FLUID DISPENSING SYSTEM

Filed Sept. 18, 1959 2 Sheets-Sheet 1

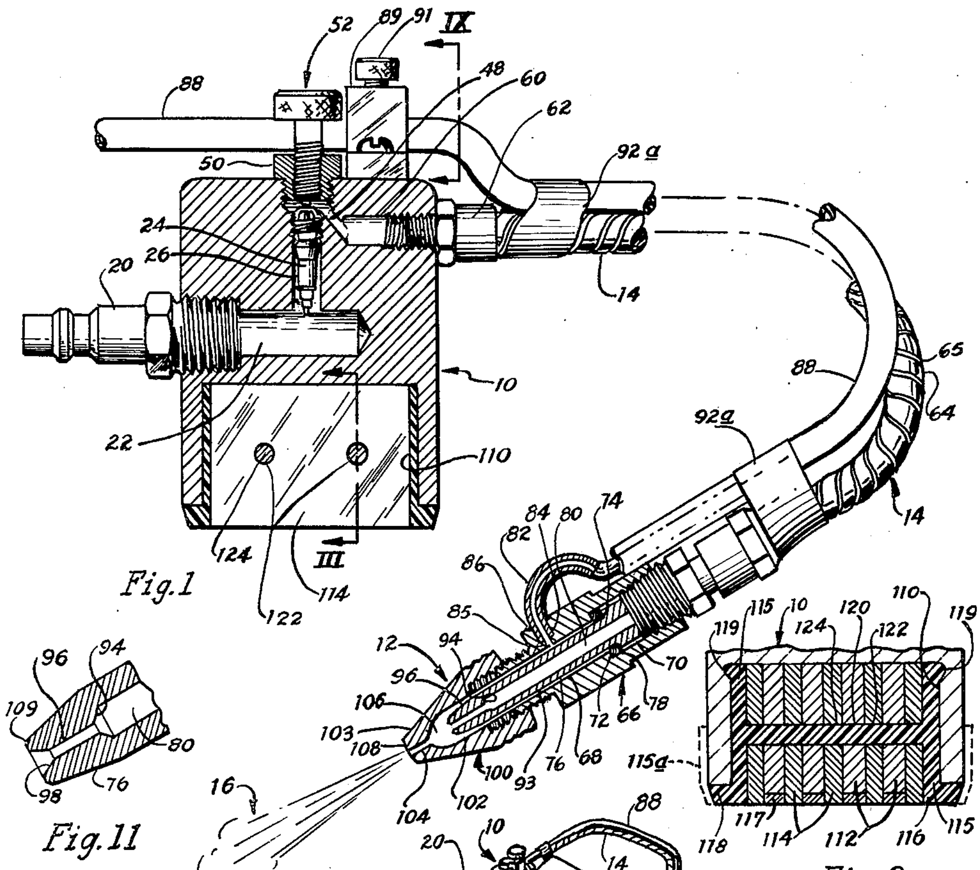

Fig.1

Fig.11

Fig. 3

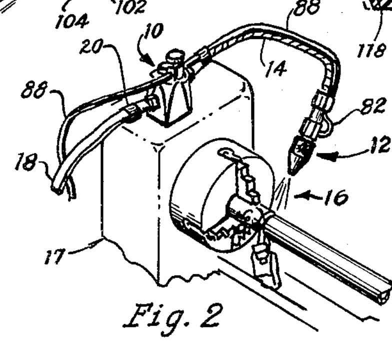

Fig. 2

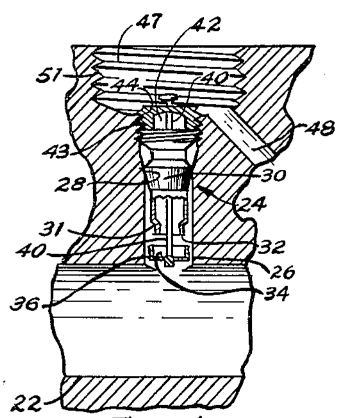

Fig. 4

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FLUID DISPENSING SYSTEM

Filed Sept. 18, 1959 2 Sheets-Sheet 2

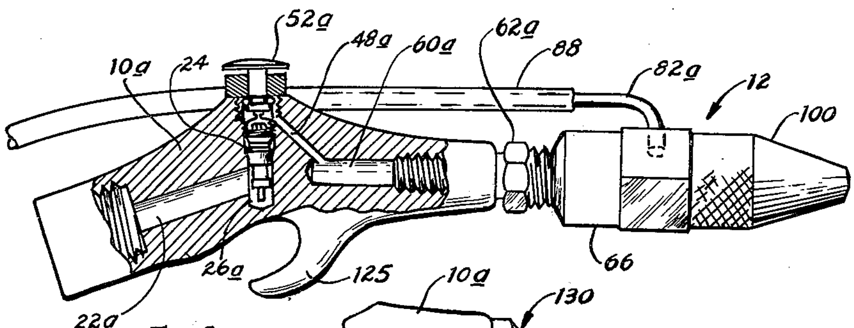

Fig. 5

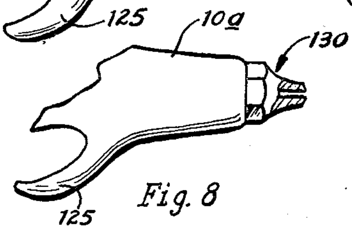

Fig. 8

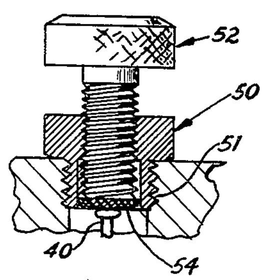

Fig. 6

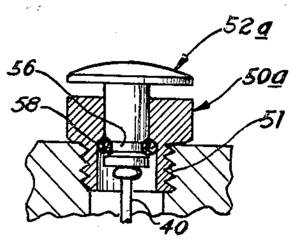

Fig. 7

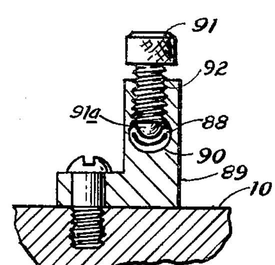

Fig. 9

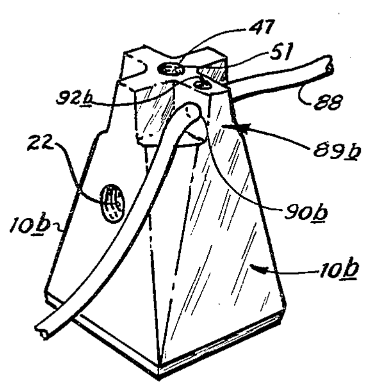

Fig. 10

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FLUID DISPENSING SYSTEM

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9 Claims. (Cl. 239—424)

This invention relates to fluid dispensing means, and in embodiments here described, relates more particularly to a device especially adapted for applying coolant liquid advantageously in a machine tool cutting operation, and for applying other fluids in other operations as desired.

Advantages of supplying so-called "coolant liquid" to cutting operations are well known. The fluid tends not only to cool the work-piece and the tool, but serves to lubricate, retard corrosion, and prolong tool life and add to the appearance of the machine work-piece.

However, certain problems are encountered in attempting to apply and dispense the desired coolant fluid by means and devices heretofore known.

One disadvantage has been that it has been inconvenient to attach a coolant-dispensing device to existing machine tools. A further disadvantage has been that coolant-dispensers have been somewhat hard to regulate, with the result that if sufficient coolant were supplied to give adequate effects, the volume would be in excess of that conducive to neatness of the work area.

A further disadvantage of the stream-type coolant dispensing heretofore practiced has been that the solid-stream type of cooling has required relatively large volumes of coolant liquid, and even so, fail to achieve sufficient coolant effects.

Other disadvantages have existed with known coolant dispensers, and, accordingly it is an object of my invention to provide a novel and highly effective air-actuated means for applying coolant to a cutting operation, overcoming disadvantages of coolant means heretofore known.

It is another object to provide a new and improved coolant-dispensing device which may be added to existing machine tools at low cost and with great convenience.

A further object is to provide a novel coolant-dispensing device which may be conveniently adjusted to position its disposed coolant at the most advantageous spot, and which will hold that position even during vibration of the machine tool.

A still further object is to provide such a device which may be readily and conveniently removed from one machine and readily and conveniently transferred to another machine, as may be desired.

A further object of my invention is to provide a novel coolant-dispenser which may be readily adjusted between wide extremes of flow rate, to give optimum cooling effect without wasting, and which may be readily adjusted to completely shut off the coolant in a situation where only compressed air is desired.

Another object is to provide a novel device which will dispense coolant fluid in an effective particulate or "atomized-mist" form, giving greater coolant effects with relatively smaller volumes of coolant fluid, and without disadvantages inherent in systems in which pressure is applied to the coolant fluid.

A still further object is to provide a coolant-dispensing device which performs effectively yet which generally confines the coolant to a relatively small area.

Another object is to provide a novel coolant-dispenser having an associated air jet adapted to blow away work chips as an incident to the coolant emission.

A still further object is to provide a novel coolant-dispensing device which is economical of manufacture, and economical of installation and use, and which may be readily and economically serviced.

A yet further object is to provide a novel and economical pneumatic dispensing device which may readily be manipulated to dispense a stream of air or other fluid under pressure, at desired flow rates.

An additional object of my invention is to provide a novel device of the "hand-gun type" to dispense compressed air or other fluid.

A further important object is to provide a valved compressed-air dispenser so constructed and arranged as to permit utilization, for the regulating valve thereof, of a so-called "core" of a so-called "tire-valve," thus providing extreme economy of manufacture and which may be quickly and readily replaced by the user.

Another object is to provide a novel fluid dispensing device for dispensing a single fluid at any desired flow rate, or a mixture of two fluids at desired proportions and flow rates.

Accordingly, in a form here illustrated, I provide a casing having an inlet passage, the passage being fitted at its rear to receive a supply of compressed air. Forwardly, the inlet passage extends to a valve passage in which is fitted a valve of the type commonly known as "core" of a "tire-valve" or "inner-tube valve," with the inlet passage of the bore communicating with the valve passage below the seat of the valve therein. Above the valve seat, the valve passage leads to a forward air-discharge portion of the casing bore. The device as so far described provides means to dispense compressed air or other fluid as desired at regulated flow rates.

Forwardly of the compressed-air dispensing means just described, attached thereto either contiguously or at the end of a flexible tube, there is provided a coolant-dispensing head. Such head includes a body portion having a hollow bore; and loosely disposed in the bore is a hollow stem, the bore of which stem communicates at its rear with the air-dispensing means just described. Coolant is supplied to the body-bore, in a chamber thereof around the stem; and a jet-action pump-effect draws the coolant forwardly as air is caused to pass through the stem and out a restricted nozzle provided thereon.

The coolant is dispensed from the discharge head in a particulate or "atomized-mist" nature, providing great advantages of better coolant effects, neatness, better lubrication, prolonged tool-life, permitting the heavier cuts, providing faster production, closer tolerances and better finishes, better visibility of work, and other advantages with many different types of cutting tools, grinding wheels, and the like.

Means are provided to permit wide adjustment, including full shut-off, of the rate of coolant discharged. Thus the discharge head may be adjusted to give the optimum flow rate, or simply air alone if the application makes the air stream by itself desirable, as in a blowing operation in sand-mold making, or in milling cast iron.

The air stream, which induces the coolant flow, is of great advantage in chip removal, particularly advantageous in operations such as drilling and tapping, but advantageous also in other operations; for not only are the chips blown away from the work area effectively, but the expansion of the air past the discharge orifice produces a refrigeration effect.

Elaborate and expensive means heretofore used to install, re-circulate, pump, and filter coolant supply are not necessary. No splash guards are needed. The coolant consumption is so low as to not require re-circulation nor splash-guarding. The coolant is drawn by the air-stream jet, with no pump being required.

And filters in the coolant line are not needed; for if the line should become clogged, the operator merely puts his finger over the outlet of the discharge head, and the air stream immediately blows back through the coolant line, unblocking it rapidly.

The use of coolant fluid herein is merely illustrative, for while my dispensing means have shown tremendous advantages in dispensing machine-tool coolant, it is also very advantageous in dispensing other fluids, for example cleaning fluids.

These and other objects, features, and advantages of the present invention will further appear from the following description of illustrative embodiments thereof, which illustrate the general concepts of the invention, taken in conjunction with the accompanying, generally diagrammatic drawings in which:

FIG. 1 is a longitudinal view of the air dispenser body and discharge head, partly in elevation, and partly in section, for clarity;

FIG. 2 is a pictorial sketch illustrating the use of device in a machine tool operation;

FIG. 3 is a cross-sectional view taken along the section line III of FIG. 1, and illustrating magnetic holding means;

FIG. 4 is an enlarged detail illustrating the air valve of FIGS. 1 and 5;

FIG. 5 is an elevational view, partly in section, illustrating a modified form of my device;

FIG. 6 is an enlarged detail illustrating the air valve control of the embodiment shown in FIG. 1;

FIG. 7 is an enlarged detail similar to FIG. 6, but illustrating the air-valve control of the embodiment shown in FIG. 5;

FIG. 8 is a detail of the modification of FIG. 5, but illustrating a modified discharge head;

FIG. 9 is a detail taken generally along section line IX of FIG. 1, illustrating a coolant-tube clamp, and a coolant-tube regulating screw;

FIG. 10 is a pictorial view illustrating a modified form of air-dispenser body; and

FIG. 11 is a enlarged detail illustrating the stem member of FIG. 1.

The embodiment illustrated in FIGS. 1 and 2 generally comprises an air-dispensing body **10** and a coolant discharge head **12** interconnected by a flexible air-hose **14**.

In use, as illustrated in FIG. 2, the air-dispensing body **10** delivers a regulated stream of air, through hose **14**, to the coolant discharge head **12** for the dispensing of an "atomized mist" **16** of coolant to the cutting zone of an associated cutting machine **17**. The hose **14** may be of any desired length, as desired, or omitted altogether if the mounting is such that the discharge head **12** may be mounted directly on the body **10**.

Accordingly, compressed air under pressure is shown as supplied to the air dispensing body **10** through a supply tube **18** from an associated source (not shown). The air supply tube **18** is connected, as by a fitting **20** to the body **10**, and communicates with an inlet passage **22** provided within the body **10**, leading to an air valve **24**.

The air valve **24** is shown in larger detail in FIG. 4; and is of a type commonly referred to as the "valve-core" of a "tire-valve" or "inner-tube valve," a type common, for example, to inner-tubes of vehicle tires.

Such a valve **24** offers the advantages of low-cost, ease of replacement, positiveness of action, adequate range of flow rate, and quickness and ease of control.

Valve **24** is shown in FIG. 4 as seated in generally radially-directed valve sleeve or passage **26** provided in the body **10** and communicating with the inlet air-supply passage **22**.

Passage **26** is shown as provided with a shoulder **28** against which a tapering resilient body-seal **30** of the shell or body **31** of valve **24** bears, to seal the passage **26** except for flow axially through the valve body **31**.

The mating members which provide a seat for such a valve **24** of this general type are shown as the circular lip **32** of the valve body **31** and the inner face **34** of a cap **36** carried on a valve-actuating stem **40**.

Flow through valve **24** from the inlet passage **22** below the valve body seal **28—30** is past the valve seat **32—34**, then interiorly of the valve body **31** axially toward the valve-body outlet **42** at the opposite end of the valve body **31**.

The valve **24** is held in place by screw-threads **43** provided in the passage **26**, which engage screw-threads **44** of valve body **31**.

Outwardly of threads **43**, passage **26** is shown as enlarged to provide an air chamber **47** which receives air passing out of the upper outlet **42** of valve body **31**, and which communicates with an intermediate discharge passage **48** yet to be described.

Two embodiments of the means which close the outer end of valve passage **26** and which provide for actuation of valve-stem **40** are shown. In FIGS. 1 and 6, such means are shown as a bushing **50**, which is screwed into threads **51** of the wall of air chamber **47**, and a knurled actuating screw **52** which is screw-threadedly carried in bushing **50**. A resilient disk **54**, received in the bore of bushing **50** seals against air leakage along the actuating screw.

Actuation of the valve stem **40** is achieved, in this embodiment, by screwing the actuating screw **52** to push against the valve stem **40**. The flow may be set to any desired rate; and the flow will continue until the operator retracts screw **52**, for the screw **52** holds the valve stem **40** open against the bias of a valve-spring (not shown) and against the pressure of air in inlet passage **22**.

In another embodiment, as shown in FIGS. 5 and 7, positive-return means are shown for actuating valve stem **40**, comprising a bushing **50a** which slidably receives an actuating plunger **52a**. Plunger **52a** is shown as provided adjacent its inner end with a circumferential groove **56** in which is seated an O-ring **58** which limits outward travel of plunger **52a** and which seals against air leakage along the plunger surface.

In this embodiment, valve shut-off is effected by air pressure in inlet **22** and by a valve spring (not shown) enclosed within the valve body **31**, which close the valve automatically as soon as the operator releases the plunger **52a**.

Accordingly, it is seen that the "tire-valve core" type of valve **24** and associated valve-actuation means provide desired flow of air at desired flow rate and duration.

Air discharge from air chamber **47** is through intermediate passage **48**, and thence through a discharge passage **60**, to discharge outlet fitting **62**.

It is to be noted that the passages **22**, **26**, **48**, and **60** are all so inclined that they may be formed, as by drilling or by withdrawal pins in a casting operation, by extending the forming tool through outlets which are inherently capped by other components; hence no auxiliary closure-caps are required.

The outlet fitting **62** is shown in FIG. 1 as receiving air hose **14**, shown as of a flexible type having alternate windings of strip stock **64** and spring-wire stock **65**. The hose **14** carries the air, as delivered through the air-dispensing body **10** and valve **24**, to the coolant discharge head **12**, where the air provides a jet-pump force to discharge an "atomized-mist" of coolant liquid, as will be described.

Discharge head **12** is shown as comprising a generally cylindrical body **66** which is provided with a cylindrical bore **68**, the rear portion of which is enlarged as indicated by reference numeral **70**, to provide a rearwardly facing shoulder **72**.

This shoulder **72** provides an abutment which is engaged by a forwardly-facing shoulder **74** on a generally cylindrical jet-pump nozzle such as a hollow stem member **76** which is disposed axially of the body-member bore **68**, thereby locating the stem-member **76**.

Along its entire length, the stem-member **76** is of slightly less diameter than the bore of the body-member (about .010 inch less diameter with a body-member bore of about .250 inch, has been found desirable). This clearance even rearwardly of the entrance for coolant fluid, has been found desirable to permit the stem 76 to center itself.

A resilient O-ring 78 is disposed between the shoulders 72—74 to permit such self-centering, but nevertheless sealing against air passage through the body 66 except within the confines of the bore 80 of stem 76.

Coolant is supplied to the body 66 through a coolant inlet pipe 82 which extends through a radial opening 84 of body 66 and communicates with the bore 68 of body 66 ahead of the O-ring 78. A shoulder 85 is provided in opening 84 to bottom the pipe 82 in the opening 84. The pipe 82 is shown as held to body 66 by staking 86.

The source of coolant liquid for pipe 82 is from an associated source (not shown) through a flexible conduit 88, shown in FIGS. 1 and 9 as held to the air-dispenser body 10 as by a clamp 89. As shown in more detail in FIG. 9, the clamp 89 is provided with an opening 90 through which the conduit 88 is inserted, and the conduit is retained therein by a snug fit of conduit 88 and opening 90 and by a knurled retaining screw 91 threaded into a threaded opening 92 of the clamp 89.

In FIG. 9, the retaining screw 91 is shown as having a rounded convex tip 91*a* operatively mating with the curvature of the opening 90. This provides that screw 91 may be used to collapse conduit 88, as illustrated in FIG. 9, to shut off flow of coolant through the conduit, as would be desired, for example, to prevent draining of coolant through the device during non-use if the coolant supply were carried at an elevation above the discharge head 12.

Returning to FIG. 1, the coolant conduit 88 desirably leads along the flexible air-hose 14 to the discharge head 12, and is conveniently secured at spaced intervals to the air-hose 14 as by the tape-strips 92*a*.

The coolant liquid flowing through pipe 82 thus enters the bore 68 of body 66, in the cylindrical recess or clearance space, identified as the chamber 93, between stem 76 and body bore 68.

The coolant is thence drawn forwardly over and past the end of the stem 76 by the jet-pump effect of air passing through stem 76 which creates a vacuum in the coolant line.

Toward this end, the forward end portion 94 of the bore 80 of the stem 76 is of a reduced diameter as at 96 to restrict air passage therethrough, and enlarged at the extreme forward end (see FIG. 11) as by outward taper 98 to achieve the jet-pump effect. Taper 98 has been found to be desirably about 60 degrees included angle.

A knurled cap 100 is screw-threadedly carried on the forward end of the body 66, and is provided with an axially extending bore 102 to receive the mixture of air and coolant. The cap-bore 102 is desirably the same diameter as the body bore 68, and at its forward end tapers as at 103 to a restricted diameter at the discharge outlet 104, that diameter having been found to be in the order of .067 inch, desirably to give desired flow patterns.

The coolant emerging from outlet 104 is in the form of an "atomized-mist" 16, the particulate nature of which provides better coolant effect with relatively less coolant volume, and provides many other advantages such as discussed above.

The extreme forward face 108 of cap 100 is shown as conical, about 160 degrees included angle, this shape having been found to prevent undue turbulence of the mist 16 which would cause undue scattering and loss of directed flow of the particles thereof.

To regulate the nature and quantity of coolant discharged in the coolant-air mixture which forms the mist 16, the operator merely adjusts the screw-threaded setting of the cap 100 on the body 66. This varies the size and shape of the dispersion chamber 106 between the forward end of the stem 76 and the front wall of cap 100, and varies the effective opening of the annular coolant chamber 93.

Thus, the amount and nature of coolant mixture may be regulated as desired for the particular job, even down to a mixture of zero coolant and all air. To provide for such blocking-off of all coolant, the nose portion 94 of stem 76 outwardly of the flare 98 is tapered back as at 109 (see FIG. 11) to mate with the taper 103 of cap 100, and thus the surfaces 103—109 seal off coolant flow when the cap 100 is adjusted to fully-closed position.

The discharge head 12 is formed generally of light-weight aluminum and alloy materials. This, together with the light-weight simplicity of construction, and with the relative stiffness of the pair of conduits 14 and 88 which carry the air and the coolant, provide that the discharge head 12 stays in the selected position and orientation with respect to the cutting zone, even during heavy vibration of the machine tool 17 with which my device may be associated.

For holding the device to the associated machine tool 17 the air-dispensing body 10 is provided with magnetic holding means now to be described.

Accordingly, the body 10 is shown as provided with a well 110 extending upwardly from the bottom of the body 10. Into this well 110, with the body inverted for convenience of manufacture, is stacked a series of alternating magnet blocks 112 and spacer blocks 114, the spacer blocks 114 extending a distance (about one-eighth of an inch has been found desirable) beyond the surface of body 10, the magnet blocks 112 somewhat less (about one-sixteenth inch less has been found desirable). The series of blocks 112–114, as shown, does not extend the full width of the well 110, but leaves a peripheral space 115.

A retaining jacket 115*a*, indicated by the dash lines in FIG. 3, is slipped around the body 10, extending past the surface of body 10 as far as the spacer blocks 114 so extend; and (remembering that during manufacture the bod 10 is desirably inverted to position its well 110 to face upwardly), binder material such as molten plastic 116 is poured into the well 110, filling the clearance space 115, the space 117 outwardly of the magnet blocks 112, and the space 118 outwardly of the walls of body 10.

Desirably, the well 110 of body 10 is undercut, as by a groove 119, which the plastic 116 fills to lock the assembly in the well 110.

The plastic also flows through a plurality of aligned openings 120, 122 provided in the magnet blocks 112 and spacer blocks 114 respectively, forming locking bars 124.

Thus, the magnetic means is firmly held in place, and provides an attractive appearance.

Jacket 115*a* is removed, and face grinding of the exposed surface may be employed if desired.

During assembly it may be desirable to extend a holding wire, eyelet, or the like (not shown) through the stacked series of blocks 112, 114, to hold them in desired position before pouring and setting of the plastic 116. Since such a holding means remains invisibly buried within the plastic, it does not detract from the external appearance of the article.

The magnetic holding power of such a device is great, and permits the use of a relatively long length of air-hose and coolant conduit required to be able to mount the air dispenser body 10 on a stable area of the machine tool 17.

Thus a device may be readily and easily installed wherever there is a source of compressed air; and a single device may be conveniently used successively on different machines of a user's plant, without the necessity of his purchasing a separate device for each machine, for the device may be readily and conveniently removed and attached to any machne in the plant. The coolant fluid consumption is so relatively low that such fluid reservoir need be only a bucket or the like, obviously portable.

While I have described this embodiment as relating to the dispensing of coolant fluid in a machine tool operation, it of course is advantageous in other applications of fluid dispensing. And while compressed air has been used as illustrating the primary fluid, flowing through the body **10**, the device may be used with other fluids, such as water in a liquid-mixing application.

FIG. 10 illustrates a slightly modified form of dispenser body **10*b*** having integrally formed along its upper surface a plurality of upstanding ribs **89*b***, one of which is provided with a conduit opening **90*b*** and a screw opening **92*b***, similar to the features of clamp **89** of FIGS. 1 and 9.

FIG. 5 illustrates a modified form of the invention, primarily for a portable "hand-gun" type of use. This form of device may be used to dispense coolant and other fluids, as in the embodiments above, but finds special use as a hand-carried dispenser of cleaning fluids, as in cleaning gear housings and the like.

As shown in FIG. 5, this embodiment as here illustrated comprises an air-dispenser body **10*a*** somewhat in the general shape of a small gun, the portion which would roughly correspond to a trigger guard of a gun providing a hook **125** by which the device may be suspended during periods of non-use.

The body **10*a*** is shown as provided with features and components generally similar to those of the body **10** in the FIG. 1 embodiment already described; hence, for brevity, will not be described in detail.

Suffice it to say, accordingly, with reference numerals of FIG. 5 similar to reference numerals of FIG. 1 indicating such similarity of components and features, the device illustrated in FIG. 5 has inlet passage **22*a***, valve sleeve or passage **26*a***, a valve **24** of the type of a "core" of a "tire valve," intermediate discharge passage **48*a***, and discharge passage **60*a***. The actuating plunger **52*a*** already described is shown, although, of course, for maintained valve actuation, the alternate valve actuating screw **52** of FIG. 6 may be employed as discussed before.

The forward portion of the body **10*a*** is shown as provided with a fitting **62*a*** adapted to receive a fluid discharge head **12** as above described, but if desired, the discharge head could be carried on a section of flexible air-hose **14**, such as above described, the hose **14** being connected to body **10*a*** rather than the direct connection of the discharge head as shown.

The fluid-discharge head **12**, as mentioned above, may be adjusted to give the desired mixture of coolant and air, or may completely shut off the fluid flow, delivering only the compressed air flowing from the body **10*a***, providing advantages already discussed.

However, if a particular application, such as the blowing away of loose foundry sand in making a foundry mold, permanently requires only a single fluid, such as the compressed air illustrated as the primary fluid passing through and regulated by the body **10*a***, the further modification illustrated in FIG. 8 may be advantageously employed.

Accordingly, in FIG. 8, the body **10*a*** is provided merely with a dispensing tip **130**, screwed into the forward end of body **10*a*** instead of a fitting **62*a*** of FIG. 5, and no discharge head **12** is provided. The dispensing tip **130** emits a stream of the fluid passing through body **10*a***, as regulated by valve-control means such as the plunger **52*a***.

The concepts of my present invention thus provide a novel fluid-dispensing system having many advantages, in the operation of dispensing coolant fluid in a machine tool operation in a particular application, and in other applications which a user may need to dispense a single fluid or a mixture of fluids, at various proportions and various flow rates as desired.

Portability, low cost, light weight, positiveness of location, attractiveness and neatness of appearance, and effectiveness of operation are achieved to great advantage. In applications of coolant-fluid dispensing, in particular, advantages of low fluid consumption, ease of regulation, appearance of work area, and better coolant stream nature are some of the many particular advantages.

The means and concepts which permit the utilization of a so-called "core" of a so-called "tire-valve" as the regulating valve provide for extreme economy of manufacture and service.

The various modifications here illustrated for purposes of disclosure indicate the adaptability of these concepts to various applications, and with different flow conditions and materials.

Accordingly, it will thus be seen from the foregoing description of my invention according to these illustrative embodiments, considered with the accompanying drawings, that the present invention provides a new and useful fluid-dispensing device and method, having desired advantages and characteristics, and accomplishing its intended objects, including those hereinbefore pointed out and others which are inherent in the invention.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:

1. A device of the type described, comprising a first body-member, a valve carried by said first body-member, said first body-member being provided with an inlet passageway and a discharge passageway, the valve being adapted to regulate fluid flow of a primary fluid from said inlet passageway to said discharge passageway, actuating-control means carried by said first body-member for actuating said valve for regulating said primary fluid flow, a second body-member having a hollow bore, a hollow stem carried within the said bore of said second body-member and communicating with the discharge passageway of said first body-member for receiving a flow of primary fluid therethrough, the second body-member being provided with a cap means having a discharge outlet, means communicating a source of associated fluid to said second body-member bore along the exterior of said stem to provide that fluid flow of primary fluid through said stem will carry associated fluid along said stem and thence through the discharge outlet of said cap means, the said cap means being adjustably carried by said second body-member for movement with relation to said stem outlet to regulate flow of said associated fluid.

2. A device of the type described, comprising a first body-member, a valve carried by said first body-member, said first body-member being provided with an inlet passageway and a discharge passageway, the valve being adapted to regulate fluid flow of a primary fluid from said inlet passageway to said discharge passageway, actuating-control means carried by said first-body member for actuating said valve for regulating said primary fluid flow, a second body-member having a discharge outlet, a hollow stem having an outlet, said stem carried within said second body-member and communicating with the discharge passageway of said first body-member for receiving a flow of primary fluid therethrough, the said second body-member and said stem having cooperating abutment members locating said stem in said body-member, the second body-member being provided with a chamber about said stem, means communicating said chamber with a source of associated fluid, the said chamber communicating with the outlet of said hollow stem to provide that fluid flow of primary fluid through said stem will draw associated fluid through said chamber and be discharged through the discharge outlet of said second body-member.

3. A device adapted to dispense fluid, comprising, a body, the body being provided with an inlet passage adapted to communicate with a source of said fluid, the body being provided with a valve passage opening to a face of the body, a valve in said valve passage and hav-

ing a valve seat, the inlet passage communicating with the valve passage at operatively one side of the valve seat thereof, the body being provided with a discharge passage communicating with said valve passage at the operatively other side of the valve seat thereof and directed toward the said body face in the region of the open end of said valve passage permitting formation of said discharge passage by a forming means entering said body through said open end, and means to close said end of said valve passage but permitting actuation of said valve.

4. A discharge head for a fluid dispensing system for dispensing a mixture of two fluids, comprising, a body-member provided with an axial bore and a dispensing orifice, a jet-pump nozzle carried within said bore and having an outside diameter less than the bore of said boy-member, providing an annular chamber about said nozzle and within the body-member, means communicating said chamber with a source of said second fluid, abutment means carried by said body-member and said nozzle limiting movement of said nozzle forwardly with respect to said body-member, a resilient O-ring disposed about said nozzle and engaging the walls of said body-bore to seal the rear of said chamber, means communicating said nozzle with a source of said first liquid, the said chamber communicating with the outlet of said nozzle, whereby passage of the first fluid through said nozzle will draw second fluid into said chamber and dispense through said orifice a mixture of said first and said second fluids, the said orifice being provided by a dispensing cap movably carried on said body-member, said dispensing cap having abutment means co-operating with the said nozzle to vary the flow of said second fluid from said chamber to vary the mixture of said first and second fluids discharged through said orifice and for engaging said nozzle to completely block said flow from said chamber to permit only said first fluid to be discharged.

5. A discharge head for a fluid dispensing system for dispensing a mixture of two fluids, comprising, a body-member provided with an axial bore and a dispensing orifice, a jet-pump nozzle carried within said bore and having an outside diameter less than the bore of said body-member, providing an annular chamber about said nozzle and within the body-member, means communicating said chamber with a source of a second fluid, abutment means carried by said body-member and said nozzle limiting movement of said nozzle forwardly with respect to said body-member, a resilient O-ring disposed about said nozzle and engaging the walls of said body-bore to seal the rear of said chamber, means communicating said nozzle with a source of said first liquid, the said chamber communicating with the outlet of said nozzle, whereby passage of the first fluid through said nozzle will draw second fluid into said chamber and dispense through said orifice a mixture of said first and said second fluids.

6. A discharge head for a fluid dispensing system for dispensing a mixture of two fluids, comprising, a body-member, a dispensing cap threadedly mounted on said body-member, the dispensing cap having a dispensing orifice, a jet-pump nozzle carried by said body-member and communicating with a source of a first liquid under pressure, the body-member providing a chamber within the body-member but along the nozzle and communicating with the discharge of said nozzle, an outlet for said chamber, and means for communicating said chamber with a source of the second fluid, whereby passage of the first fluid through said nozzle will draw second fluid into said chamber and dispense through said orifice a mixture of said first and said second fluids, the said dispensing cap having abutment means co-operating with the outlet of said chamber and providing that as the cap is screwed on said body-member flow of said second fluid out the outlet of said chamber may be varied.

7. A discharge head for a fluid dispensing system for dispensing a mixture of air and another fluid, comprising a body-member having a dispensing orifice, a jet-pump nozzle carried by said body-member and communicating with a source of air under pressure, the body-member providing a chamber within the body-member but along the nozzle and communicating with the discharge of said nozzle, an outlet for said chamber, and means for communicating said chamber with a source of the second fluid, whereby passage of air through said nozzle will draw second fluid into said chamber and dispense through said orifice a mixture of said air and said second fluids, and screw cap means for selectively blocking communication of said chamber with the nozzle outlet to vary the amount of second fluid being drawn by passage of the air through said nozzle.

8. A machine-tool cutting-operation coolant system, comprising, a compressed air dispenser, means for communicating said dispenser with a source of compressed air, magnet means for holding said dispenser to the associated machine-tool, a flexible air-hose communicating with said dispenser, a discharge head communicating with said hose, means communicating said discharge head with a source of coolant, a jet-pump nozzle carried in said head and adapted to draw coolant to said head to be discharged in mixture with compressed air flowing through said head, and means carried by said discharge head for varying the communication of said coolant to said nozzle to vary the coolant-air mixture discharged from said head and to block off communication of said coolant to said nozzle to provide that only air will be discharged.

9. A machine-tool cutting-operation coolant system, comprising, a compressed air dispenser, means for communicaing said dispenser with a source of compressed air, magnet means for holding said dispenser to the associated machine-tool, a flexible air-hose communicating with said dispenser, a discharge head communicating with said hose, means communicating said discharge head with a source of coolant, a jet-pump nozzle carried in said head and adapted to draw coolant to said head to be discharged in mixture with compressed air flowing through said head.

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