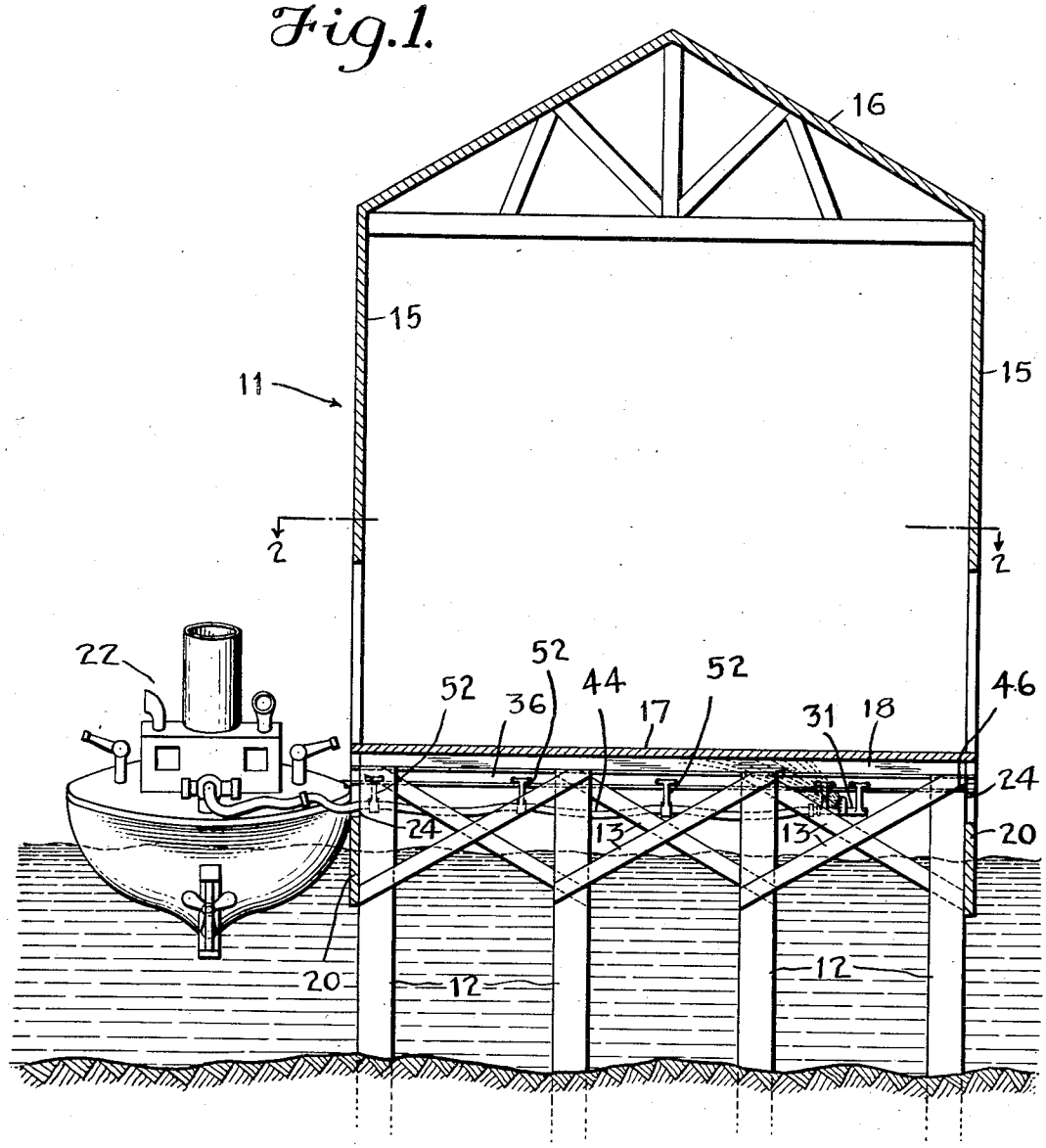
July 2, 1935. W. F. CONRAN 2,006,709

FIRE FIGHTING SYSTEM

Filed Aug. 12, 1932 5 Sheets-Sheet 1

Fig. 1.



INVENTOR

William F. Conran

BY

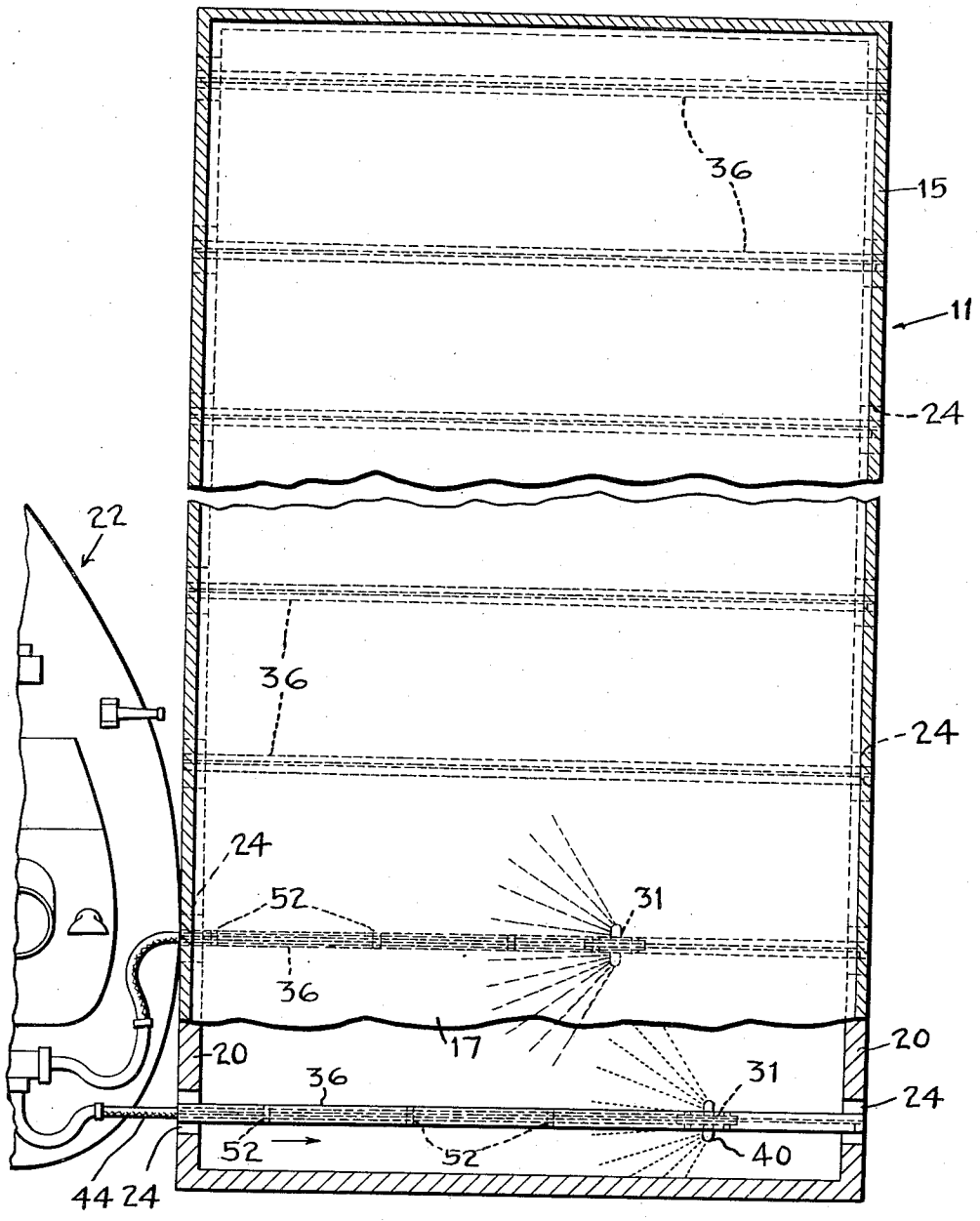
ATTORNEY

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FIRE FIGHTING SYSTEM

Filed Aug. 12, 1932 5 Sheets-Sheet 2

Fig. 2.



INVENTOR
William F. Conran
BY
H. Lombenberg
ATTORNEY

July 2, 1935. W. F. CONRAN 2,006,709

FIRE FIGHTING SYSTEM

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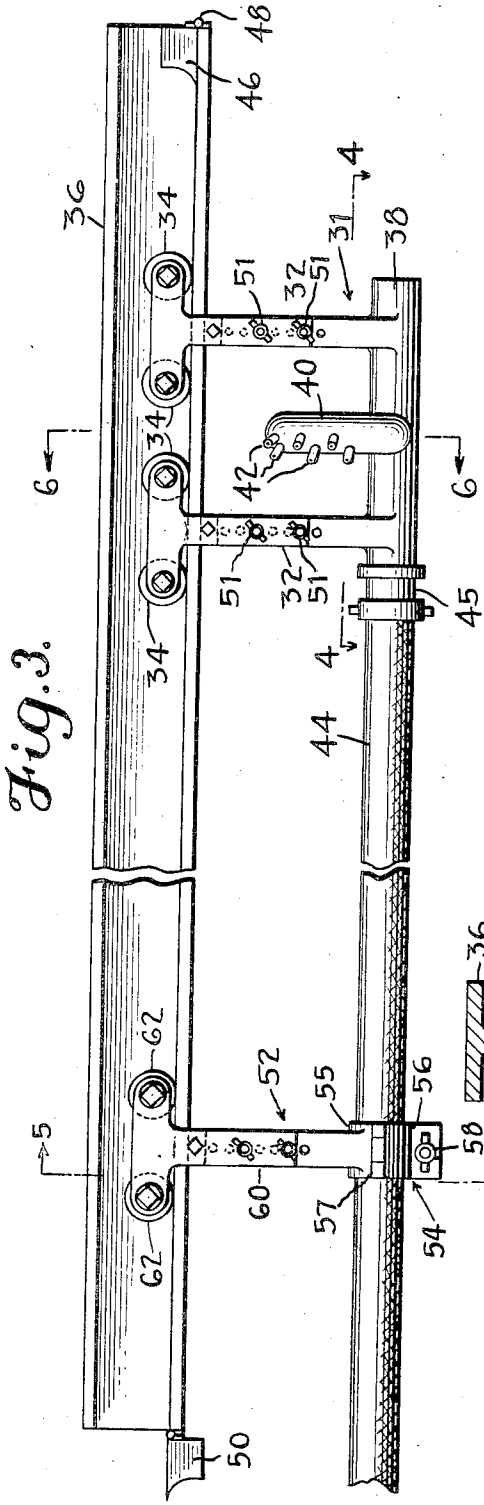


Fig. 3.

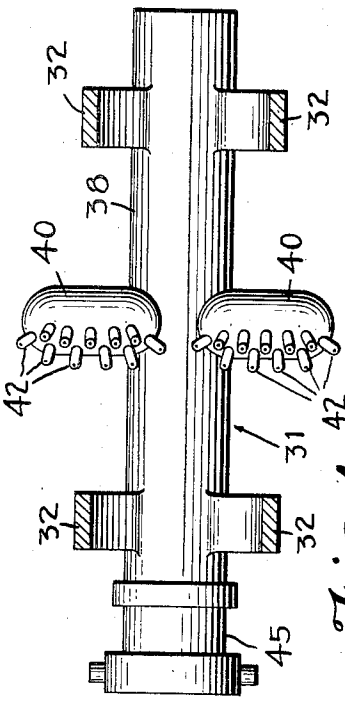


Fig. 4.

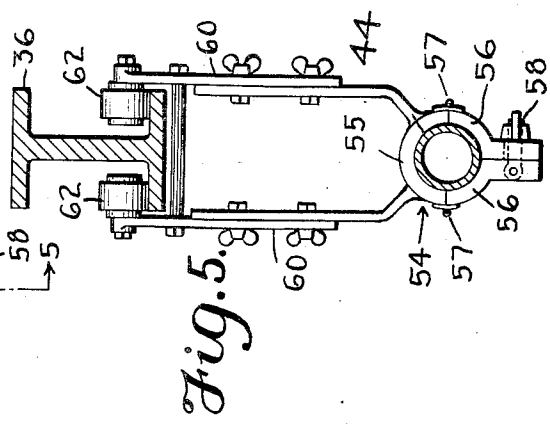


Fig. 5.

INVENTOR
William F. Conran

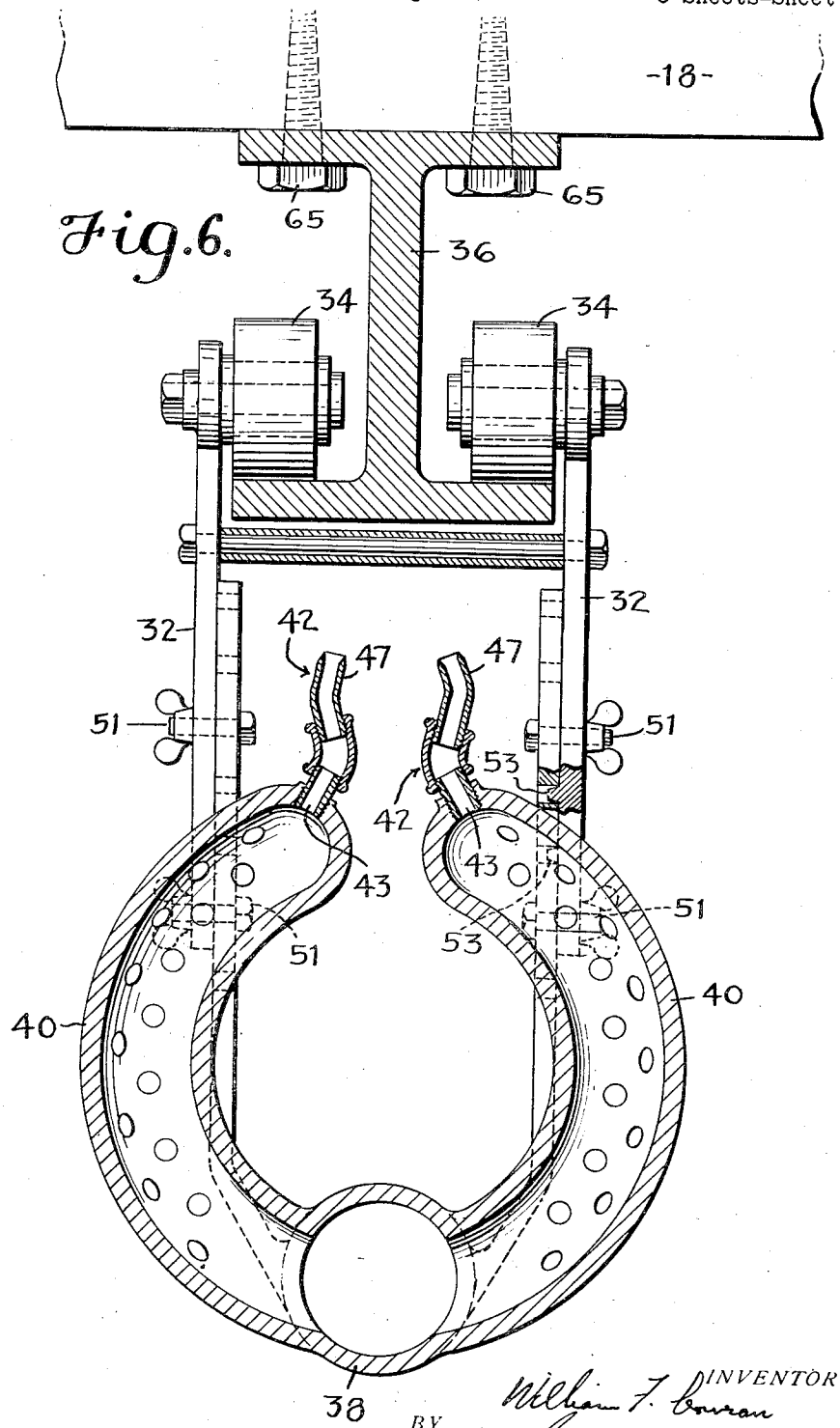
BY
J. Vandenburg
ATTORNEY

July 2, 1935. W. F. CONRAN 2,006,709

FIRE FIGHTING SYSTEM

Filed Aug. 12, 1932 5 Sheets-Sheet 4

Fig.6.



INVENTOR
William F. Conran
BY
J. F. Vandenberg
ATTORNEY

July 2, 1935. W. F. CONRAN 2,006,709

FIRE FIGHTING SYSTEM

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Fig. 7.

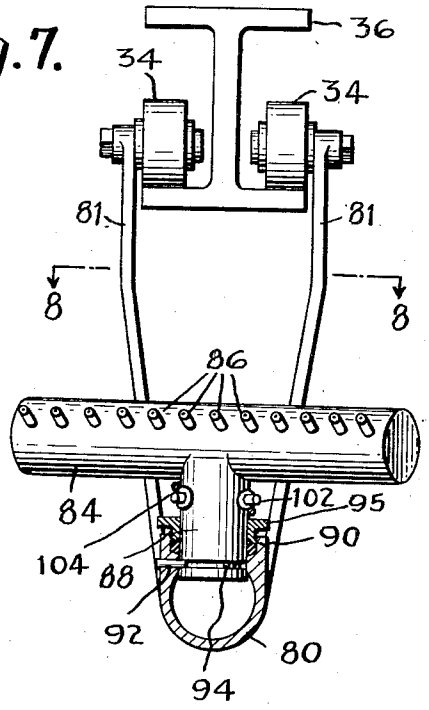


Fig. 8.

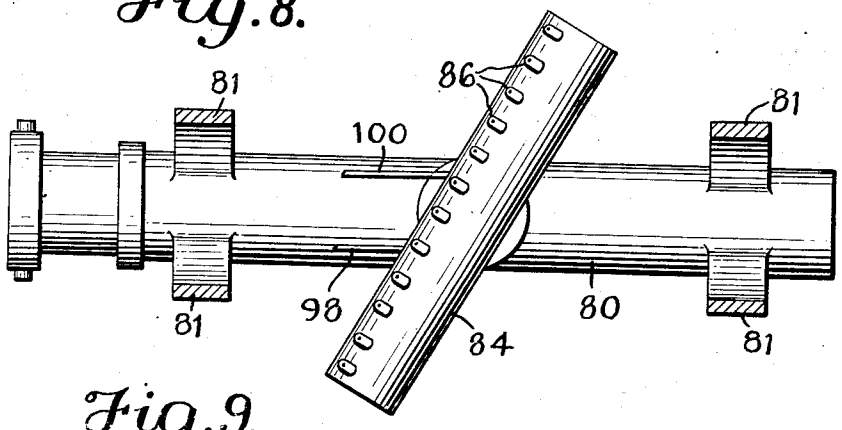
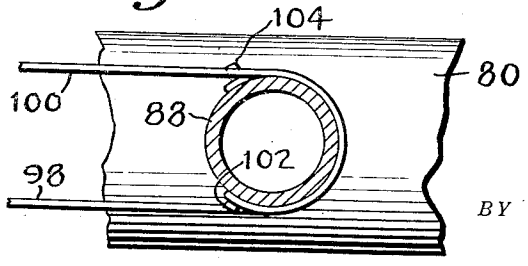


Fig. 9.



BY

William F. Conran INVENTOR

J. Brandenburg ATTORNEY

Patented July 2, 1935 2,006,709

UNITED STATES PATENT OFFICE

2,006,709

FIRE FIGHTING SYSTEM

William F. Conran, Brooklyn, N. Y.

Application August 12, 1932, Serial No. 628,463

20 Claims. (Cl. 169—2)

This invention relates to fire-fighting systems and apparatus, and its object is to provide an effective means for extinguishing fire and/or preventing the spread of fire in relatively inaccessible places, that is to say, places which are or may be inaccessible or difficult of access to firemen and conventional portable fire-fighting equipment, or to streams thrown from fire-hose nozzles or the nozzles of fire-boats.

A particular object of the invention is to afford fire-protection for the substructures of docks, piers, wharves and the like, and a practical way of extinguishing fires therein. The term "substructure" may be taken to mean the main, or sub-, deck or floor, or the under side thereof, and the parts below. The term "dock" is used in the sense which includes piers and wharves. These and other structures built in or over water, and usually supported on piles, present a serious fire hazard, since an unreachable fire may start in the substructure and spread by burning along the under side of the floor or deck and from pile to pile. The substructure being over water, firemen can not walk into the space, and those on fire boats are unable to get streams under the deck or to cause them to strike the fire. If, as is often the case, there are side walls or shields coming down to or below the water, the subjection of such fires becomes even more impossible. Experience has shown that fires of this kind are apt to be uncontrollable. As a means of fire-protection, manholes are sometimes placed in the dock deck, but it may be impossible to get to the manholes, or extremely hazardous to use them, and whatever it might be possible to accomplish by using the manholes, the draft which results when they are open is likely to carry the fire into the superstructure.

In accordance with this invention, tracks or rails are installed in the region to be protected, and portable nozzle-heads are provided having connections to receive fire-hose. These nozzle-heads are so devised that they will be driven along the tracks by the force of jet reaction directly utilized, and draw the hose with them; at the same time, and when held stationary, so distributing the discharge of water as to wet effectually surfaces within a large area, to extinguish fire within the range of the coverage, or, by the water curtain which is created, to prevent the spread of fire.

The nozzle heads are equipped with wheeled carriages so as to travel freely on the tracks, the construction being preferably such that the nozzle-head is slung beneath the rail.

The propulsion of a nozzle-head and the effective distribution of water therefrom, with the pressure and volume of water obtainable through a firehose, may be achieved by providing the nozzle-head with numerous nozzles or jet outlets set in different directions, so that water is thrown upward against the floor, toward the sides and rearward. The number of the jets and their directions may vary; in fact, it is advantageous that the nozzles, or some of them, be adjustable so that they can be set in a manner which will be most suitable for particular substructure conditions; but by the jets of general rearward directions ample reaction force is developed to drive the nozzle-head with its supply hose along the supporting rail. The water thrown backward, more or less lengthwise with respect to the track, also serves to give extent in that dimension to the curtain or discharge. By placing two or more of the nozzles, each with its hose, in series on a single rail, a water barrier to the spread of fire can be maintained extending all the way across beneath a dock floor. Elements of lateral direction among the jets gives width of coverage transversely of the track, and breadth to the water curtain. A copious amount of water strikes the under side of the deck, in addition to which piles, cross-bracing and the like are also wetted.

A single track may be sufficient for the protection of a given region, but the typical installation, such as a dock installation, comprises numerous tracks, usually parallel and extending across the substructure at suitable spacings. It is one of the practical and valuable features of the invention that the nozzle-heads need not remain continually on the tracks, subject to weather and depredations of river pirates, and that many nozzle heads are not needed for adequate protection of a structure. Therefore, it is most desirable that the nozzle heads be portable, rather than stay as part of the permanent installation, and that a nozzle head be applicable to any one of a set of tracks depending upon the location of a fire. Furthermore, each nozzle head can be put on at either end of a track, this being a matter of importance since it may not be possible to come close to the leeward side of a dock fire.

Also included in the invention is a provision that may be used to keep the hose up, and more especially to keep it from dragging and catching on braces or other parts of the substructure. This provision comprises one or more wheeled hose-carriers adapted to be attached to the hose and to be pulled along the supporting rail.

Other objects, features and advantages of the

invention will become apparent from the drawings and from the detailed description of the embodiments of the invention illustrated therein.

In the accompanying drawings, forming a part hereof:

Fig. 1 is an elevation, partly in section, of a dock with a fire-boat supplying water to fire-fighting apparatus in accordance with this invention;

Fig. 2 is a fragmentary sectional view on the line 2—2 of Fig. 1, part of the floor being broken away;

Fig. 3 is a side elevation of fire-fighting apparatus designed in accordance with this invention;

Figs 4 and 5 are sectional views, taken on the lines 4—4 and 5—5, respectively, of Fig. 3;

Fig. 8 is an enlarged sectional view, taken along the line 6—6 of Fig. 3;

Fig. 7 is an end view, partly in section, showing a modified form of the invention;

Fig. 8 is a sectional view along the line 8—8 of Fig. 7; and

Fig. 9 is an enlarged view, partly in section, showing the means for turning the nozzles in the modified form of the invention shown in Figs. 7 and 8.

Figs. 1 and 2 show the application and use of the invention beneath a dock 11 supported on piles 12 having conventional cross braces 13. The dock has side walls 15, a roof 16, and a floor 17 which is laid on floor beams 18 supported by the piles 12. Side walls 20 are shown extending from the floor 17 downwardly into the water. If such walls are present, as they frequently are, they are provided at intervals with openings 24 for the purpose of this invention.

A fire-boat 22 is shown alongside the dock supplying water to fire-fighting equipment under the dock floor. The side walls 20 have a plurality of openings 24.

The fire-fighting equipment seen in action under the dock floor in Figs. 1 and 2 is shown on an enlarged scale in Fig. 3. A nozzle head 31 has brackets 32, to which wheels 34 are connected. The wheels run on a rigid track 36, which is connected by lag screws 65 under a beam 18 of the dock, or other structure, to be protected from fire. The track or rail is preferably in the form of an I-beam, on the lower flanges of which the wheels travel, but other forms of tracks or ways may be used.

The nozzle head includes a hollow body portion 38 to which are connected branches 40, these branches being integral with the body portion 38 in the form of the invention shown in Figs. 3, 5 and 6. The branches 40 are hollow and communicate with the interior of the body portion 38, as shown in Fig. 6. Water entering the body portion 38 flows into the branches 40 and discharges through a multiplicity of nozzles 42. The water is supplied to the nozzle head through a hose 44 (Fig. 3), connected with the rearward end of the nozzle head by a conventional screw coupling hose connection 45.

Two of the nozzles 42 are shown in detail in Fig. 6. Each nozzle includes a nipple 43 threaded into the nozzle head. A 45° elbow threads over the nipple 43 and a nozzle tip 47 is threaded into the outer end of the elbow. The nozzle tip has a 22.5° bend and can be turned about its threads to change the direction of discharge of the water jet. Further adjustment of the direction of the water jet is made by turning the elbow on the threads of the nipple 43. These two adjustments combine to produce a very wide range of directions for the water jet. Simple non-adjustable nozzle tips threading directly into the nozzle head can be used, if desired.

The nozzles are set at different angles so as to wet the underside of the floor or deck and other substructure surfaces, and to distribute the water over a large area. The type of building, the width of bays, and the spacing between tracks when parallel tracks are used, are important considerations in determining the setting of the nozzles. Figs. 3 and 4 show the nozzles diagrammatically, and in positions to direct the water upwardly, rearwardly and laterally. The disposition of the nozzles is such that, by the simple reaction of jets of more or less rearward direction, sufficient force is produced to drive the wheeled nozzle-head forwardly the full length of the track, and to pull the fire hose, with or without the hose-carriers which will be described. At the same time a curtain or coverage of water is thrown, this curtain extending a considerable distance to the rear and spreading sidewise. With the amount of water that can be supplied through a fire hose at pressures ordinarily available, ample propulsion and very effective distribution are secured, and a means is provided for extinguishing a substructure fire and/or preventing extension of such fire.

One of two blocks 46 and 50 at the ends of the track 36 limits the forward travel of the nozzle head 31, and prevents the wheels 34 from running beyond the end of the track. The blocks are connected with the track by hinges 48, so that either block can be swung clear of the wheels when the nozzle head is to be placed on or taken off the track at that end. The block 50 is shown hinged down into a position where it will not obstruct the wheels 34.

The brackets 32 are made in two sections, which are fastened together by bolts 51. The construction is shown in detail in Fig. 6. The upper section has lugs 53 which fit into holes in the lower section. The bolts 51 clamp the sections together, and the lugs 53 relieve the bolts of shearing stress.

If the brackets 32 are to be lengthened, the bolts 51 are removed and the upper and lower sections of the brackets moved apart to withdraw the lugs 53 from their registering holes. The lower section of the bracket is then moved down so that each lug registers with the next hole above, or some higher hole, depending on how much elongation is desired. The lugs are then inserted in the new holes and the bolts 51 again used to clamp the sections together. All of the holes in the lower sections are equally spaced and the same set of holes is used for both the bolts 51 and lugs 53.

The hose is supported at one or more points along its length by hose carriers or hose-supporting carriages 52, each of which has a hose clamp 54 at its lower end Each hose clamp comprises a top portion 55, to which are connected two lower portions 56 by hinges 57. These lower portions swing outwardly, so that the hose can be inserted in the clamp, and are then brought together and held in position by a bolt and wing nut 58.

Each hose supporting carriage 52 has upwardly extending brackets 60 supported by wheels 62 which run on the track 36. These brackets 60 are similar to the brackets 32 and can be extended or shortened in the same way. A particularly important application of the invention

is the protection of the under-floor portion of a dock, which is especially inaccessible with conventional fire-fighting equipment. Many disasters have demonstrated that it is difficult, and often impossible, to successfully combat with known fire-fighting equipment a fire traveling along the underside of a wharf or dock.

Fig. 2 shows a plurality of tracks **36** extending across the dock **11** under the floor **17**. The openings **24** in the side walls **20** are located at the ends of the tracks **36**, to permit access to both ends of each track. The nozzle head **31** can be placed on any of the tracks from either end, and in case of fire, with a wind blowing across the dock, the nozzle head is placed on the up-wind end of the track. The openings permit the nozzle head to be placed on the track from the outside of the structure, and this is a feature of the invention applicable to other structures as well because it is often dangerous or impossible for a fireman to enter a burning structure.

The hose **44** is connected with the nozzle head, and when water is pumped into the hose by the fire-boat the nozzle head is driven along the track, discharging streams of water against the under side of the dock floor. As the nozzle head moves along the track, additional hose is paid out and hose supporting carriages **60** are placed on the track to carry the weight of the long hose line trailing behind the nozzle head. The nozzle head can be moved in a reverse direction by pulling in the hose. If the fire is of large extent, nozzle heads **31** are used on several of the parallel tracks at the same time. These nozzle heads may be placed on the tracks from the deck of the fire-boat.

Although the invention is described as applied to the under side of a dock floor, it will be evident that it may have other applications. The invention may be used to carry hose and nozzles into the vicinity of a fire which would be otherwise inaccessible, or difficult of access, either because of location or intervening structure or because of unbearable heat from the fire.

Figs. 7 to 9 show a modified form of the invention having a different type of nozzle head. In this form of the invention, the nozzle head has a body portion **80**, which is similar to the body portion **38** except for its connection with the nozzles, and its one-piece brackets **81**.

A T head **84** carries a plurality of nozzles **86**. These nozzles are directed upwardly and are substantially parallel to one another. Both ends of the head **84** are closed, so that the nozzles are the only discharge openings. Water is supplied to the head through a hollow stem **88**, which communicates with the interior of the body portion **80** through a bearing **90**. The stem **88** is rotatable in the bearing **90**, but is held against movement longitudinally of its axis by a pin **92**, which extends into a groove **94** in the lower end of the stem **88**. A stuffing gland **95** prevents water from leaking through the bearing **90**.

When the stem **88** is turned so that the nozzles discharge rearwardly, the reaction from the water jets moves the nozzle head forward. The nozzle holder can be moved rearwardly by reaction of the water jets if the nozzles are turned to direct the jets forward.

Means are provided for turning the nozzles, and one embodiment of such means is shown in Figs. 7–9. A pair of flexible members **98** and **100** pass around the stem **88** from opposite sides and have their respective ends fastened to the stem by pins **102** and **104** (Fig. 9).

When the stem **88** is to be rotated clockwise, in Figs. 8 and 9, the flexible member **98** is pulled to the left and the flexible member **100** is left free to wrap further around the stem as it turns. When the nozzles are to be turned in the opposite direction, the pulling force is applied to the flexible member **100** and released from the member **98**. The flexible members **98** and **100** are as long as necessary to reach from the carriage to an operator located on a fire-boat or at some other remote point out of danger from the fire. The operator can thus be stationed outside the burning building and can control the movement of the carriage, through an opening in an outside wall of the building, by these flexible members **98** and **100**.

The operation of the system shown in Figs. 1–6 is as follows:

The fire-boat **22** pulls up to the windward side of the burning dock **11**, alongside of the ends of the tracks **36** which are closest to the fire. If there are covers or doors over the openings **24**, these covers or doors are removed or opened by the firemen.

When the tracks **36** are not in use, the blocks **46** and **50** (Fig. 3) at the ends of the tracks are all kept in the blocking position, which is the position of the block **46** in Fig. 3. The block at the fire-boat side of the wharf, for example, the block **50**, is swung into the position shown in Fig. 3, and the nozzle head **31** is placed on the track. The hose **44** is more conveniently coupled to the nozzle head before putting the nozzle head on the track.

Water is pumped into the hose by the fire-boat and discharges through the nozzles **42**. The force of the water drives the nozzle head forward along the track in the manner already explained. When the nozzle head has traveled some distance, the hose supporting carriage **52** is placed on the end of the track and clamped to the hose to support the weight of the hose which trails behind the nozzle head. As the nozzle head moves away from the fire-boat and hose is paid out, additional hose supporting carriages **52** may be used at suitable distances along the hose. Fig. 2 shows three hose supporting carriages **52** on the track behind each nozzle head **31**. If there are no parts beneath on which the hose may catch, and if tide is not setting so strongly as to cause difficulty, the hose carriers need not be used.

When the nozzle head reaches the desired position, it is stopped by holding the hose. The nozzle head is moved rearwardly by pulling the hose back toward the fire-boat. If water is to be sprayed over a larger area, nozzle heads are placed on a number of the tracks **36** at the same time. The nozzle heads can be held in one position to discharge water over a fixed area, or can be moved continuously back and forth to spray a larger area. Each nozzle-head in action creates a water curtain extending rearward and laterally. By operating two or more nozzles on the same track, the individual curtains may be made to overlap, forming a longer curtain, or a curtain which extends entirely across the substructure. This is especially useful for preventing extension of a fire. At the same time, one or more nozzles may be operated on one or more tracks at or nearer the actual fire, to extinguish it.

The invention has been explained as applied to a dock, where it is particularly valuable, but it will be evident that it is also applicable to other

types of building and to other interior or substance spaces. When applied to a building other than a dock, overhead tracks are advantageous because they do not interfere with the ordinary use of the building. The invention is also applicable to subways and tunnels. Additional changes and modifications can be made in the preferred embodiments without departing from the invention as defined in the appended claims.

I claim:

1. Fire-fighting means of the character described comprising a track installed in a substructure and under a floor or deck to be protected, and a nozzle-head connectible with a fire hose and provided with means so that the nozzle-head will be supported by and move freely along the track, said nozzle-head being so constructed as to deliver a discharge of water upward against the floor, and in directions and amount sufficient to propel the nozzle head forward along the track by simple jet reaction and to create water coverage extending laterally and rearward.

2. Fire-fighting means of the character described having a track or rail installed in a place, such as the substructure of a dock, which is inaccessible or difficult of access for ordinary fire-fighting operations, and comprising a nozzle-head having a connection for a fire hose and a wheeled carriage capable of traveling freely along the track, said nozzle-head including a plurality of nozzles of different directions so arranged as to discharge water upward, laterally and rearward and by the jets of rearward direction to propel the nozzle-head and draw the hose by simple jet reaction and provide a rearward water curtain.

3. Fire-fighting means of the character described, having a track installed beneath the deck or floor of a substructure to be protected, and comprising a nozzle-head constructed to move freely on said track and having a connection for the supply of water, said nozzle-head having a number of jet orifices arranged to distribute water over a substantial area and upward against the deck, enough of the discharge being of such rearward direction as to propel the carriage forward by the force of jet reaction and to afford a curtain or coverage extending rearward.

4. Fire-fighting means of the character described, comprising the combination with a track installed beneath a deck or floor, of a portable nozzle-head with wheeled carriage to travel on said track, both ends of the track being effectively free for application and removal of the nozzle-head, so that the nozzle-head can be introduced at either end, said nozzle-head having a hose connection and a plurality of nozzles of different directions set to distribute fire-fighting jets upward against the deck, and also rearward, the force of reaction of such jets being sufficient to propel the nozzle-head forward along the track.

5. Fire-fighting means of the character described, comprising a rigid track or rail installed in an interior, and a wheeled nozzle-head movable along such supporting track, said nozzle-head having a hose connection and a system of jet nozzles of such disposition as to create a water curtain extending rearward and spreading laterally, and by virtue of the rearward direction of the jets to propel the nozzle-head forward by simple jet reaction.

6. Fire-fighting means of the character described, comprising a plurality of tracks installed in a substructure, and a portable nozzle-head with wheels adapted to be applied to any one of said tracks, said nozzle-head having a hose connection and a system of jet nozzles set to distribute a coverage of water upward, laterally and rearward and by virtue of the rearward direction of this discharge to propel the nozzle-head forward by jet reaction directly utilized.

7. A fire-fighting means of the character described, comprising a system of tracks installed in a substructure over water, and a portable nozzle-head applicable to and removable from any of said tracks, said nozzle-head having a wheeled carriage enabling it to move freely on the track, a hose connection and a system of nozzles arranged to create a rearwardly extending and laterally spreading water curtain, the reaction of jets of rearward direction being sufficient to propel the carriage forward along the track and draw the hose.

8. Fire-fighting means of the character described comprising a rigid track or rail, a nozzle-head having a hose connection, and a wheeled carriage which is adapted to travel on the rail and by which the nozzle-head is supported below the rail, and numerous nozzles on said nozzle-head set to distribute fire-fighting jets upward, laterally and rearward and by the force of such rearward jets to propel the nozzle-head forwardly along the track.

9. Fire-fighting means of the character described having a track or rail installed in an interior, and comprising a nozzle-head provided with a hose connection, a carriage to travel on said rail, and nozzles arranged to distribute a curtain of water directed upward, laterally and rearward and by virtue of the rearward direction of such jets to propel the nozzle-head forward along the track, and a hose carrier attachable to the hose and also having a carriage adapted to travel on the track.

10. The combination with a system of tracks installed beneath the deck of a dock and extending across the same, of a nozzle-head having a carriage enabling it to be applied to either end of any of said tracks and to travel freely thereon, said nozzle-head having a hose connection and jet nozzles so arranged as to cover a substantial area and to wet the under side of the deck, there being such rearward direction among the jets as to extend the coverage in that direction and also develop sufficient reaction to propel the nozzle-head with its hose forwardly along the track.

11. Fire-fighting means of the character described comprising a nozzle-head having a connection for a fire hose and a wheeled carriage capable of traveling freely along a track or rail, said nozzle-head including a plurality of nozzles of different directions so arranged as to distribute water upward, laterally and rearward to create a water curtain, the jets of rearward direction giving length to the water curtain and creating a jet reaction force sufficient to propel the carriage forward and draw the hose.

12. A portable nozzle apparatus for fighting fire in substructures, comprising a hollow nozzle-head provided with a hose connection and a wheeled carriage adapted to travel on a track or rail installed in the substructure, said nozzle-head bearing a plurality of nozzles, which are independently adjustable in direction, the nozzles being adapted to discharge jets upward against the floor and in such rearward direction and amount as to create a rearwardly extending cur-

tain and propel the carriage by the force of their reaction.

13. Means for attacking or preventing the spread of fire in relatively inaccessible places, comprising a nozzle-head having a hollow body provided with a connection for a supply hose, means for supporting such nozzle-head to travel freely along a guided course, and nozzles connected with said body and constructed and arranged to deliver jets in such directions as to create an extinguishing and barrier discharge of water distributed transversely and lengthwise of the course and including jets of such rearward direction as to propel the nozzle-head, with its hose, by the force of their reaction.

14. Means for attacking or preventing the spread of fire in relatively inaccessible places, comprising a nozzle-head having a hollow body provided with a connection for a supply hose, hollow arms extending upward from said body and spread apart laterally, means for supporting such nozzle-head to travel freely along a guided course, and jet nozzles on said arms set in various directions to distribute water upward, laterally and rearward and by the reaction force of rearward jets to propel the nozzle with its hose.

15. A fire-protection system for docks, piers and structures built over water and land or otherwise making a place not readily accessible, said system comprising a number of tracks set close under the floor or deck to be protected, and at least one nozzle device applicable to any of the tracks to travel thereon drawing its hose, the nozzle having upwardly and rearwardly striking jets, the rearward action of which drives the nozzle, there being movable stops at the ends of the tracks so that the stop at the side where the nozzle device is entered can be moved out of the way, the other stop standing.

16. In a dock or like structure; a track supported beneath the dock floor and extending across the dock; side walls extending below the dock floor and having openings at each end of the track; a nozzle head adapted to be passed through either of the openings and placed on the track to travel thereon; and nozzles on the head for discharging water upwardly against the under side of the floor.

17. In a structure, fire protection apparatus including a nozzle head having upwardly extending brackets and wheels at the upper ends of the brackets for running on a track; an overhead track supported by the beams of the structure and extending between two of the outside walls, each wall having an opening so that the nozzle head can be placed on or taken off either end of the track, from the outside of the structure; and nozzles on said nozzle head for discharging water against under parts of the structure.

18. In a structure, a fire protection system including a plurality of tracks extending across between outside walls of the structure, each outside wall having an opening at the ends of each track so that a wheeled nozzle head can be placed on or taken off either end of any of the tracks, from the outside structure.

19. In a structure, a fire protection system including a nozzle head having upwardly extending brackets, and wheels at the upper ends of the brackets for running on a track above the nozzle head; a plurality of substantially parallel tracks extending across the structure between outside walls having openings at the ends of each track so that the nozzle head can be placed on or taken off either end of each track, from the outside of the structure; and nozzles on the nozzle head for discharging water over an area above the nozzle head.

20. A fire-fighting device comprising a wheeled nozzle head; nozzles on the nozzle head for discharging jets of water to drive the said nozzle head by the direct reaction from the jets; and means for turning the nozzles so that the jets of water will propel the nozzle head in the reverse direction.

WILLIAM F. CONRAN.