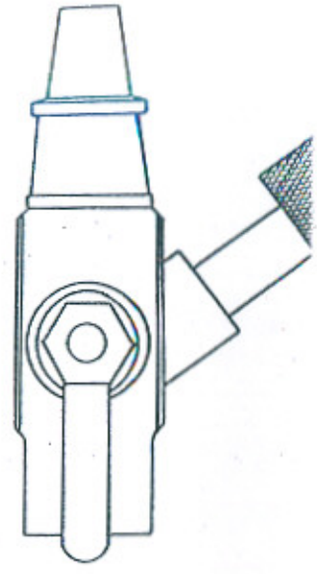


FIG: 81 ATOMISING NOZZLE

FIG: 82. JET NOZZLE



83. (a) ELEVATION

83. (d) PLUG

FIG: 83. PUNJAB

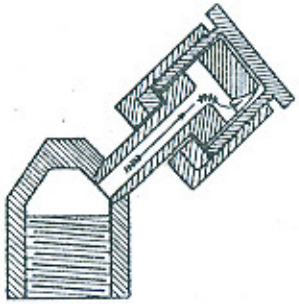
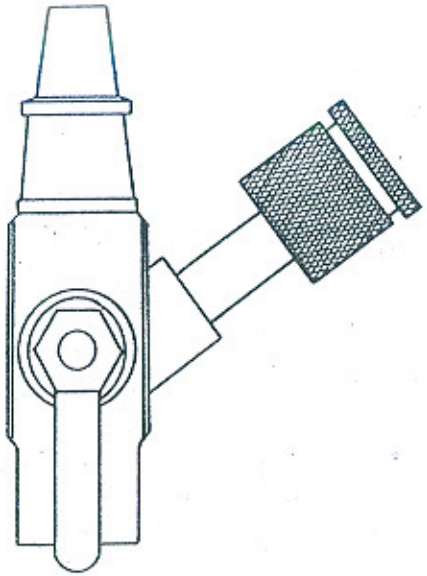


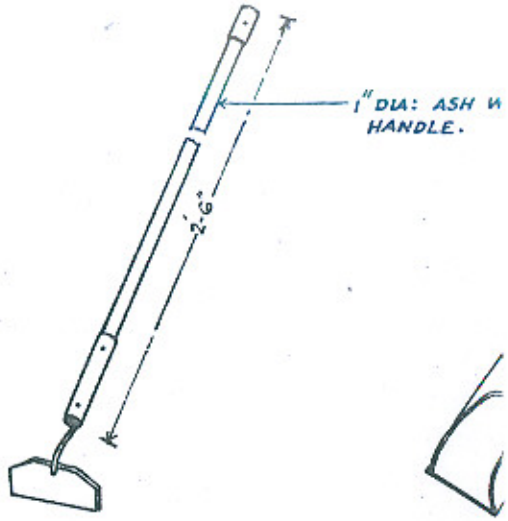
FIG: 81 ATOMISING NOZZLE



83. (a) ELEVATION

83:(b) HANDLE OR LEVER

83.(C) WASHER



(a) RAKE

(a) SCOO

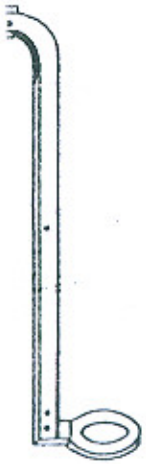
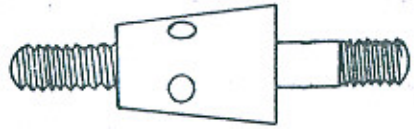


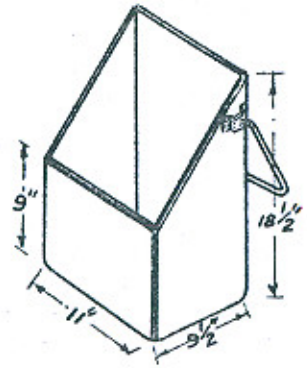
FIG: 82. JET NOZZLE

83. (d) PLUG



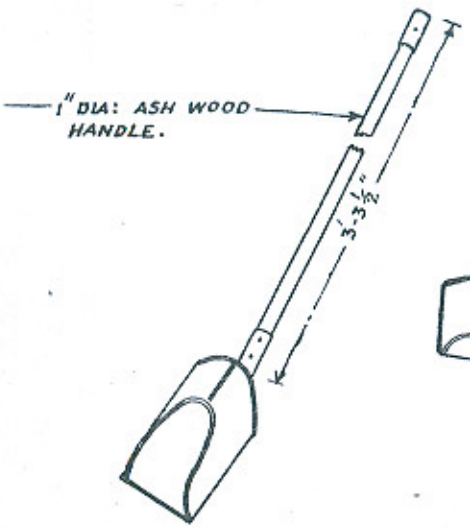
83. (e) PLUG

FIG: 83. PUNJAB DUEL PURPOSE NOZZLE



(C) SAND CONTAINER ENGLISH STANDARD.

FIG: 84. RED HILL EQUIPMENT.



(a) SCOOP

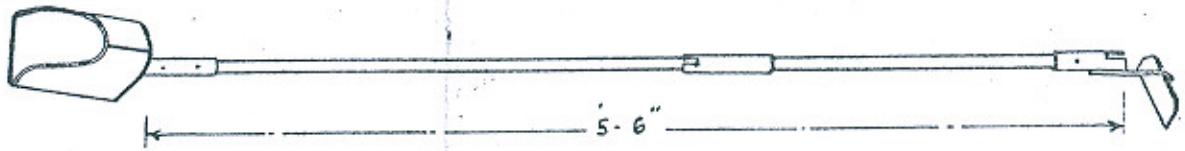


FIG: 85. ENGLISH STANDARD SCOOP & RAKE JOINED TOGETHER.

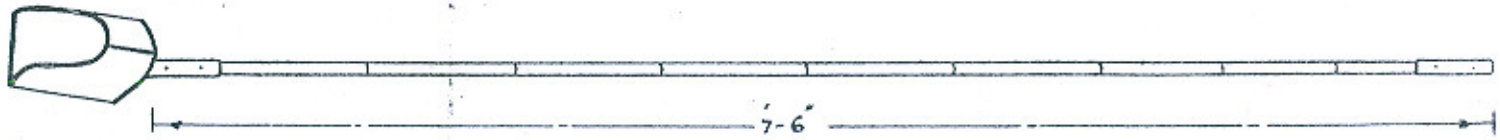


FIG: 86. PUNJAB BAMBOO HANDLED SCOOP.

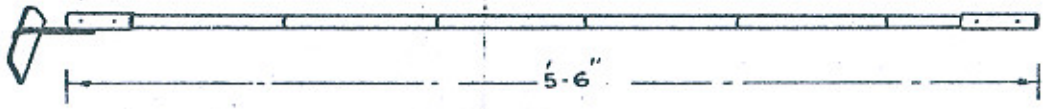


FIG: 87. PUNJAB BAMBOO HANDLED RAKE.

IGLISH

IPMENT.

DISCUSSION

In introducing his Paper *Sardar Hukam Singh* said that a war having been forced on us had increased fire risks beyond one's comprehension.

He added that amongst other causes of fires, was carelessness, such as unnecessary accumulation of rubbish, improper storage of inflammable materials, defective electric wiring, overheating or sooty flues, faulty shaft bearings, naked flames near inflammable materials, smoking where smoking is prohibited, dropping matches and ends of cigarettes in waste-paper baskets and thousands of other causes, in addition to incendiarism.

He went on to say that incendiarism as a war weapon could be traced back into antiquity. It was mentioned in the Old Testament of the Christian Bible that Samson tied burning brands to the tails of foxes before letting them into the enemy's camp. In Ramayana, a reference existed to the effect that Hanuman set ablaze "Lanka" with burning materials tied to his tail. In Mahabharata a lot was said about "Aganbans" or fire-arrows.

Sardar Hukam Singh further remarked that in war-time there was special need for vigilance, in addition to taking specific measures to minimise the risks of fires caused by incendiary bombs falling among inflammable articles and setting them ablaze. He was of opinion that fires occurred in spite of all preventive measures and as such it was necessary to organize fire services capable of rising to the occasion if and when the emergency arose.

In the Punjab, the existing arrangements in the way of men and material for fire-fighting purposes, were inadequate even for peace-time requirements and in many cases they were conspicuous by their absence.

The Government had taken up the question of bringing the existing fire brigades up to date, reorganising the existing personnel, providing trained men and material where none existed at present and training corps of volunteers at places liable to air attacks.

The Author had made an attempt in the Paper to deal with the engineering equipment of fire brigades which would be suitable for the Punjab and to indicate lines on which standardisation could be effected. While making mention of the methods of destruction by incendiarism, he remarked that since the days of Samson, Hanuman and Mahabharata they had undergone considerable advancement and in these modern days, tails of foxes and Hanuman had been replaced by high explosive and incendiary bombs dropped from aeroplanes; furthermore the number of fires likely to be caused in an air attack depended on the intensity of attack and the local defences.

In the city of Edinburgh, with a population of 439,000 according to the last census figures and now nearing 650,000, upwards of 92 fire engines with equipment had been provided, in addition to the appliances kept by private individuals and firms at their premises.

For fighting small incendiary bombs, the stirrup pumps and Red Hill equipment described in para 9D were very useful.

In addition, another very easily operated dual-purpose nozzle, as shown in the Figure 88, had been evolved recently. This threw a spray which, though not so finely atomised as that of the " Punjab " dual-purpose nozzle, projected its discharge to a greater distance than the latter.

Referring to the handicaps in the Punjab, due to the absence of real incendiary bombs, he said that they had not been able, so far to arrive at definite conclusions as to which form of atomised jet was most suitable for the purpose and the matter was still under investigation. He then gave details of an asbestos bomb-snuffer, which had recently been successfully brought in use. This consisted of an 18" i/d hollow hemi-sphere which was placed over and snuffed the incendiary bomb.

Regarding the requirements for fire protection by individuals, etc., he remarked that every householder and Government office should possess a stirrup pump with Red Hill equipment.

Dealing with existing arrangements, the Author pointed out that even in towns provided with piped water supply, the numbers of fire-hydrants and the size of distribution mains on which they were fitted were inadequate for reasonable fire-fighting purposes. The reason for this was that in the past, the incidence of fire had been comparatively low, but he hoped that in future the provisions given on page 6 of his Paper would not be overlooked.

Referring to elevated service reservoirs, he added that in future, as an A. R. P. measure, they would have to give way to the extensive use of underground pressure tanks with hydrostatic off and on switches. As regards the selection of power-driven fire pumps, he remarked that due consideration should be given to the quality of water available, distance to which water was to be pumped and height of the jet required. For this purpose, reference to Appendices I, II and III would be helpful.

He advised that :—

(*i*) Reciprocating and rotary pumps, as a rule, should not be provided at places where gritty water was likely to be used.

(*ii*) There should be positive fool-proof arrangements for exhausting the suctions of the pumps.

(*iii*) For places without piped water supply and with depth of subsoil water table in wells more than about 20 ft. below ground level,

provision for auxiliary pumping plant to lift the water from wells to the ground, should be made, along with tackle to lower the auxiliary pumping plant into the wells.

(*iv*) In this part of the world, canvas flax, high pressure, fire-hose should be preferred but one or two lengths of rubber-lined hose were convenient for use inside buildings and for connecting with dividing breeching, etc.

(*v*) Even if the fire-hoses were of different bore, the couplings should be all of one size, with tail-pieces to suit the hose.

The Author hoped that the advantages of using multiple lines of fire-hoses would be obvious from a perusal of Appendix II.

Referring to the figures given in Appendix I, showing the effective height and length of good fire streams or jets, he remarked that they were based on experimental data and might vary slightly from the results obtained by other experimenters. These figures were, however, on the conservative side and were useful in selecting the sizes of nozzles suitable for use under various working conditions.

He added that it was of course, obviously desirable that owners or occupiers of buildings should not store or keep more imflammable material than positively necessary, on their premises.

Before concluding he mentioned that one of the results of the provisions of A. R. P. Fire Brigades in the Punjab had been the stimulation of local industry in manufacture of various classes of fire brigade equipment. Unfortunately, the manufacture of complicated power-driven fire fighting pumps and high pressure flaxen fire-hose had not, so far, been attempted in India; but he was glad to say that workshops at Lahore had been able to produce numerous other classes of articles such as hydrants, couplings, nozzles, breechings, portable canvas folding tanks, hose repairing outfits, stand pipes, nozzles, hose clamps, jacks, stirrup pumps, Red Hill equipment and other similar articles suitable for use, which hitherto had been imported.

Samples of various classes of equipment were available for inspection outside the meeting hall and he gladly offered to show to the members the other equipment which had been collected at the Old Fort at Lahore and was then nearly ready for distribution.

Mr. D. A. Howell said that the Paper was of special and topical interest not only because it touched upon matters which in these days of stress and strife were liable to affect the daily life and even the existence of every human being, but also, so far as he was aware, it was the first time that a Paper upon the subject of so-called "Fire Engineering" had been presented before any engineering or scientific body in India. The speaker had been concerned with the subject of "Fire Engineering" for many years in a general sort of way, as all hydraulic engineers dealing with town water supplies were supposed to take into account the demands of water for fire purposes in com-

puting the sizes of mains and reservoirs for distribution of water supply, but he was afraid that in the past, in the case of Indian towns and cities, hardly any notice had been taken of this aspect and except in the large cities of Calcutta and Bombay, very little attention had been paid to fire requirements in the design of town water supply distribution systems. Indeed, even in the comparatively few cities where fire brigades had been maintained, they were in various stages of unpreparedness and obsolescence and the best of them could not be considered adequate or up to date in any sense of the words.

In the Punjab, like the rest of India, in the vast majority of towns, either there was no attempt at all to maintain any sort of fire-fighting equipment, or where such were maintained, the equipment was a mere travesty, with rotten or damaged fittings, old, perforated, half-perished hoses and broken down, rusty, old manual or (in a very few cases) power-driven pumps.

Since about 1934, the authorities in this province had been taking a more detailed interest in fire-fighting measures and schemes had been drawn up laying down certain definite standards of fire brigades for towns of various sizes and populations. As a result, a certain amount of improvement in the fire brigades of a few towns had become noticeable. Some municipal bodies had purchased more modern types of fire pumps and tenders as well as new hoses and other fire-fighting equipment, but the vast majority of places had continued to take little or no interest, even up to recently. The new methods of destruction by air attack with explosive and incendiary bombs were forcing public authorities throughout the civilized world to take very much greater interest in improving the means of countering these attacks. Such means of defence were classified as "Active" and "Passive."

The chief "weapon" of defence (if one might call an instrument of passive defence by such a word) was "Fire-Fighting" and as evidenced by the greatly increased numbers of civilians who had been called upon to undertake "Fire-Fighting" duties in Great Britain, as reported in the press in the course of the past few weeks, "Fire-Fighting" was rapidly assuming a still more important role as time passed on.

The speaker remarked that *Sardar Hukam Singh's* Paper pointed the way to securing strongly desired improvements in fire-fighting measures in India, especially in mofussil towns, and it indicated rational lines of standardization based on considerations of the utmost economy which were adapted to Indian conditions. They were, of course, not wholly applicable to large metropolitan cities like Calcutta and Bombay, where complicated fire-fighting and rescue equipment, suitable for dealing with huge buildings and structures, many stories in height, were also needed; but they were suitable for ordinary Indian mofussil cities and towns where in many areas lanes and streets were narrow and did not permit of the passage of

very large or cumbersome self-propelled motor fire pumps, tenders, turntable fire escapes and ladders, but could be made accessible to trailer fire pumps.

Incidentally, these very same, comparatively simple (though of the latest modern design) trailer fire pumps, had been greatly evolved and improved in design and construction, as the direct result of the ever-present threats of war in Europe, extending over the past five or six years. Trailer fire pumps had been turned out by the thousand or even by the ten thousand in Great Britain (and no doubt by some other countries also) for use in connection with so-called passive defence measures or A. R. P.

Mr. Howell went on to say that if ever this country should become the target of air attacks pressed home by a foreign enemy force (which might God forbid), the practical problems of dealing with incendiary bomb-attacks would assume a very serious aspect, and would need the assistance of many engineers as well as other classes of men to overcome or combat the dangers.

In the past as well as in the present, few engineers in India had interested themselves in the problems of fire-fighting.

Moreover, there was still a singular lack of experienced and competent fire masters and fire-fighting experts who understood the practical applications and use of all types of fire-fighting equipment and appliances and the training and exercise of men, *i.e.*, firemen to man the fire brigades.

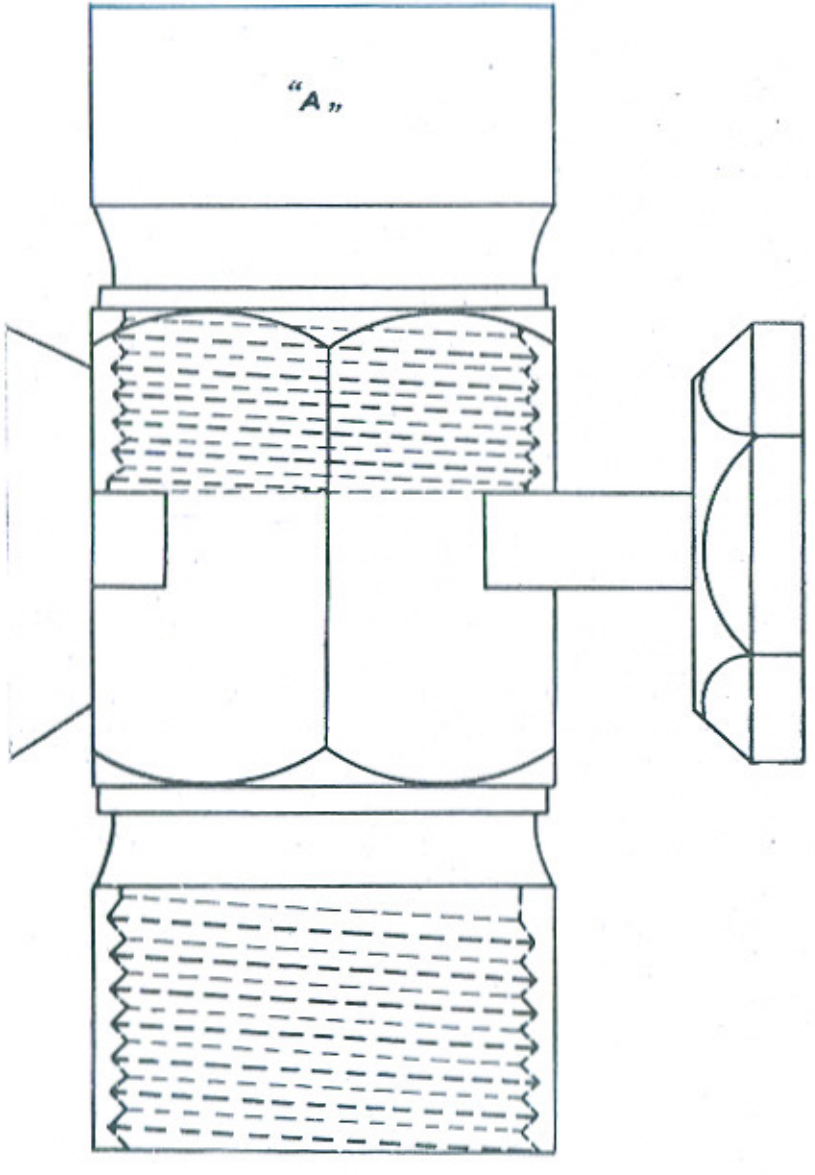
The speaker hoped that this state of affairs, however, would be remedied as quickly as possible and that Sardar Hukam Singh's Paper would prove a useful manual in the hands of persons who had to deal with problems connected with fire-fighting in all its aspects.

Replying to the discussion, the *Author* said that he had nothing to add to his previous remarks.

DUAL PURPOSE NOZZLE
FOR STIRRUP PUMP
SCALE FOUR TIMES FULL SIZE

FIG. 88
PAPER NO. 243

ELEVATION



PLAN
PART "A" REMOVED

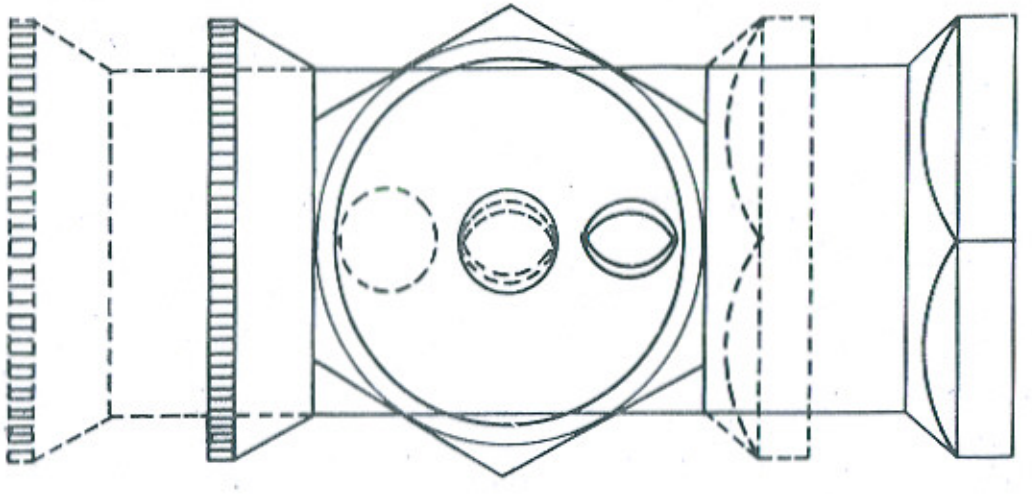
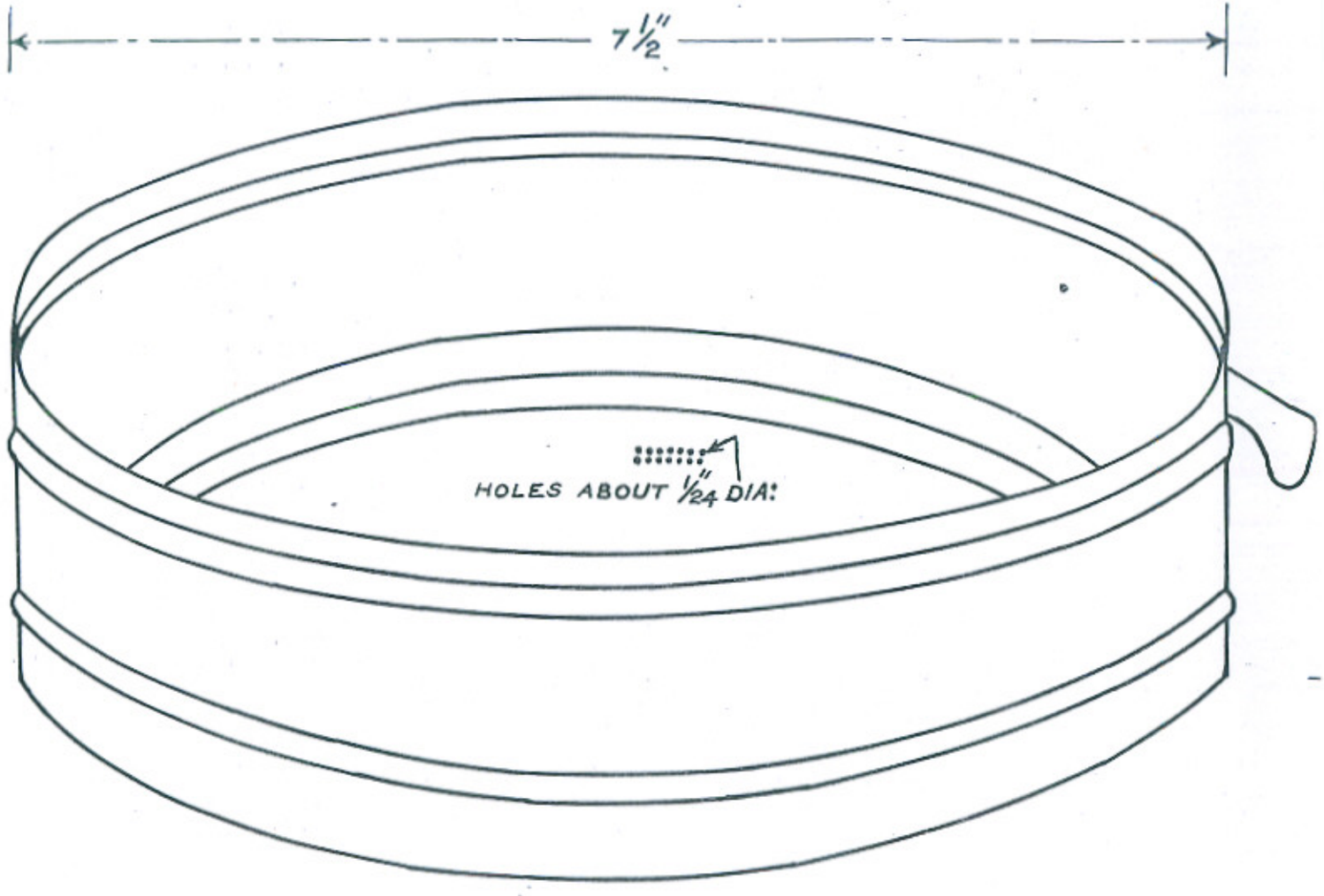


FIG. 88
SIEVE



APPARATUS FOR TESTING SAND

FIG. 89
CONTAINER

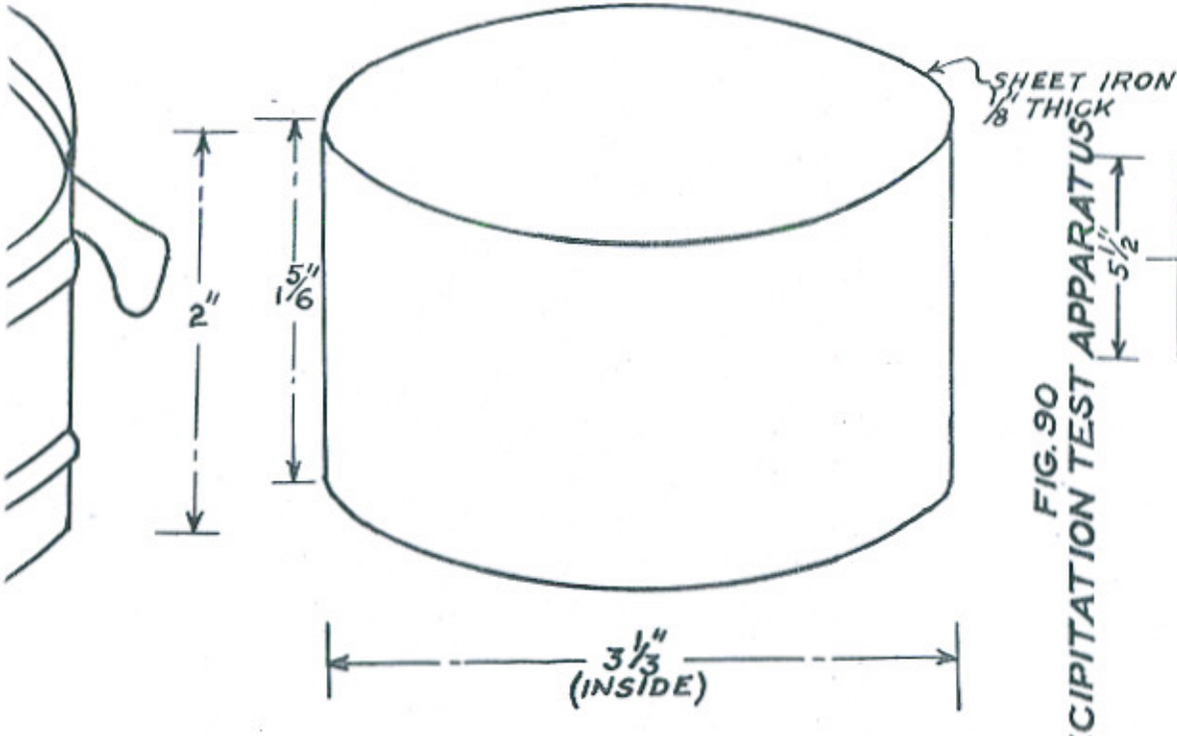
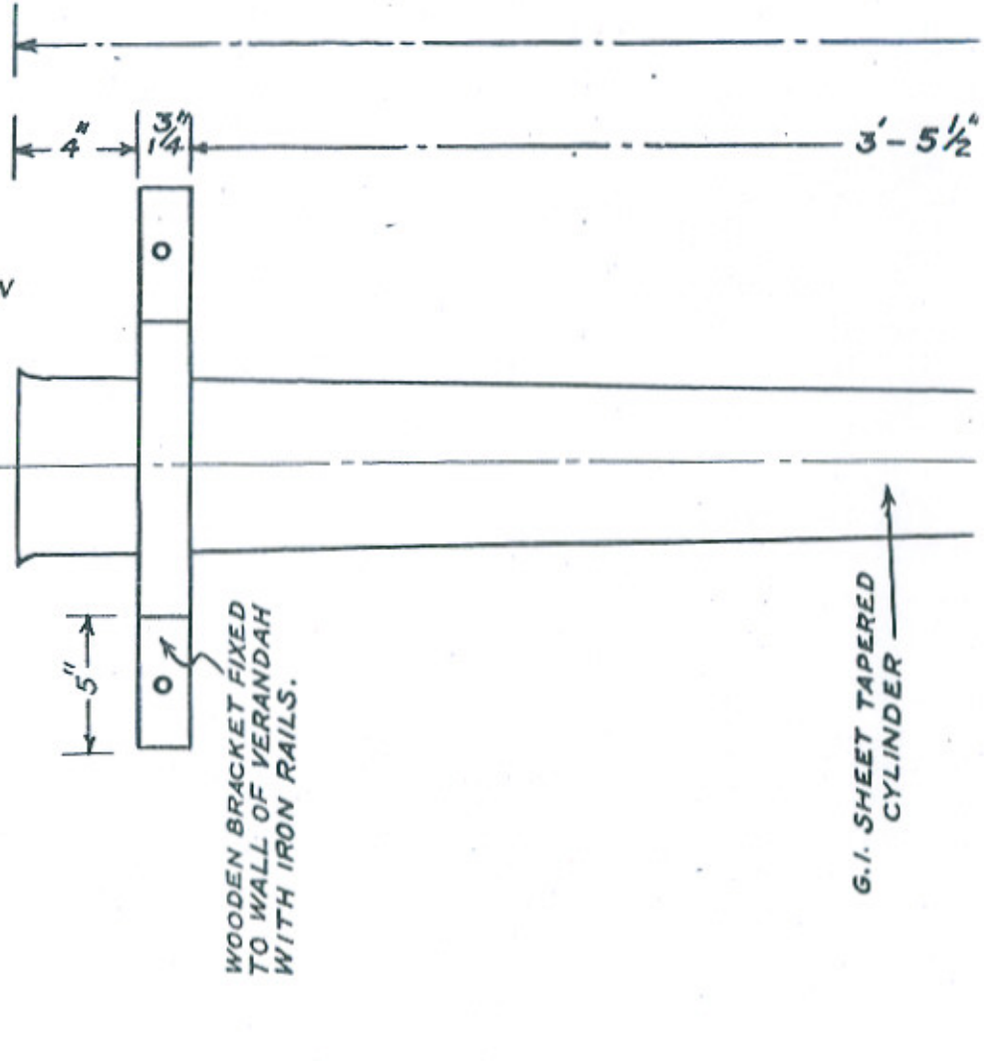
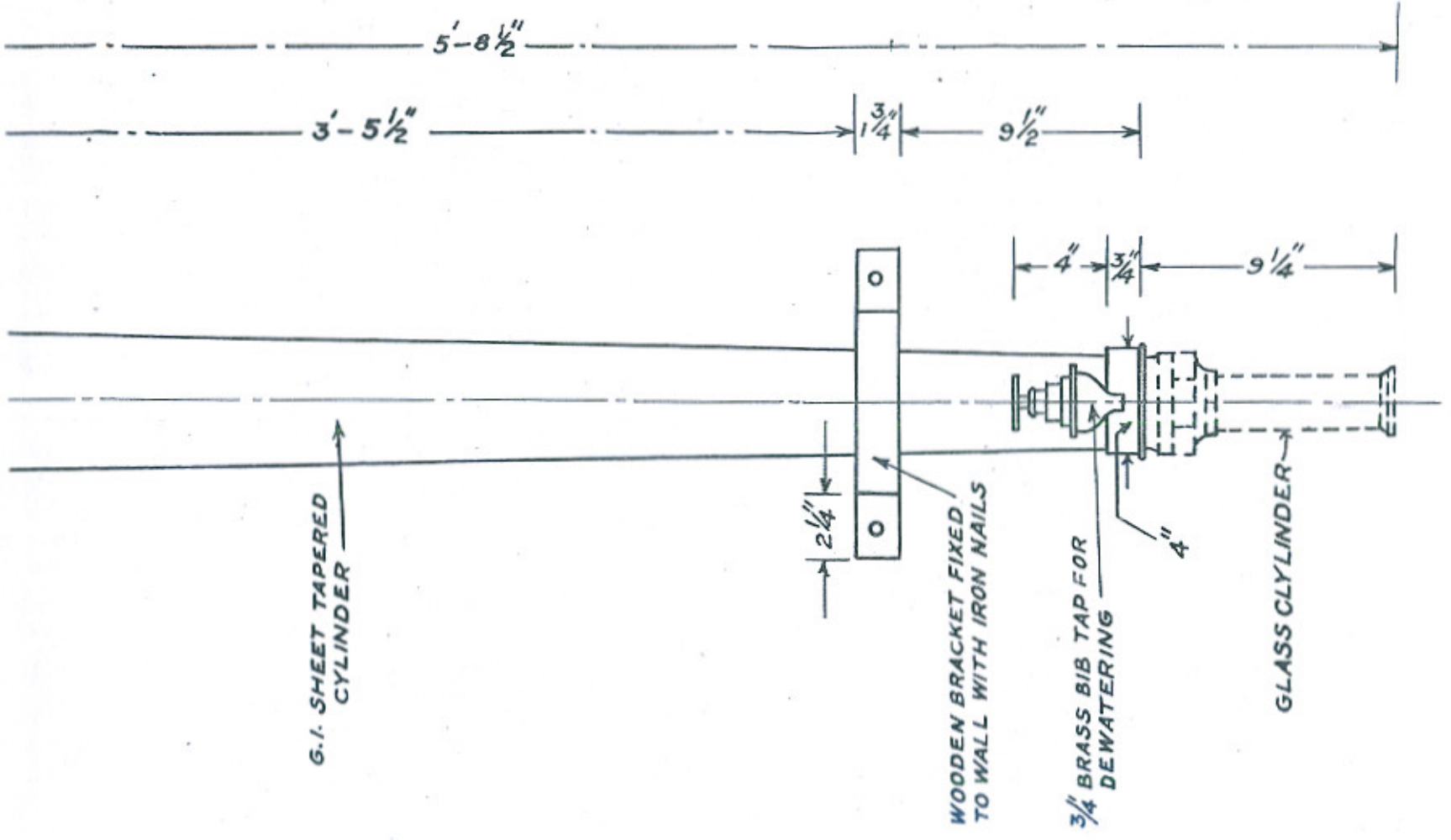


FIG. 90
PRECIPITATION TEST APPARATUS




5'-8½"
3'-5½"
¾"
1¼"
9½"
4"
¾"
9¼"
2¼"
G.I. SHEET TAPERED CYLINDER
WOODEN BRACKET FIXED TO WALL WITH IRON NAILS
¾" BRASS BIB TAP FOR DEWATERING
4"
GLASS CLYLINDER

GRAPH

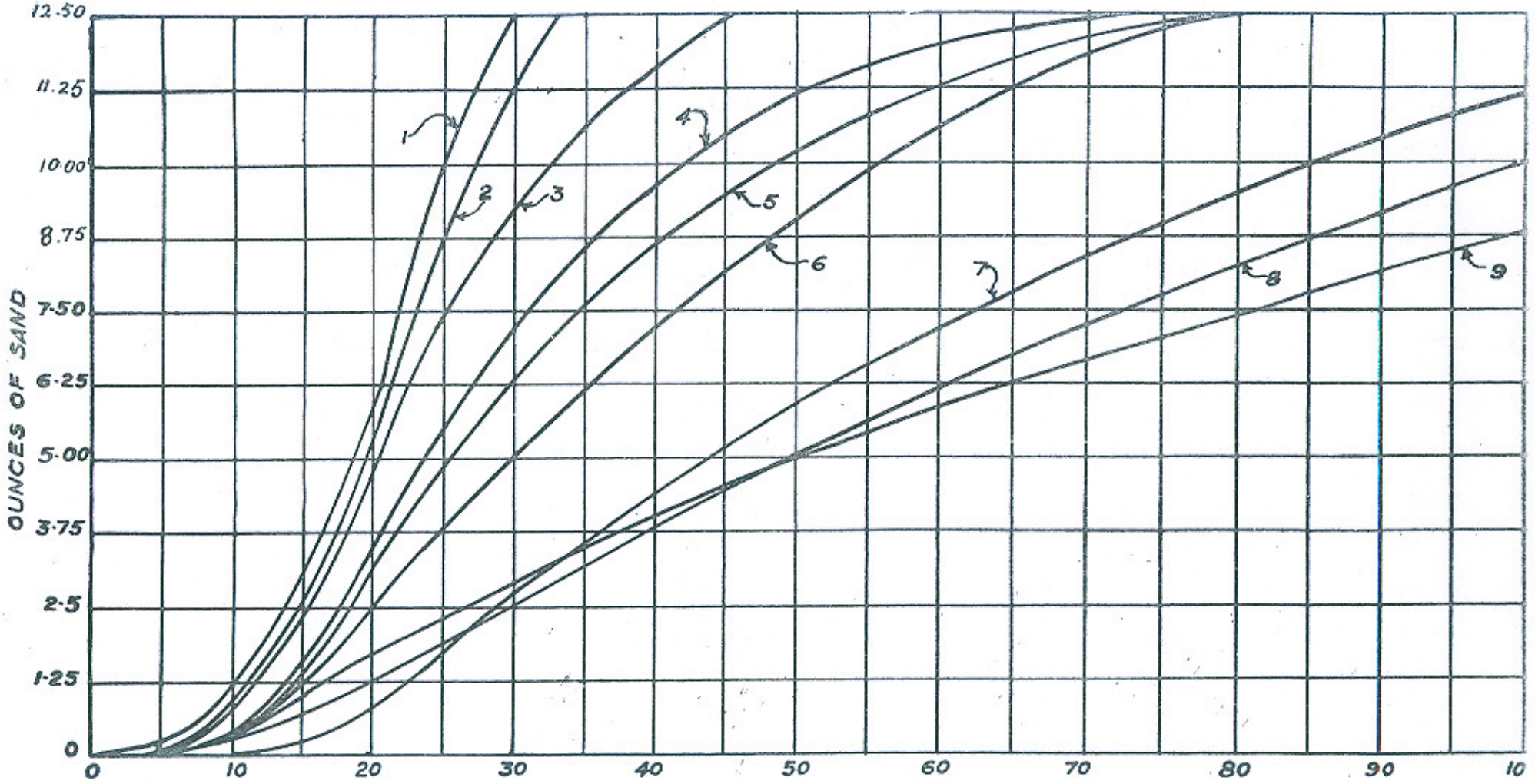
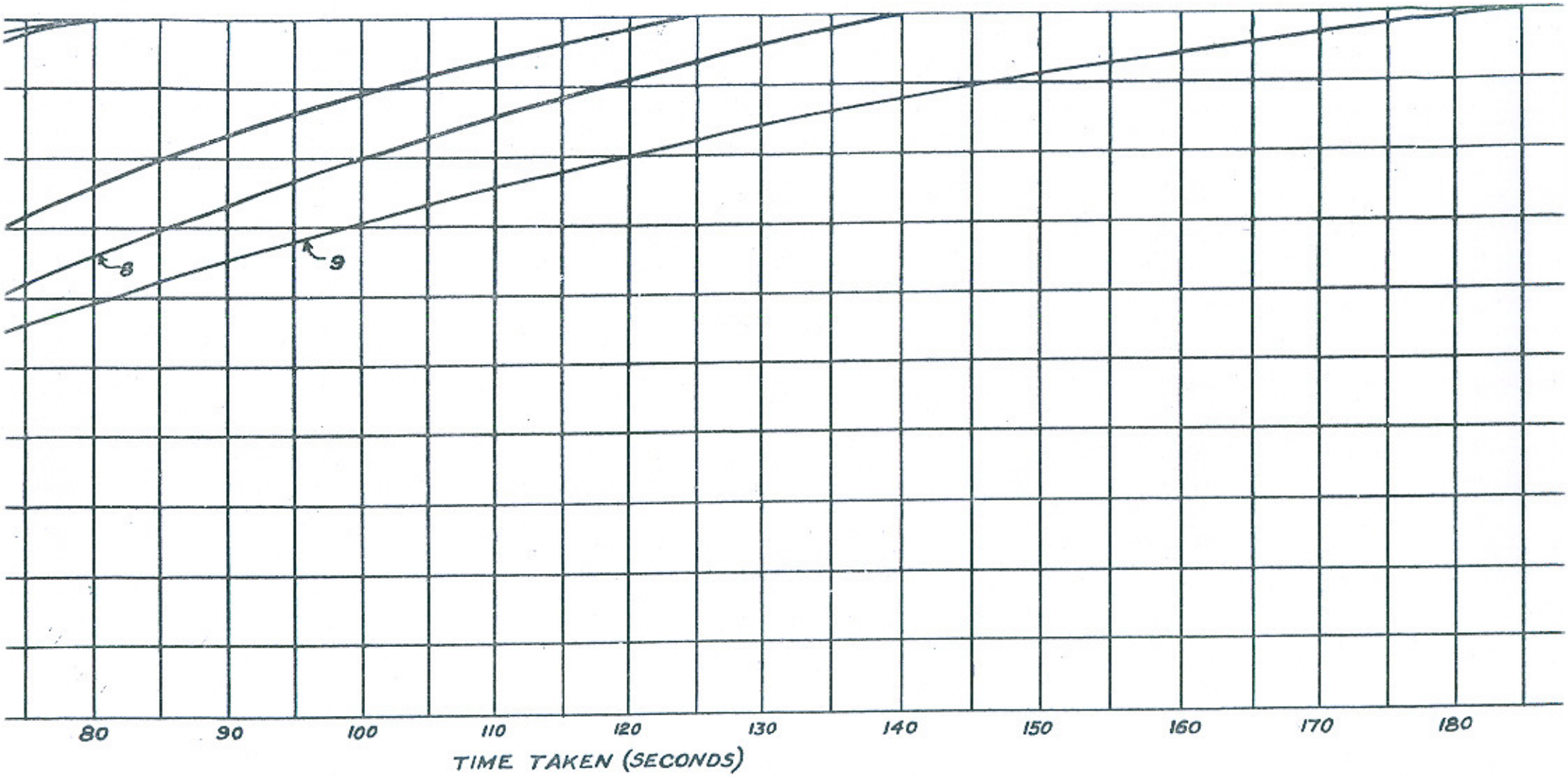
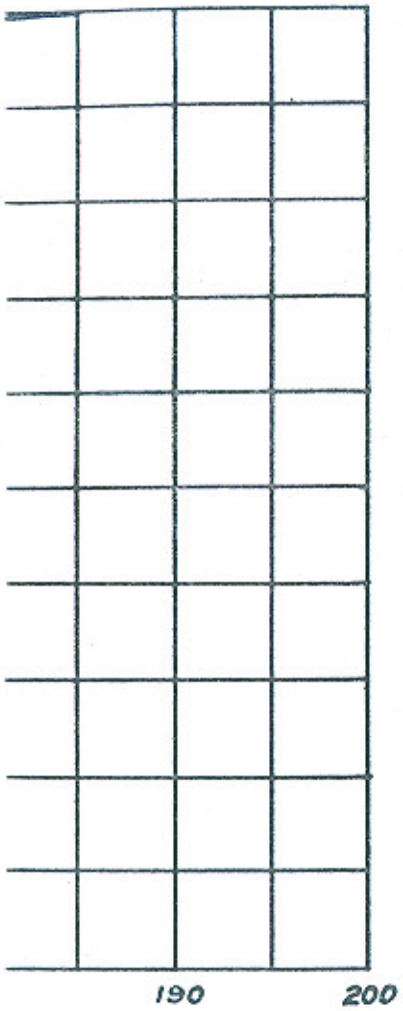

12.50
11.25
10.00
8.75
7.50
6.25
5.00
3.75
2.5
1.25
0
OUNCES OF SAND
0
10
20
30
40
50
60
70
80
90
1
2
3
4
5
6
7
8
9

FIG. 92
GRAPH OF SAND SAMLES



DETAIL OF GLASS CYLINDER TO BE FIXED IN POSITION AS SHOWN IN DOTTED LINES IN FIG. 90



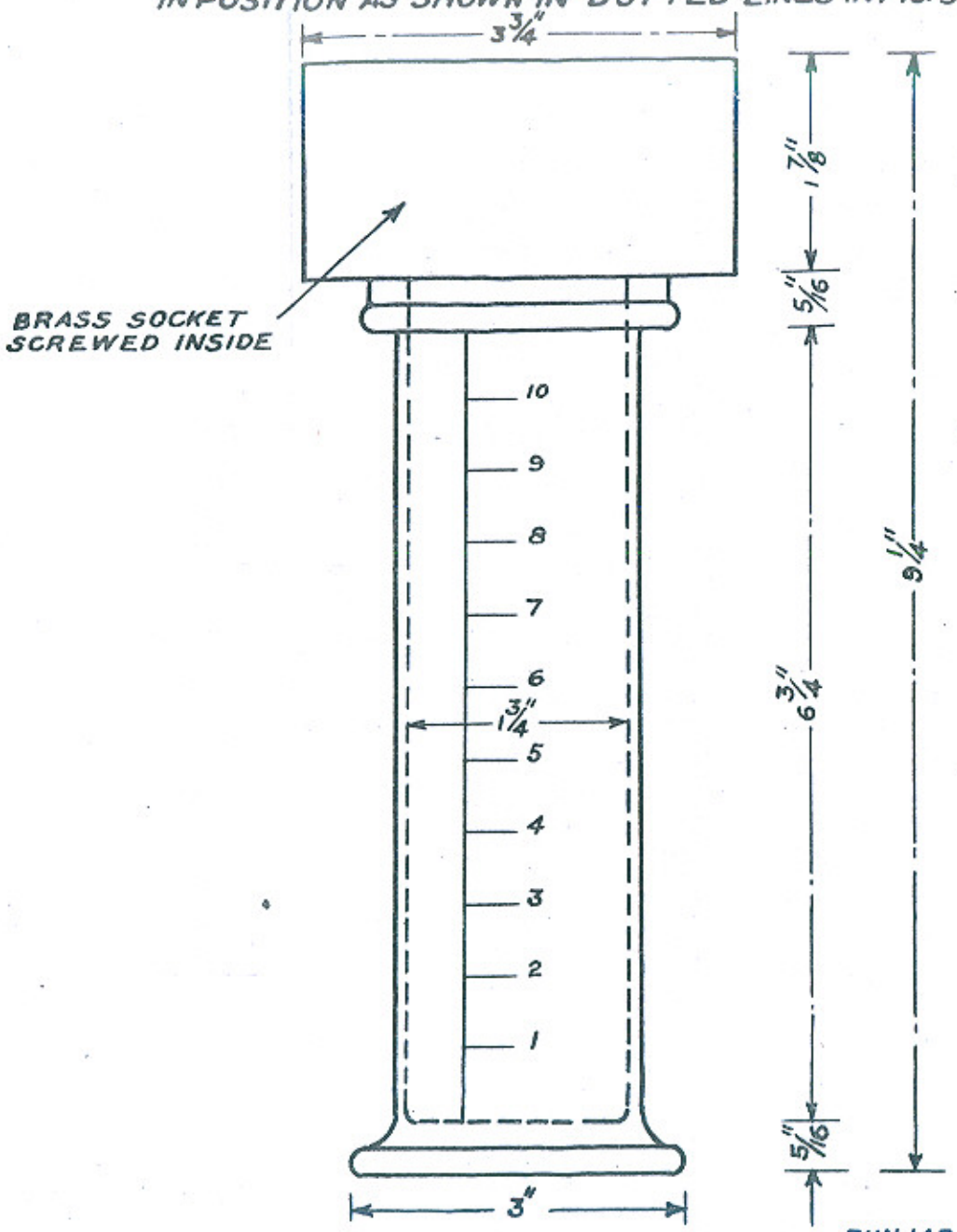
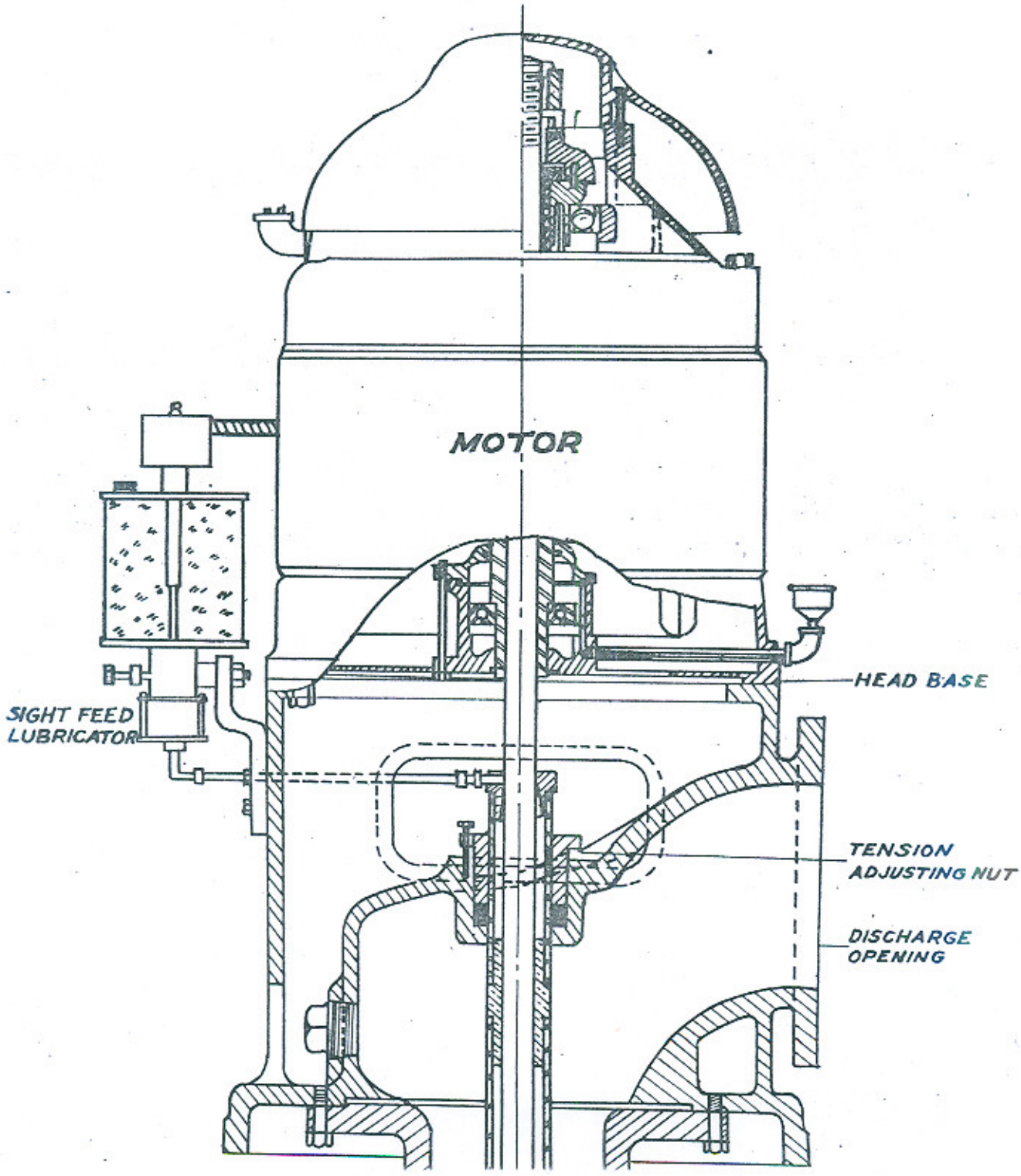
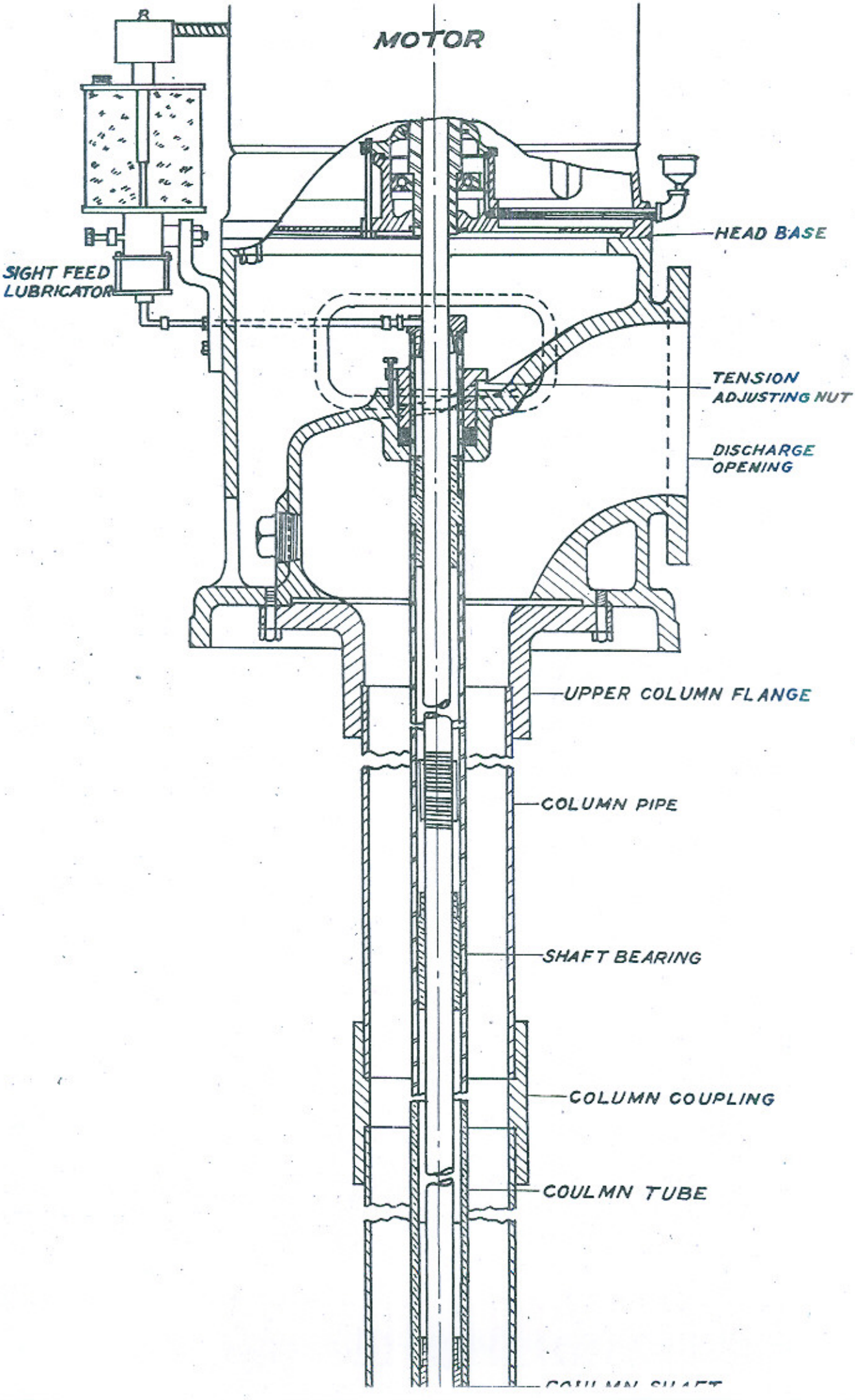


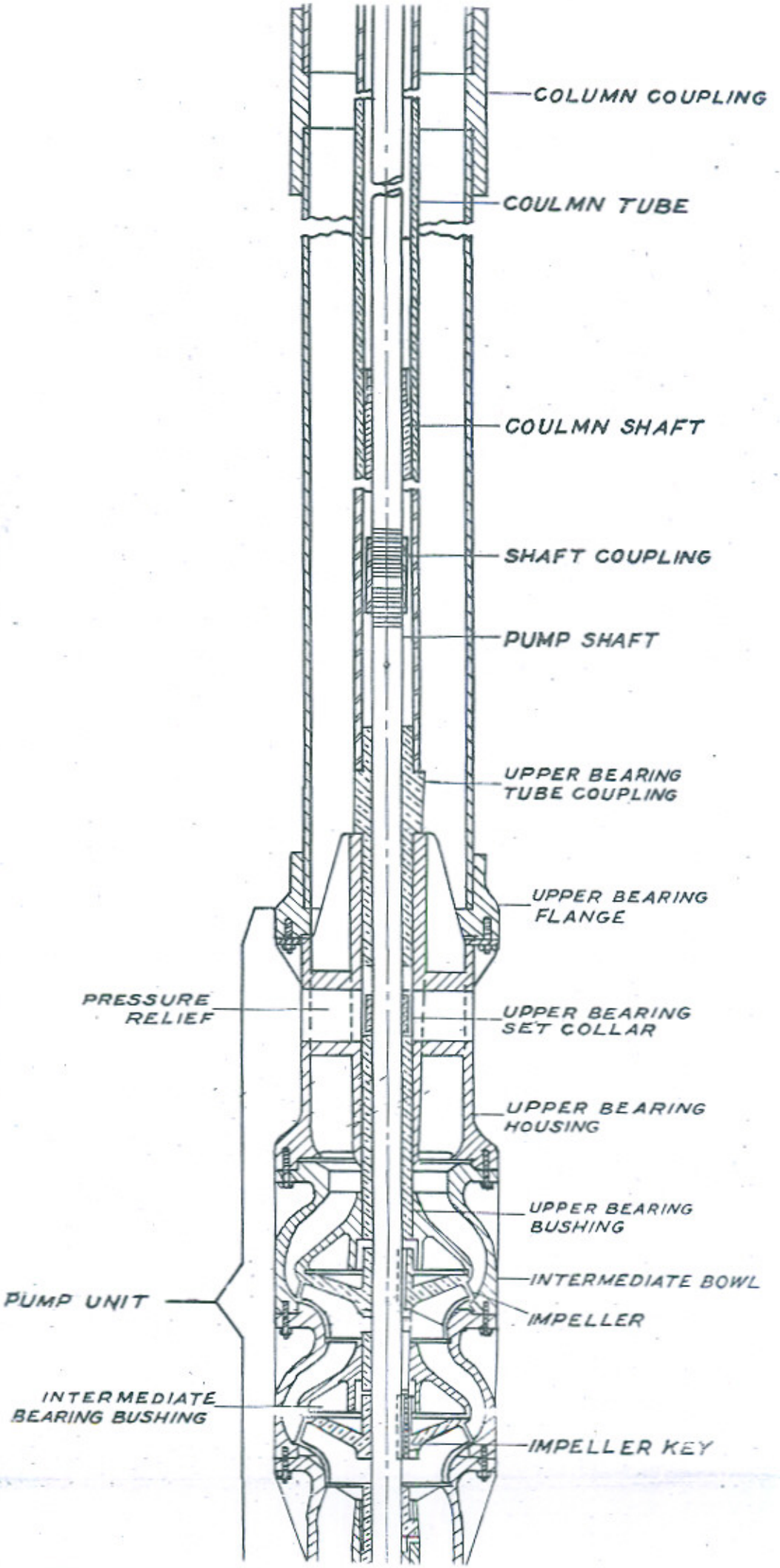
FIG. 91

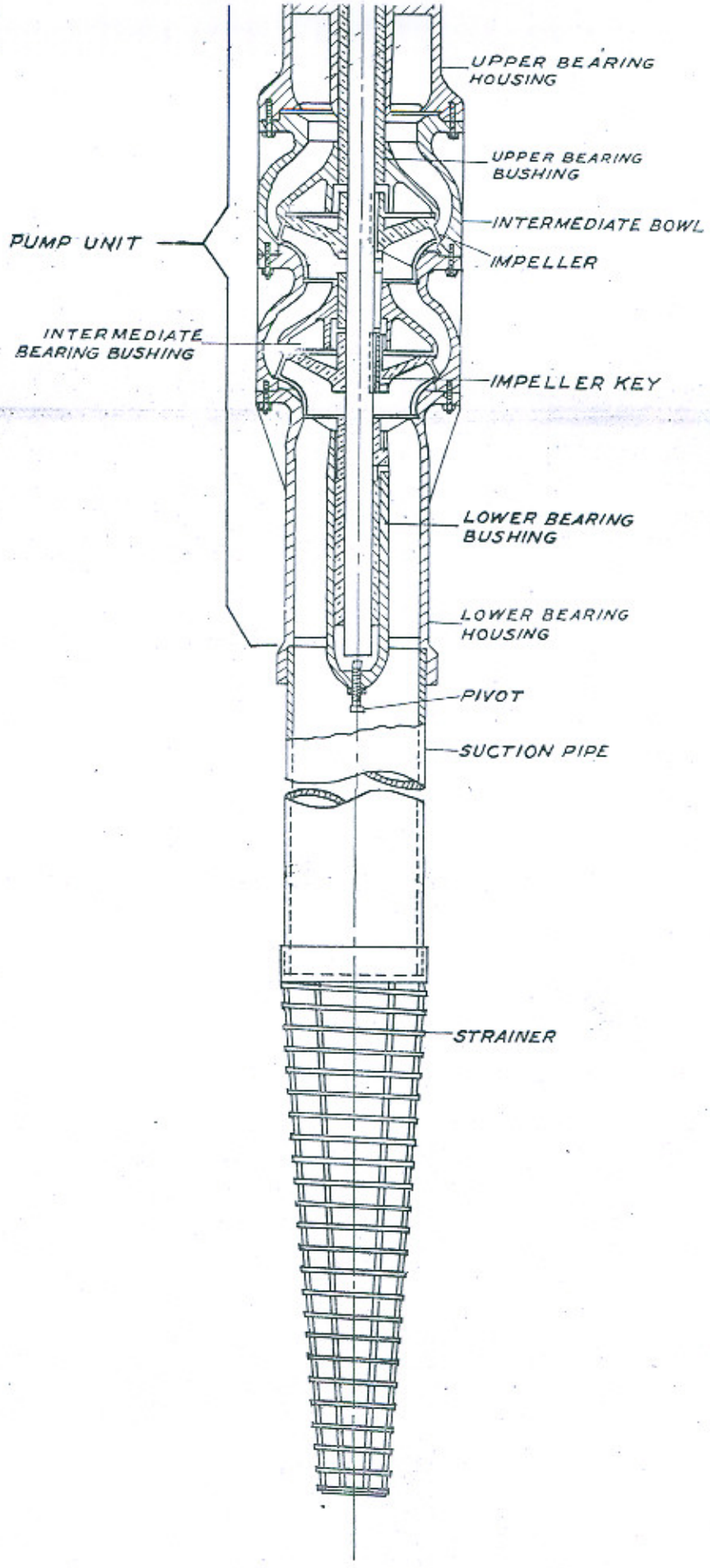
PAPER NO. 243

TYPICAL BORE HOLE TURBINE PUMP




MOTOR
HEAD BASE
SIGHT FEED LUBRICATOR
TENSION ADJUSTING NUT
DISCHARGE OPENING
UPPER COLUMN FLANGE
COLUMN PIPE
SHAFT BEARING
COLUMN COUPLING
COULMN TUBE

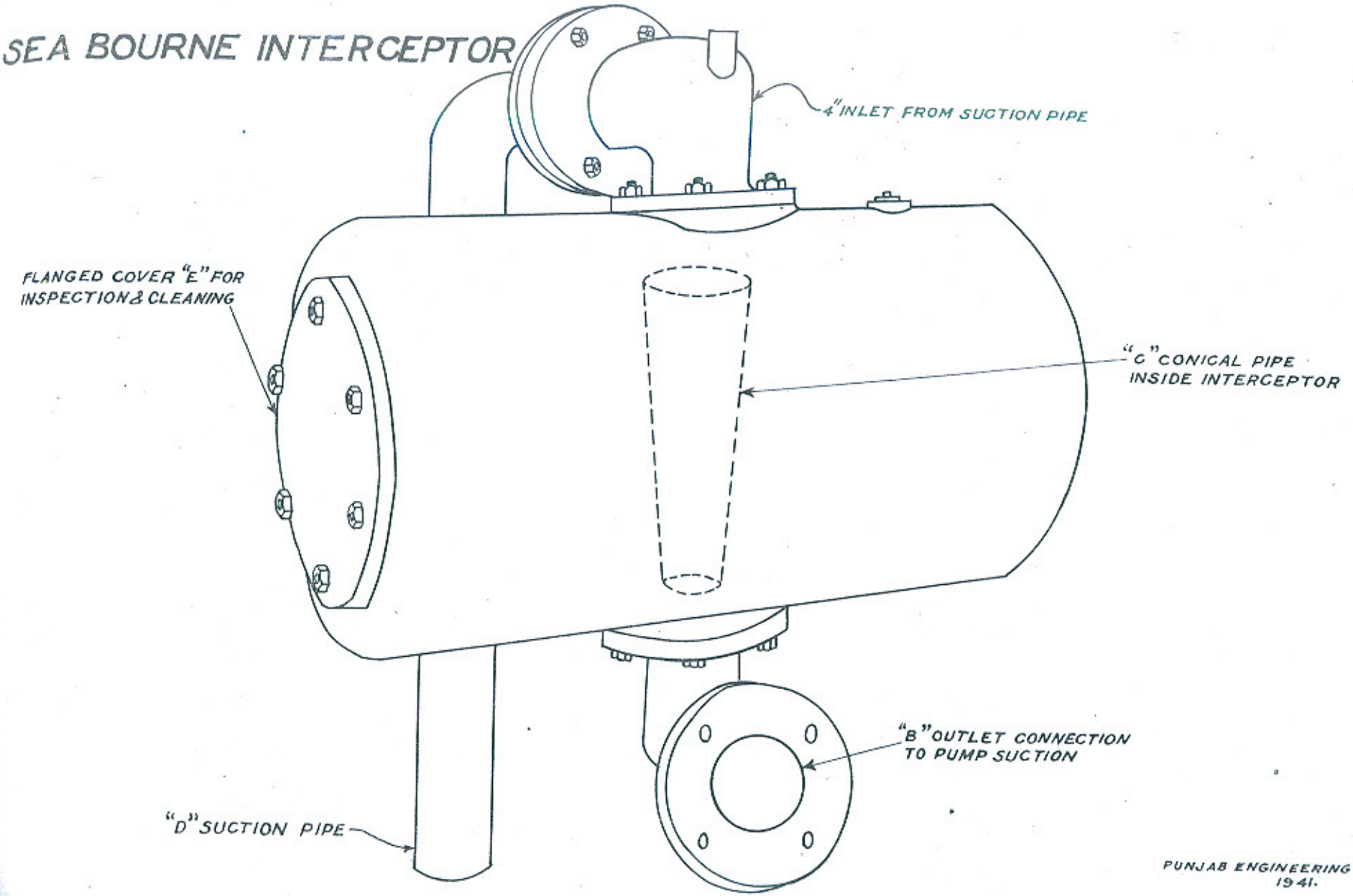

COLUMN COUPLING
COULMN TUBE
COULMN SHAFT
SHAFT COUPLING
PUMP SHAFT
UPPER BEARING TUBE COUPLING
UPPER BEARING FLANGE
PRESSURE RELIEF
UPPER BEARING SET COLLAR
UPPER BEARING HOUSING
UPPER BEARING BUSHING
INTERMEDIATE BOWL
IMPELLER
PUMP UNIT
INTERMEDIATE BEARING BUSHING
IMPELLER KEY



PUNJAB ENGINEERING CONGRESS
1941

SEA BOURNE INTERCEPTOR

PAPER NO. 243



PUNJAB ENGINEERING CONGRESS
1941.