June 24, 1941. J. W. GEDDES 2,246,797

BREACHING NOZZLE FOR FIRE HOSE

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Fig. 1.

Fig. 2.

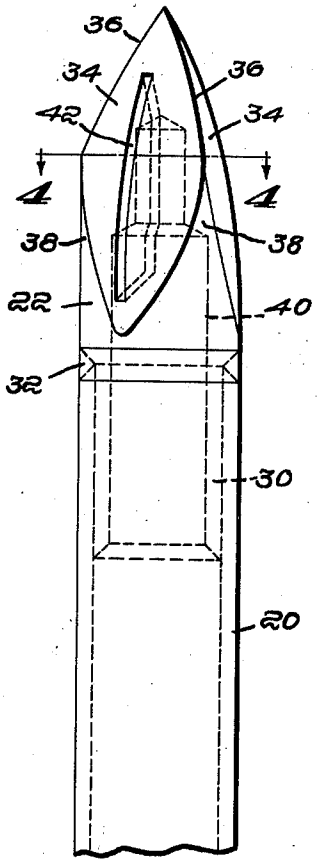

Fig. 3.

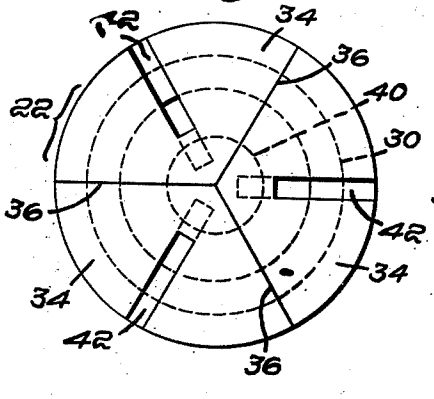

Fig. 4.

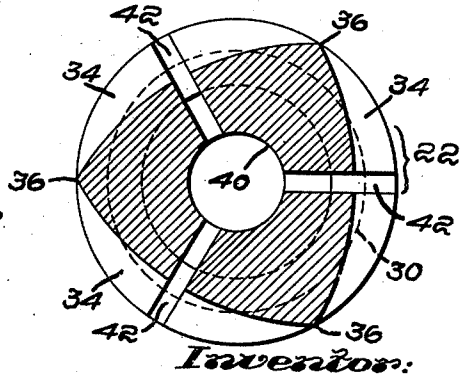

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Fig. 6.

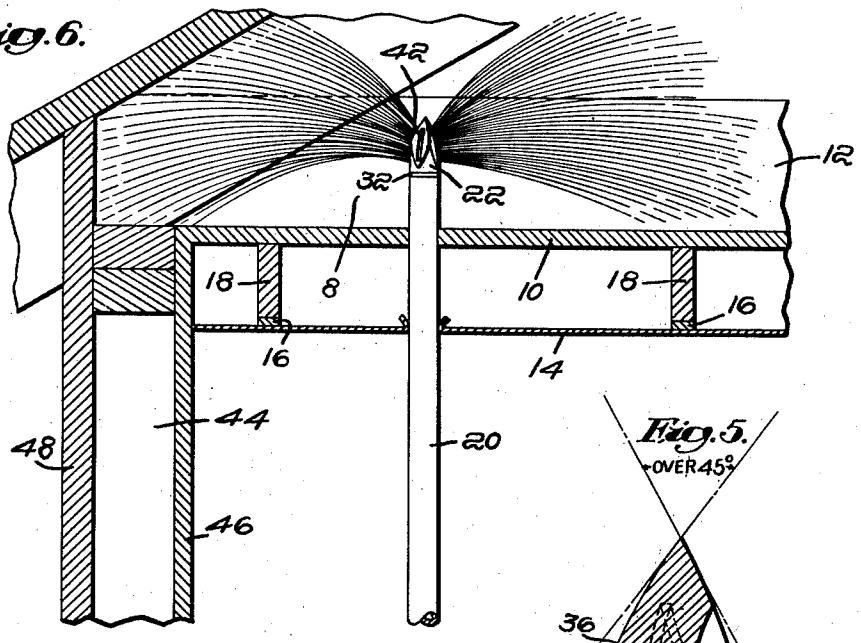


Fig. 5.

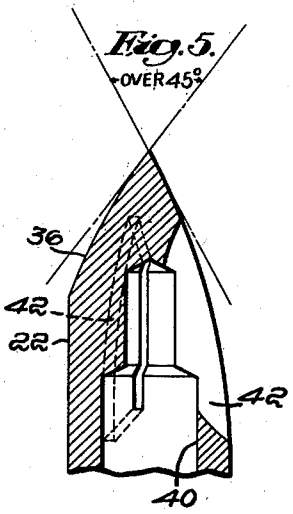
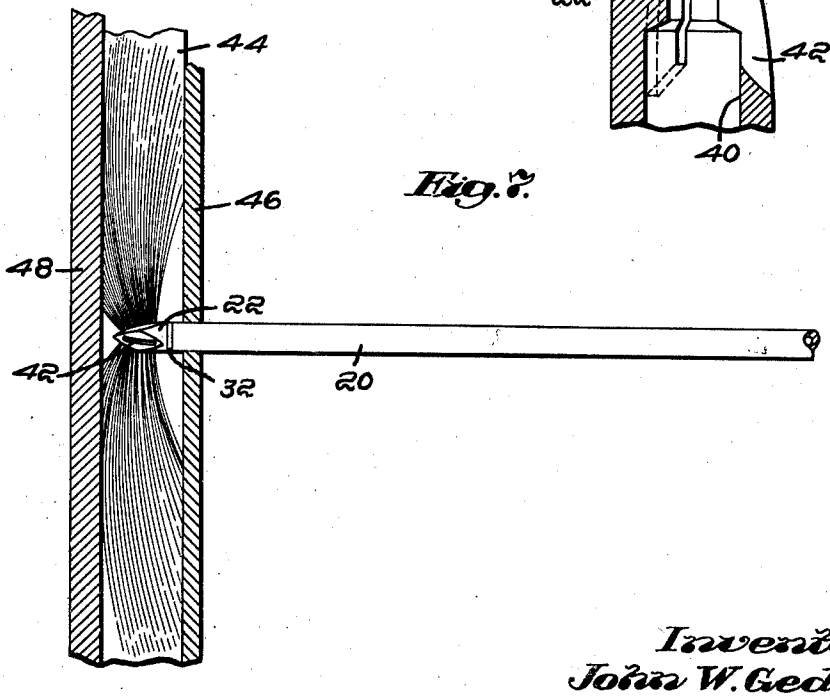


Fig. 7.



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UNITED STATES PATENT OFFICE

2,246,797

BREACHING NOZZLE FOR FIRE HOSE

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Application July 28, 1938, Serial No. 221,790

6 Claims. (Cl. 299—110)

This invention relates to fire fighting apparatus and the object is to provide a device for attachment to a hose line whereby effective streams of water may almost instantaneously be introduced into the interior spaces of building structures to combat fires therein. I therefore provide a nozzle which in itself constitutes a breaching tool adapted to be manhandled to force the discharge end of the pipe through obstructions into such hollow spaces.

My invention will be well understood by reference to the following description of the illustrative embodiment thereof shown by way of example in the accompanying drawings, wherein:

Fig. 1 is a general view of the device showing a fireman about to plunge the same through an overhead obstruction;

Fig. 2 is an elevation of one end of the device;

Fig. 3 is an end view on a larger scale;

Fig. 4 is a section on the line 4—4 of Fig. 2 on the larger scale of Fig. 3;

Fig. 5 is a fragmentary diametrical section on the same scale as Fig. 2; and

Figs. 6 and 7 are fragmentary sections illustrating respectively the use of the device to combat a fire in a cockloft and within a vertical wall.

In buildings fires may be localized in or may spread through the hollow interior spaces of the structure, as, for example, between the studs of walls, between ceilings and floors, or in enclosed spaces under roofs known as cocklofts. Thus, for instance, in Fig. 3 I have shown a cockloft 8 closed off by a ceiling 10 applied to the floor beams 12 and further having a metal ceiling 14 supported in spaced relation to the ceiling 10 on furring strips 16 supported by the blocks 18. To combat a fire in the loft 8 it has hitherto been necessary for the fireman either to break through the roof or to tear away the metal ceiling 14 and a portion of the ceiling 10.

I am aware that it has been proposed to utilize hose nozzles as battering rams to batter through a partition to provide access to the opposite side thereof and that nozzles have been proposed fitted with threads or other means supposed to facilitate the perforation of a partition for the same purpose. These have not come into practical use and appear to be unknown to practical firemen at the present day, and indeed, as described in patents of the prior art, the structures are unadaptable to practical use. I am also aware that pipes having perforated ends have been used by pressing them into masses of loose material, as piled coal, to discharge water within the pile to combat fires therein.

Referring now more particularly to Figs. 1 and 2, a play-pipe embodying my invention may comprise a tubular body portion 20, essentially a length of pipe, having a terminal head 22 adapted to breach a partition or other obstruction to reach a fire at the further side thereof. The length and diameter of the device are such as to provide a suitable mass or weight to make it an effective breaching tool while permitting it to be handled as such by one or more men utilizing the powerful muscles of the legs and trunk to propel the same as distinguished, on the one hand, from a small device adapted only to be wielded by the hand and requiring driving by supplemental mechanisms or by tools and, on the other hand, from such a bulky or weighty device as could not effectively be lifted or swung by a man. The length is such as to permit it to be readily carried into the interior of a building, yet to extend across the usual interior spaces thereof as, for example, to permit a man standing on the floor of an ordinary room to wield it to reach the ceiling and breach the latter. Thus by way of example but without limitation to these exact dimensions, I have secured good results from a device about 7 feet in length, the body being of substantially the proportions of ordinary 1-inch iron pipe and weighing about 15 pounds. No substantial benefits in portability or wieldability would be provided by making such a length in separable sections to be assembled within the building, and while obviously for working across large spaces the length could be extended by attaching additional sections, such a length as indicated is sufficient to reach across the spaces in ordinary dwellings and commercial buildings.

The body 20, as above suggested, may be of about the proportions of ordinary iron pipe and is desirably made of steel, heat treated to provide a spring temper enabling it to withstand the shocks of use without breakage or deformation and of such thickness of wall as to give substantial rigidity and adequate mass. One end is suitably fitted to provide for attachment of the hose 24, preferably through a coupling having a shut-off valve adapted to be operated by the handle 28. The head 22 (see Figs. 2, 3 and 4) is preferably forged from steel of suitable composition to permit it to be hardened by suitable heat treatment and is herein shown as provided with a reduced portion 30 fitting

within the hollow bore of the body **20** and as terminally connected to the same by means of the line of welding **32**.

The head **22** has a rather blunt point, as hereinafter more fully explained, and a cross section gradually increasing in area as the point is receded from, providing a smoothly streamlined exterior contour free of any transverse projections which might catch or interfere with penetration. Herein the head has a generally ogival or conoidal form and is tapered off along three angularly related, longitudinally and transversely curved surfaces **34**, their intersections providing groins **36** disposed substantially in radial planes passing through the axis and which curve outwardly away from the point and terminate in the surfaces **38**, which are of generally triangular contour and increase in circumferential width as the point is receded from.

The head is provided with a central chamber or bore **40** communicating with the bore of the body **20** and laterally opening discharge ports are provided extending from the bore through the surfaces **34** between the groins **36**. These herein take the form of slots **42** disposed in substantially radial planes, and, as seen in Fig. 5, may be formed by kerfs of a circular cutting tool to give them a segmental form flaring outwardly in the radial plane. Preferably the head is organized within the projected outline of the outer surface of the body **20**, it herein having a substantially cylindrical base portion of the same exterior diameter.

I have referred to the head as having a generally blunt point. The purpose of this is twofold. If the point is thrust against a wooden structure and encounters a beam or heavy planking, it will not, under the force developed by man power, stick in the beam so that it cannot readily be withdrawn for application at a more favorable location. Secondly, if used against a sheet metal ceiling, for example, the first action of the blunt point will be to push back the ceiling, making it substantially taut and stressing it to or near its elastic limit before actual penetration takes place. To secure such an effect the included angle of the point should not be less than about 45°, as indicated in Fig. 5, and in the example illustrated it is about 65°.

The formation of the head by the incurving surfaces permits such a substantially blunt point while the angle between the sides below the point is much more acute so that the lower portion of the head after the initial penetration by the point follows easily. The construction wherein the head is tapered off along intersecting curved surfaces as shown is a particularly advantageous way to obtain these results. If the head were constructed as a regular cone or pyramid with a long taper to the body, the point would be objectionably acute. On the other hand, if the cone or pyramid were shallow, the entire head would be bluff and in the nature of a hammer rather than of a penetrating tool. While this might be remedied by constructing the proximal portion of the head as a frustrum of an acutely angled cone or pyramid surmounted by a tip in the form of a more obtuse cone or pyramid, nevertheless the cross section would decrease rapidly toward the point and to provide adequate strength of wall about the interior bore this would be spaced relatively far from the point. The lateral ports would similarly be spaced far from the point and the tool would not be capable of working in such close spaces. In the case of a pyramid the angles of the pyramid would provide tearing edges similar to the groins **36**, but the flat surfaces, corresponding to the chords of the arcs between those groins in Fig. 4, would, even more than in the case of a cone, weaken the wall unless the central bore were terminated relatively far from the point. In the example shown the surfaces which curve inwardly lengthwise of the head and also, as best seen in Fig. 4, curve in transverse planes not only provide for the groins **36** at their intersections but provide a gradual taper terminating in a bluntly angled point and ensure a wall of substantial thickness around the central bore **40**, which latter extends closely adjacent the extremity of the head.

In operation the device may be seized in the hands by one or more men and powerfully swung or thrust against an obstructing surface to break through the same and permit the head to pass to the further side for the discharge of water through the discharge ports **42** into the space at the further side of the obstruction. As an example of such an obstruction, let us consider a metal ceiling such as that shown at **14** in Fig. 5, an obstruction frequently encountered. If torn down to give access to the space beyond, there is considerable delay and the resultant debris may be particularly hampering and embarrassing. The formation of head described is particularly adaptable among other things to pierce such an obstruction. The edges or groins **36** form tearing ribs, tearing the metal along defined lines radiating from the initial puncture formed therein. and as the head advances, the surfaces **38** act to roll up the resultant segments and propagate the tears so that the device quickly pierces through an obstruction of this kind instead of merely bending or battering it to one side. When, as herein illustrated, the head is not of substantially larger diameter than the body or shaft **20** of the device, the latter will enter the hole made by the head and substantially seal the same so that water discharged through the ports is confined substantially to the space beyond the construction pierced.

In Fig. 5 the device is illustrated as having been thrust through a metal ceiling **14** and through a ceiling **10** above the same, perhaps of lath and plaster, to project into the cockloft **8** and discharge water within the same. In Fig. 6 is illustrated a portion of a vertical wall framed on studs **44** ceiled on one side by the layer **46** which may be supposed to be lath and plaster and on another side by a layer **48** which may be supposed to be siding. The construction of the device is such that the lengthwise area occupied by the discharge ports and, preferably, the distance from the point of the device to the remote ends of the discharge ports is not greater than the cross-wall dimension of the usual studs. Thus, assuming **44** in Fig. 6 to be a so-called 2x4 stud, it will be apparent that where the head **22** is thrust through the lath and plaster the entire discharge portion thereof is received in the hollow space of the wall between studs and the discharge of water is delivered within the hollow wall without waste.

I am aware that the invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and I therefore desire the present embodiment to be considered in all respects as illustrative and not restrictive; reference being had to the appended claims rather than to the foregoing description to indicate the scope of the invention.

I claim:

1. A device of the class described comprising a substantially rigid tubular body of such diameter and length as to provide a substantial mass adapted to a breaching operation while permitting it to be manhandled within and across the usual interior spaces of building structures, the body having means at one end providing for attachment of a hose thereto and at the other an axially extending head rigidly related thereto, the head being tapered off along a plurality of angularly related curved surfaces defining between them substantially axially extending groins, the head having discharge openings through said surfaces communicating with the hollow interior of the body.

2. A device of the class described comprising a substantially rigid tubular body of such diameter and length as to provide a substantial mass adapted to a breaching operation while permitting it to be manhandled within and across the usual interior spaces of building structures, the body having means at one end providing for attachment of a hose thereto and at the other an axially extending head rigidly related thereto, the head being organized within the projected external diameter of the body and being tapered off along a plurality of angularly related curved surfaces defining between them substantially axially extending groins, the head having discharge openings through said surfaces communicating with the hollow interior of the body.

3. A tool of the class described having a breaching head provided with discharge ports, the head having a terminal point from which recedes in substantially radial planes outwardly curving tearing edges terminating in surfaces which increase in circumferential width as the point is receded from, the head presenting in all radial planes surfaces smoothly diverging from the point.

4. A tool of the class described having a breaching head provided with an interior chamber, the head being tapered off to a point along a plurality of angularly related incurving surfaces defining between them substantially axially extending groins, and having substantially axially extending slots of substantially uniform width through said surfaces opening to the chamber.

5. A tool of the class described having a breaching head tapered toward the end with a relatively long and acute taper to facilitate its penetration in and enlargement of an initially formed aperture and having a relatively blunt point formed by a plurality of intersecting inwardly inclined surfaces defining included angles of not less than forty-five degrees, whereby when the tool is propelled by man power against an object it will not stick in a wooden beam or plank and will initially stress a metal ceiling or similar substance before penetration of the same, the head having an interior chamber and discharge ports therefrom opening rearwardly of said point.

6. A tool of the class described having a head tapering toward the end and terminating in a breaching point, the head having a chamber extending toward the point and having slot-like discharge openings of substantially constant width formed in the tapered portion thereof, the openings extending from said chamber to the exterior of the head rearward of the point and lying substantially in radial planes and increasing in length outwardly.

JOHN W. GEDDES.