May 8, 1956 A. W. G. LARSON ET AL 2,744,361

SCOURING GUN

Filed May 14, 1954 2 Sheets-Sheet 1

FIG. 1

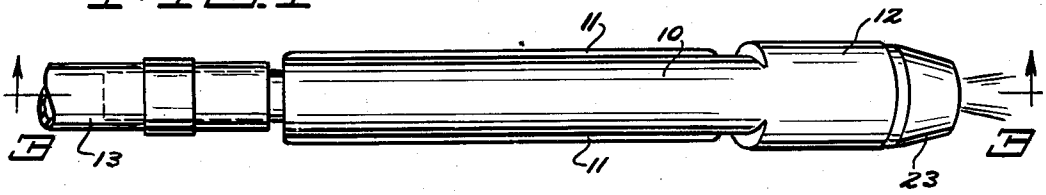


FIG. 2

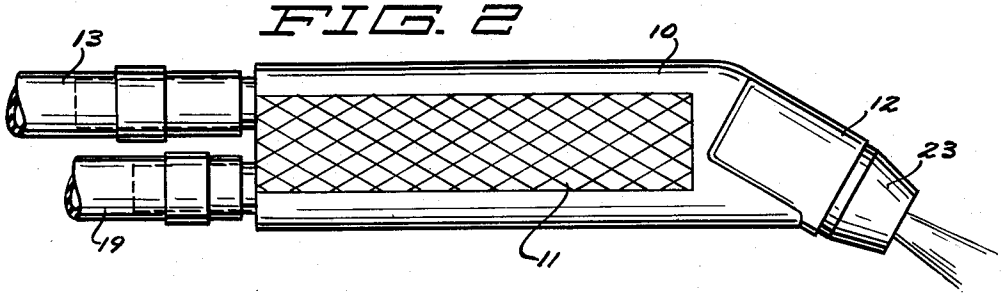


FIG. 3

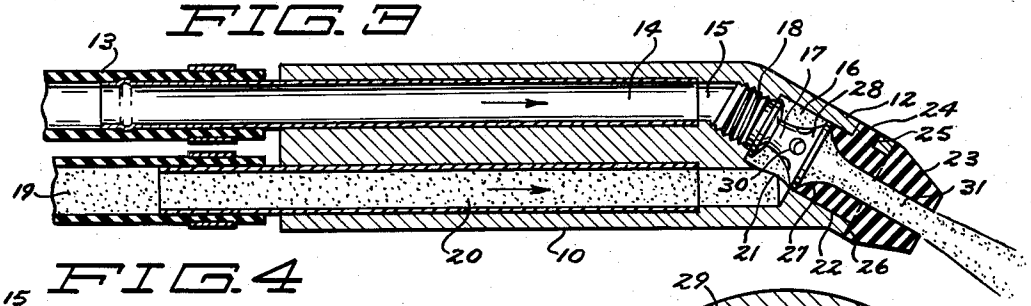
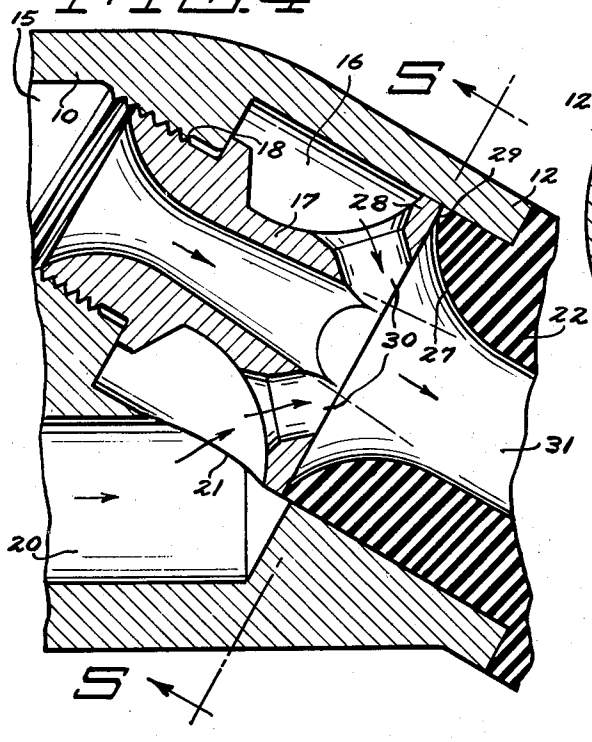


FIG. 4



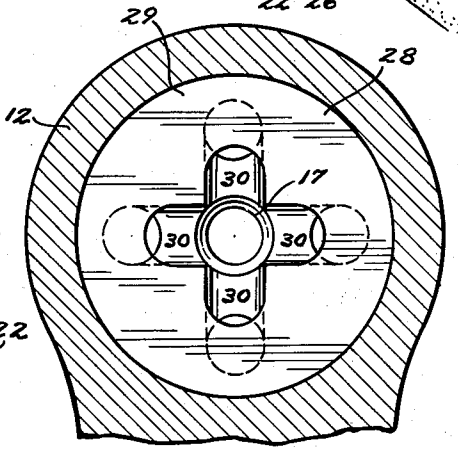


FIG. 5

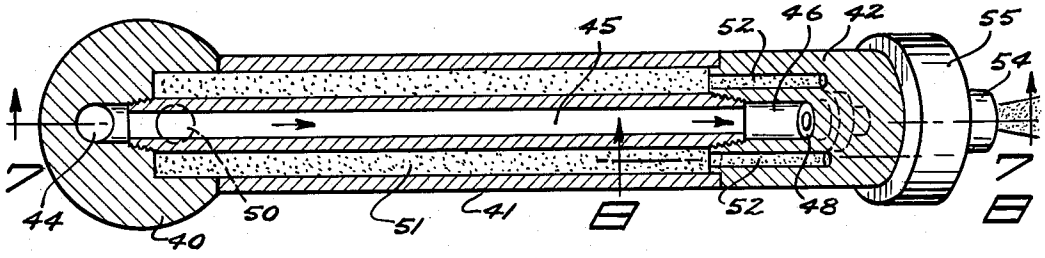
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FIG. 6



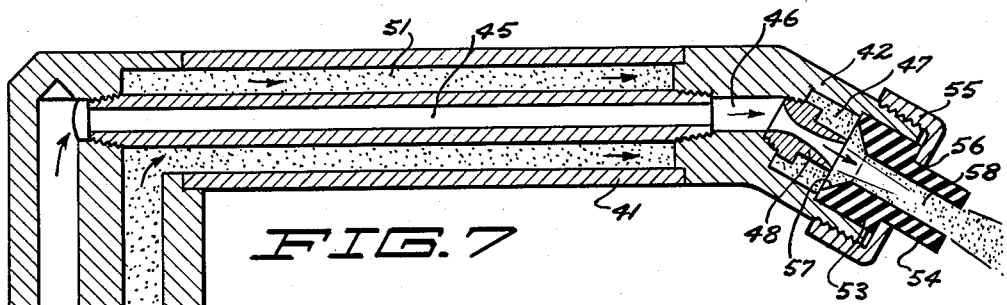
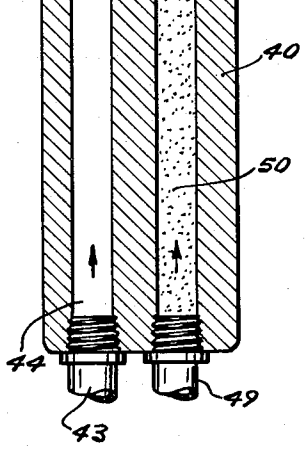


FIG. 7



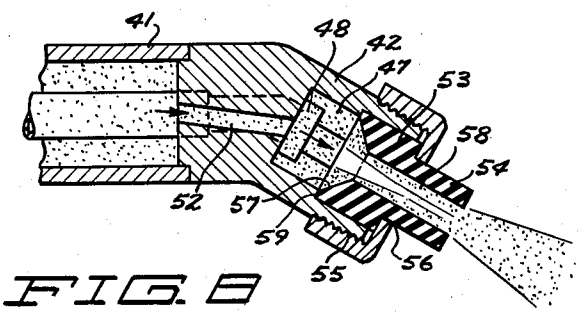


FIG. 8

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2,744,361

SCOURING GUN

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Application May 14, 1954, Serial No. 429,723

4 Claims. (Cl. 51—11)

The invention herein has relation to a gun for scouring articles of various types, and its object is to provide a new and improved gun devised to be especially useful in the arts to clean such articles as pistons, valves, brake shoes, etc.

This application is a continuation in part of the disclosure of our pending application Serial No. 396,014, for Apparatus for Cleaning Articles, filed December 3, 1953, and presents novel and improved features and characteristics of construction relating to scouring guns additional to those illustrated and described in said disclosure.

In the accompanying drawings forming a part of this specification,

Fig. 1 is a top plan view of a scouring gun made according to the invention;

Fig. 2 is a side elevational view of the disclosure of Fig. 1;

Fig. 3 is a longitudinal sectional view, taken on line 3—3 in Fig. 1;

Fig. 4 is a detail sectional view corresponding with the disclosure of a part of the scouring gun adjacent the right in Fig. 3;

Fig. 5 is a transverse sectional view, taken as on line 5—5 in Fig. 4;

Fig. 6 is a view of a scouring gun of modified construction incorporating features and characteristics of the invention disclosing a grip piece and barrel of said scouring gun in longitudinal section and a discharge nozzle of the gun as it would appear from the top of the sheet in Fig. 7;

Fig. 7 is a detail sectional view, taken as on line 7—7 in Fig. 6; and

Fig. 8 is a detail sectional view, taken on line 8—8 in Fig. 6.

With respect to Figs. 1 to 5 of the drawings, the scouring gun there shown includes a barrel **10**, with roughened grip pieces **11** upon the opposite side thereof, and a nozzle **12** at the outer end of said barrel.

A flexible air conveying pipe **13**, to lead from a source (not shown) of air under pressure, opens to air outlet passage **14** disposed at an upper portion and extending longitudinally of the barrel **10**. The air outlet passage **14** is open to a centrally disposed port **15** in the inner, adjacent end portion of a tubular element of the nozzle **12**, and said tubular element is integral with the barrel **10**. An end portion of said tubular element having the port **15** is in longitudinal alinement with said barrel, and said port opens at its outer end, or end spaced from the barrel, to a chamber **16**, concentric with and of diameter larger than the port, situated in an outer end portion of the tubular member in alined relation with an outer end portion of said port and in oblique relation to and extending generally downwardly from the barrel **10**. A venturi **17** has its inner end portion threaded, as at **18**, in the outer end of the port **15** and its body portion centrally situated in the chamber **16**.

A flexible conveying pipe **19** for slurry, to lead from a suitable source (not shown) of slurry, opens to an outlet passage **20** for slurry, in the barrel **10** and the inner end portion of the tubular element of the nozzle **12** at a side of the air outlet passage **14**, and said outlet passage **20** opens, as at **21**, to the chamber **16** at a side thereof, as well as at a side of the venturi **17**. The chamber **16** is of annular configuration and in surrounding, concentric relation to said venturi.

An outlet plug of the nozzle **12**, of hard rubber as disclosed, includes an inner end portion **22** snugly fitted into an outer end portion of the tubular element of said nozzle in contiguous relation to the chamber **16** and an outer portion **23** which extends forwardly and downwardly. A protuberance **24**, upon a side surface of the inner end portion **22** of the outlet plug and fitted into an opening **25** in the tubular element of the nozzle, retains an inwardly facing shoulder **26** of said outlet plug, between its inner and outer end portions, against the forward end of said tubular element. The inner end **27** of the inner end portion **22** of the outlet plug is of conical configuration and slants interiorly, toward the longitudinal axis of said outlet plug, and forwardly, away from the venturi. Said inner end **27** is in concentric relation to said venturi. The outer end of the venturi integrally supports a flared flange or member **28** which extends exteriorly, away from the axis of the outlet plug, and forwardly, away from said venturi. A forward, exterior annular marginal surface **29** of the flared flange or member **28** engages a rearward, exterior annular marginal surface of the inner end **27** of the inner end portion **22** of the outlet plug, and ports **30** through said flared flange or member connect the chamber **16** with an outlet passage **31** through said outlet plug. There are four ports **30** as disclosed, at 90° apart, and each of said ports is situated exteriorly of the venturi and interiorly of the exterior, annular marginal surface **29**. The venturi **17** and the flare flange or member **28** separate the chamber **16** from the outlet passage **31** save by way of the ports **30**. Stated differently, the only slurry which can pass from said chamber **16** to the outlet passage **31** is that which enters said outlet passage by way of said ports **30**. As will be clear from Figs. 3 and 4, the slurry outlet passage **20** communicates with the chamber **16** at the forward side of the inner end of the venturi and at the rearward side of the flared flange or member **28**. That is to say, the construction and arrangement are such that travel of slurry from said outlet passage **20** to the outlet passage **31** is by way of the chamber **16** and the ports **30**. The outlet passage **31** is concentric and in longitudinal alinement with the venturi **17** and of greater diameter than is said venturi. As disclosed, each port **30** is of smaller diameter than is the venturi.

Ejection of slurry from the outlet passage **31** will be in respense to passage of air under pressure through the conveying pipe **13**, the outlet passage **14** and the venturi **17**. As air under pressure travels through the venturi, its rate of flow will be greatly accelerated to cause pressure of air in the chamber **16** of the tubular element of the nozzle **12** to be reduced to pressure below atmospheric pressure, thus to cause slurry to be drawn or sucked into said chamber, by way of the slurry conveying pipe **19** and the outlet passage **20**, and then into the outlet passage **31**, by way of the ports **30**. Slurry which enters said outlet passage **31** will be forced out of the scouring gun by and with air under pressure which enters the outlet plug from the venturi. The magnitude of the blast of the jet of slurry and air will be at its maximum a short distance in advance of, or away from, said outlet plug. The construction and arrangement as disclosed, including the venturi **17**, the chamber **16** and the flared flange or member **28** with ports **30**, provides a jet of slurry and air wherein the slurry is distributed uniformly throughout the column of air as the jet is forced from the outlet plug.

The scouring gun disclosed in Figs. 6, 7 and 8 includes a grip piece **40**, a barrel **41** rigid with and perpendicular to said grip piece, and a nozzle **42** at the outer end of the barrel.

A flexible air conveying pipe **43**, to lead from a source (not shown) of air under pressure, opens to an air inlet passage **44** through the grip piece **40**, and said air inlet passage **44** opens to an air outlet passage **45** disposed centrally and extending longitudinally of the barrel **41**. The air outlet passage **45** is open to a centrally disposed port **46** in the inner, adjacent end portion of a tubular element of the nozzle **42**, and said tubular element is rigid with the barrel **41**. An end portion of the tubular element of the nozzle **42** having the port **46** is in longitudinal alinement with said barrel, and said port **46** opens at its outer end, or end spaced from the barrel, to a chamber **47**, concentric with and of diameter greater than the port **46**, situated in an outer end portion of said tubular element of the nozzle in alined relation with an outer end portion of said port **46** and in oblique angle relation to and extending generally downwardly from the barrel **41**. A venturi **48** has its inner end portion fixed in the outer end of the port **46** and its body portion situated in the chamber **47**.

A flexible conveying pipe **49** for slurry, to lead from a suitable source (not shown) of slurry, opens to an inlet passage **50** through the grip piece **40**, at a side of the air inlet passage **44**. The slurry inlet passage **50** opens to an annular outlet passage **51** for slurry in surrounding relation to the air outlet passage **45**, and said annular outlet passage for slurry opens by way of longitudinal outlet ports **52**, at opposite sides of the air outlet passage **45** and the venturi **48**, to the chamber **47**. Said chamber **47** is of annular configuration and in surrounding, concentric relation to said venturi **48**.

An outlet plug of the nozzle **42**, of hard rubber as disclosed, includes an inner end portion **53** snugly fitted into an outer end portion of the tubular element of said nozzle **42** in contiguous relation to the chamber **47** and an outer end portion **54** which extends forwardly and downwardly. A screw member **55** upon the forward end of the nozzle tubular element retains the outlet plug in said tubular element. A base of the screw member is engaged against the forward or outer end of the inner end portion of the outlet plug and includes a central opening **56** in which the outer end portion **54** of said outlet plug is situated. The inner end **57** of the inner end portion **53** of the outlet plug is of conical configuration and slants interiorly, toward the longitudinal axis of said outlet plug, and forwardly, away from the venturi **48**. Said inner end **57** is in concentric relation to said venturi. The outer end of the venturi is open to an outlet passage **58** through the outlet plug and also in alined relation transversely of the nozzle with a rearward, exterior annular marginal surface **59** of the inner end **57** of the inner end portion **53** of said outlet plug. The outlet passage **58** is concentric and in longitudinal alinement with the venturi **48** and of greater diameter than is said venturi.

Ejection of slurry from the outlet passage **58** will be in response to passage of air under pressure through the conveying pipe **43**, the inlet passage **44**, the outlet passage **45**, and the venturi **48**. As air under pressure travels through said venturi, its rate of flow will be greatly accelerated to cause pressure of air in the chamber **47** to be reduced to pressure below atmospheric pressure, thus to cause slurry to be drawn or sucked into said chamber, by way of the slurry conveying pipe **49**, the inlet passage **50**, the annular outlet passage **51** and the outlet ports **52**, and then into the outlet passage **58**. Slurry which enters said outlet passage **58** will be forced out of the scouring gun by and with air under pressure which enters the outlet plug from the venturi **48**. As in the case of the scouring gun of Figs. 1 to 5, the magnitude of the blast of the jet of slurry and air will be at its maximum a short distance forwardly of the outlet plug.

What is claimed is:

1. A scouring gun comprising a barrel, a tubular element rigid with an outer portion of said barrel and providing a chamber, a plug rigid with an outer portion of said tubular element and having an outlet contiguous with said chamber, a conveying pipe for slurry leading by way of a first passage outwardly of the barrel to said chamber, a conveying pipe for air leading by way of a second passage outwardly of said barrel past the chamber to said plug outlet, a venturi in said chamber in spaced relation to said tubular element and in contiguous relation to said first passage and said plug outlet, and a member situated inwardly of the plug between an outer portion of said venturi and the inner end of said plug cooperating with the venturi to separate the chamber from said second passageway and said plug outlet save for spaced ports through said member, an outer surface of said member being in proximate relation with the inner end of said plug and said venturi being responsive to flow of air under pressure through said second passage to the plug outlet to induce flow of slurry by way of said first passage, said chamber and said ports into said plug outlet.

2. A scouring gun comprising a barrel, a tubular element rigid with an outer portion of said barrel and providing a chamber, a plug rigid with an outer portion of said tubular element and having an outlet contiguous with a rearward, forwardly and interiorly extending conical end surface of said plug itself contiguous with and in concentric relation to the chamber, a conveying pipe for slurry leading by way of a first passage outwardly of the barrel to said chamber, a conveying pipe for air leading by way of a second passage outwardly of said barrel past the chamber to said plug outlet, a venturi in said chamber in spaced relation to said tubular element and in contiguous relation to said first passage and said conical end surface of said plug, and a member situated inwardly of the plug between an outer portion of said venturi and an exterior marginal portion of said conical end surface of the plug cooperating with the venturi to separate the chamber from said second passageway and said plug outlet save for spaced ports through said member, an outer surface of said member being in proximate relation with the inner end of said rearward conical end surface of said plug and said venturi being responsive to flow of air under pressure through said second passage to the plug outlet to induce flow of slurry by way of said first passage, said chamber and said ports into said outlet.

3. A scouring gun comprising a barrel, a tubular element rigid with an outer portion of said barrel and providing a chamber, a plug rigid with an outer portion of said tubular element and having an outlet contiguous with said chamber, a conveying pipe for slurry leading by way of a first passage outwardly of the barrel to said chamber, a conveying pipe for air leading by way of a second passage outwardly of said barrel past the chamber to said plug outlet, and a venturi in said chamber in spaced relation to said tubular element and in contiguous relation to said second passage and separating the second passage from the chamber, said venturi being in alined, contiguous relation to said plug outlet and having an outer end thereof in alinement transversely of said tubular element with the inner end of the plug outlet, and the venturi being responsive to flow of air under pressure through the second passage to said plug outlet to induce flow of slurry by way of said first passage and said chamber into the plug outlet.

4. A scouring gun comprising a barrel, a tubular element rigid with an outer portion of said barrel and providing a chamber, a plug rigid with an outer portion of said tubular element and having an outlet contiguous with a rearward, forwardly and interiorly extending conical end surface of said plug itself contiguous with and in concentric relation to the chamber, a conveying pipe for slurry leading by way of a first passage outwardly of the

barrel to said chamber, a conveying pipe for air leading by way of a second passage outwardly of said barrel past the chamber to said plug outlet, and a venturi in said chamber in spaced, concentric relation to said tubular element and in contiguous relation to said second passage and separating the second passage from the chamber, said venturi being in alined, contiguous, concentric relation to said conical end surface of said plug outlet and having an outer end thereof in alinement transversly of said tubular element with the inner end of said rearward conical end surface of the plug outlet, and the venturi being responsive to flow of air under pressure through the second passage to said plug outlet to induce flow of slurry by way of said first passage and said chamber to the plug outlet.

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