

[54] SAFETY NOZZLE FOR AIR BLOW-GUNS

[75] Inventor: Lloyd M. Ayer, Hamden, Conn.

[73] Assignee: High Precision Incorporated,
Hamden, Conn.

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[58] Field of Search ... 239/290, 586, 291, 498, 526,
239/295, 525, 299, 518, 597

[56]

References Cited

UNITED STATES PATENTS

2,604,361	7/1952	Yates	239/291
3,263,934	8/1966	Hope et al.	239/586 X
3,599,876	8/1971	Kyburg	239/291

FOREIGN PATENTS OR APPLICATIONS

885,892	11/1971	Canada	239/525
1,408,538	7/1965	France	239/291

20,384 8/1929 Netherlands..... 239/290

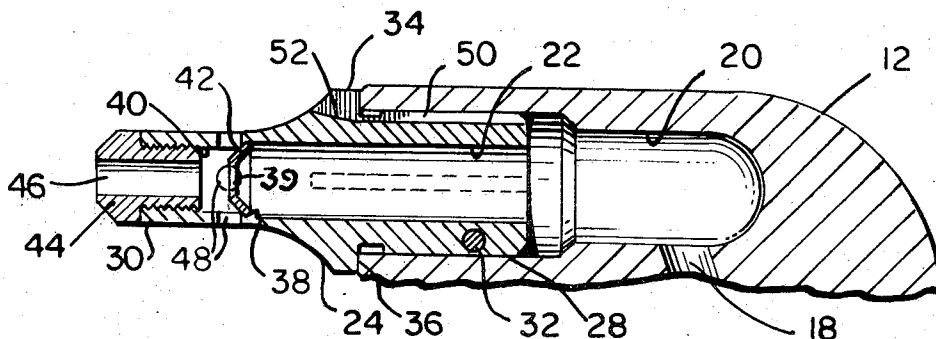
Primary Examiner—Robert S. Ward, Jr.
Attorney, Agent, or Firm—Steward & Steward

[57]

ABSTRACT

An improved safety nozzle for air blow-guns which prevents pressure build-up in the nozzle in case the tip of the nozzle is obstructed in any manner and which also provides protection against possible injuries that could be inflicted by the air vented from the nozzle when such obstruction takes place. The invention is applicable to those guns which prevent pressure build-up by recessing the nozzle tip within an extension of the nozzle so that the tip is inaccessible and by providing radial vent openings in such extension, through which the air can escape when the outer end of the extension is blocked. Auxiliary air jets aligned with the vent openings deflect the air from the vents away from the operator.

3 Claims, 4 Drawing Figures



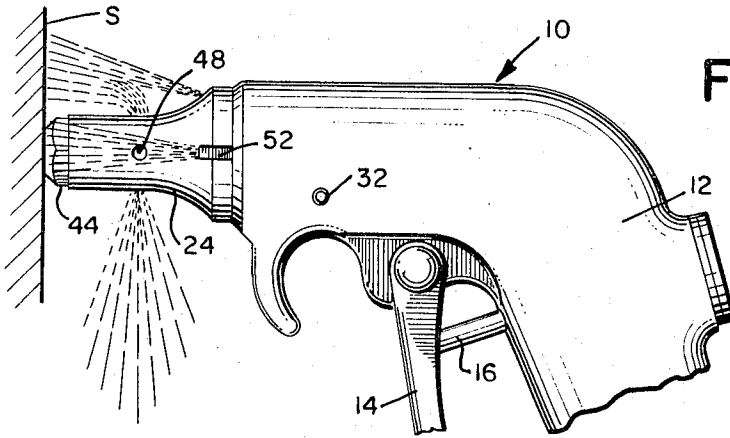


FIG. 1

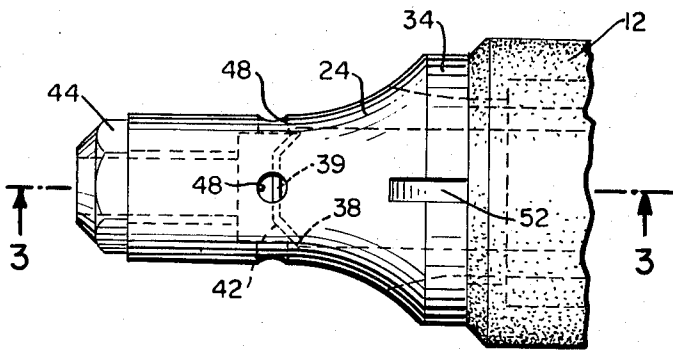


FIG. 2

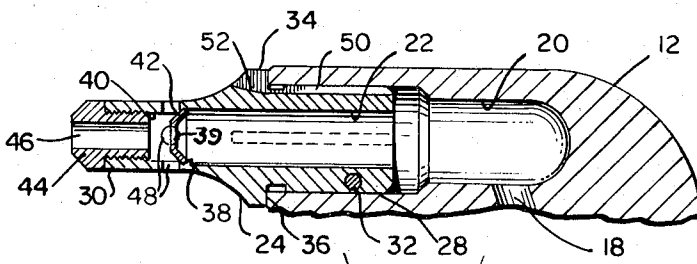


FIG. 3

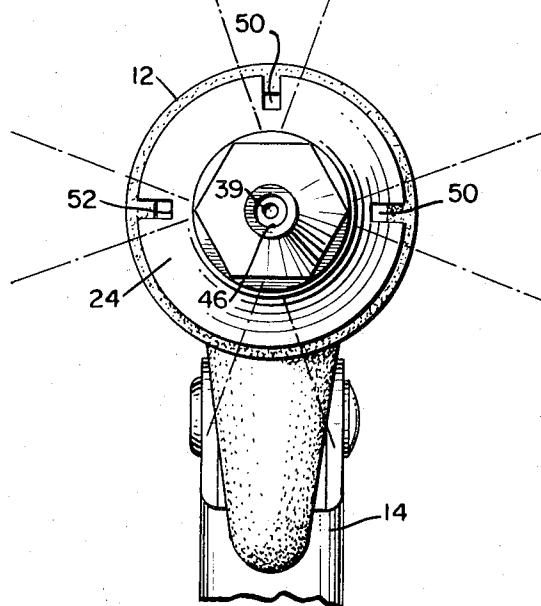


FIG. 4

SAFETY NOZZLE FOR AIR BLOW-GUNS

BACKGROUND OF THE INVENTION

The present invention relates to air blow-guns and it relates more particularly to safety nozzles therefor, which are designed to reduce the hazards caused by solid materials being blown into the faces of people in the immediate vicinity, especially the operator who is using the gun.

One of the principal hazards involved, when an air gun is used to blow out dirt from blind holes in work pieces and around machines, is the danger of the dirt being blown back into the face, and more particularly the eyes, of the operator. The most effective safe-guard against this happening is to ensure that the air pressure is low in the outlet chamber of the gun. Another safety measure is to provide a wall of air around the main-air stream in order to prevent particles from being blown back toward the operator. Air guns having such provisions are shown in the patents of Yates U.S. Pat. No. 2,320,964, Gould U.S. Pat. No. 2,917,244, Schoberg U.S. Pat. No. 3,117,726 and Kyburg U.S. Pat. No. 3,559,876.

Another extremely dangerous aspect of blow-guns is the build-up of high pressure in the nozzle of the gun when the end of the nozzle is plugged, as for example by the operator's hand or by the end of the nozzle being held against a flat surface. Such unsafe practices are very well reviewed in the patent to Tillman U.S. Pat. No. 3,219,892, which shows one way of preventing pressure from being built-up by providing a perforated outer tube around the nozzle tip so that its orifice can not become plugged.

A law recently passed in the United States known as The Occupational Safety and Health Act (OSHA) has set certain safety requirements that are intended to reduce the hazard experienced in the use of air-guns. These regulations also point out that devices for overcoming existing hazards must not create new ones.

For example, one of the ways that has been proposed for solving the problem of pressure build-up at the nozzle, caused by blockage of the opening at the nozzle tip, is to provide an outer nozzle or tube around the tip which extends forward of the tip so that the tip is not accessible, making it difficult to plug the orifice in the tip. Vent holes are provided in the sides of the outer nozzle in order to let air escape laterally when the end of the outer nozzle is stopped up. While this solution is an excellent one, the vent openings themselves may create another hazard due to the fact that air escaping laterally through the vents can blow particles of dirt toward the face and eyes of the operator, sometimes with even greater force than when dirt is blown out of a blind hole by the main-air stream.

The object of the present invention is to reduce or completely eliminate the chances of dirt being blown toward the operator, or others, by air forced out the vent openings in a safety nozzle of this type when the end of the nozzle is obstructed for any reason.

SUMMARY OF THE INVENTION

The invention resides in the improvement in safety nozzles of the type that have a laterally vented extension on its outer end which prevents access to the inner nozzle, wherein a plurality of auxiliary air passages are provided directly from the outlet chamber in the gun toward the discharge end of the nozzle, each such aux-

iliary passage being formed so that it directs a stream of air at one of the vent openings in the outer nozzle, thereby deflecting air vented through such opening forwardly and away from the operator.

DESCRIPTION OF PREFERRED EMBODIMENT

One embodiment of the invention is illustrated in the accompanying drawings, in which

FIG. 1 is a fragmentary side elevational view of a blow-gun having a safety nozzle of the present invention and showing the manner in which the air vents laterally when the end of the nozzle is obstructed, as well as how the auxiliary-air jets provided by the improved nozzle deflect the streams of vented air away from the operator;

FIG. 2 is an enlarged top plan view of the portion of the blow-gun shown in FIG. 1;

FIG. 3 is a longitudinal section thereof taken on the line 3—3 in FIG. 2; and

FIG. 4 is a front end view thereof.

The blow-gun indicated generally at 10 may be any of various more or less conventional designs, which have a cut-off valve (not shown) by which the air from a source of supply is turned on and off. The gun has a housing 12, on which is pivoted an operating handle or trigger 14 that opens the valve when the trigger is retracted. In FIG. 1 the outer portion of the stem 16 of the cut-off valve is shown engaging the rear of trigger 14 for actuation thereby.

When it is desired to use the gun, trigger 14 is retracted, admitting air through a passage 18 (FIG. 3) within housing 12 to a cylindrical outlet chamber 20, from which it passes through a bore 22 in a nozzle 24 designed to direct the air into a main stream at the desired force consistent with OSHA safety specifications. Bore 22 extends axially from the inner portion 28 of nozzle 24 through its discharge portion 30. The inner portion 28 is mounted snugly within the outlet chamber 20 of gun-housing 12 and is permanently fixed therein by means of a pin 32, which is forced through suitable holes in housing 12 into rigid engagement with the mounting portion 28 of the nozzle, so that the nozzle is not readily removable. Intermediate the opposite ends of nozzle 24 is provided a peripheral enlargement 34, forming an annular positioning shoulder 36 which seats firmly against the annular outer end of gun-housing 12.

A cup-shaped inner nozzle tip 38 has a central orifice 39 within the bore 22 of the nozzle and is spaced some distance from the opening at the outer end of the discharge portion 30, thereby forming an outer passage 40 at the outer end of bore 22 and making the inner nozzle substantially inaccessible so that the orifice 39 cannot be blocked. The outer passage 40 is somewhat smaller in cross section than the inner portion of bore 22, thus forming a positioning shoulder 42, against which the inner nozzle tip 38 seats. Tip 38 is circular in cross-section and has a diameter which makes a press-fit with the walls of the inner portion of bore 22, so that it is held rigidly in place when forced into engagement with the positioning shoulder 42.

An outer tip 44 having an aperture 46 is in this instance threadedly engaged within the outermost end of the elongated passage 40. Outer tip 44 provides additional protection against foreign matter blocking the orifice 39 in the inner nozzle tip 38. Outer tips having extensions for directing air into narrow, inaccessible

places may also be used by simply removing the short tip 44 and replacing it with a tip having a nose of the desired length. The opening 46 in the short tip 44 is larger in diameter than the orifice 39 of the inner tip, so that there is no increase in pressure within the pas-

sage 40 between the inner tip 38 and outer tip 44. In order to prevent pressure build-up within the outer passage 40 if the outer aperture 46 is blocked, vent holes 48 are formed radially through the walls of the nozzle in spaced relation to each other peripherally of the nozzle. Consequently, should the outer tip 44 at the discharge end of the nozzle be placed against an object, such as the flat surface S shown in FIG. 1, so that air can not pass through the outer aperture 46 while the gun is being used, the air will vent laterally out through openings 48.

Since it is necessary to vent upward and to both sides, as well as downward as indicated diagrammatically in FIG. 4, the air projected upwardly and to the sides, at least, may be a hazard in that the face of the person using the gun may be in line with one of the holes 48 at the time the discharge aperture 46 becomes plugged. Dirt and other foreign matter can therefore be propelled by the vented-air stream into the face of the operator.

In accordance with the present invention, this danger can be greatly reduced, if not completely eliminated, by providing several peripherally spaced auxiliary-air passages 50 in the nozzle 24, each of which directs a stream or jet of air at one of the vent openings 48 so that the vented air is deflected away from the operator, as illustrated in FIG. 1 of the accompanying drawings. Auxiliary-air passages 50 are readily formed by parallel grooves 52 in the surface of the mounting portion 28 of the nozzle, each groove 52 extending through, and opening at the inner end of mounting portion 28, as well as through the enlargement 34, so that air is continuously blown forwardly through the passages 50.

In this particular instance, each of the auxiliary-air passages 50, of which there are three all together, is directly in line with one of the vent holes 48 on the top and sides of nozzle 24. Consequently, when the air in the outer passage 40 is driven out through vent holes 48 because of a stoppage in outer nozzle tip 44, the auxiliary-air jets from passages 50 deflect the exhaust air forward in the manner illustrated in FIG. 1. The potential danger of the exhaust air picking up particles of dirt and blowing it into the face of the operator, or at anyone else in the immediate vicinity, is therefore substantially reduced.

Since the vent hole in the under side of the nozzle is directed downward away from the operator, or from persons working next to him, there is no danger from it. Consequently, no auxiliary-air jet needs to be provided at this point. However, any vent holes which direct the air upward or to either side should be protected against.

It will be noted that in addition to protecting the operator from the exhaust air through vent holes 48, the auxiliary-air jets also act to provide a partial curtain of air for intercepting material blown back toward the operator by the main stream of air in a manner similar to that disclosed in the patent to Gould U.S. Pat. No. 2,917,244. To this end, the bottoms of grooves 52 curve outward at their outer ends, so that the air from

each jet fans out to provide a better curtain effect. However, if desired, the grooves 52 can extend straight through toward each vent hole 48. It will be appreciated, moreover, that in order to obtain greater protection, additional auxiliary-air jet passages may be provided between the three shown in the accompanying drawings. However, these additional air jets would provide little or no protection against the hazard produced by the vent holes 48 unless they are aimed almost directly at one of the holes. On the other hand, the use of additional auxiliary air jets not directed at a vent hole is not excluded by the present invention as long as all the vent holes in the nozzle which may produce a hazard are protected against by at least one of the auxiliary jets.

It is desirable, moreover, to locate the vent holes 48 immediately adjacent the inner nozzle tip so that when the gun is being used normally an additional volume of air is aspirated into the main stream of air because of the venturi effect produced by the acceleration of the air passing through the inner nozzle 38. The vent holes 48, therefore, act not only to allow air to travel outward through them if the discharge end of the nozzle becomes plugged, but also to draw air in through them into the main stream of air when the gun is functioning normally.

What is claimed is:

1. In a safety nozzle for air-guns having a bore communicating at one end with the outlet chamber of the air-gun and having a discharge opening at its other end, said bore comprising an inner passage adjacent said outlet chamber and an outer passage extending coaxially therewith at its discharge end, said passages being separated by an inner nozzle tip having an orifice for directing a main stream of air through said outer passage and discharge opening, said outer passage and discharge opening being larger in cross section than the orifice in said inner nozzle tip, said nozzle having a plurality of radially extending vent openings spaced peripherally of said nozzle and disposed downstream of said inner nozzle tip for venting air from said outer passage when said discharge opening is plugged, the improvement comprising:

a plurality of peripherally spaced auxiliary-air passages in said nozzle, each communicating directly with the outlet chamber of the air-gun and terminating at its outer end upstream and radially outward of said vent openings, each of said auxiliary-air passages being disposed so as to direct a stream of air directly from the outlet chamber of the air-gun toward one of said vent openings such that air escaping through such vent opening is deflected by such auxiliary-air stream in the direction of flow of said main stream.

2. The improvement in a safety nozzle for air-guns as defined in claim 1, wherein each of said vent openings comprises a transverse hole disposed adjacent said inner nozzle tip for aspiration of air therethrough during normal operation of the air-gun when the discharge end of said nozzle is open.

3. The improvement in safety nozzles for air-guns as defined in claim 2, which further includes an outer tip removably mounted at the discharge end of said outer passage.

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