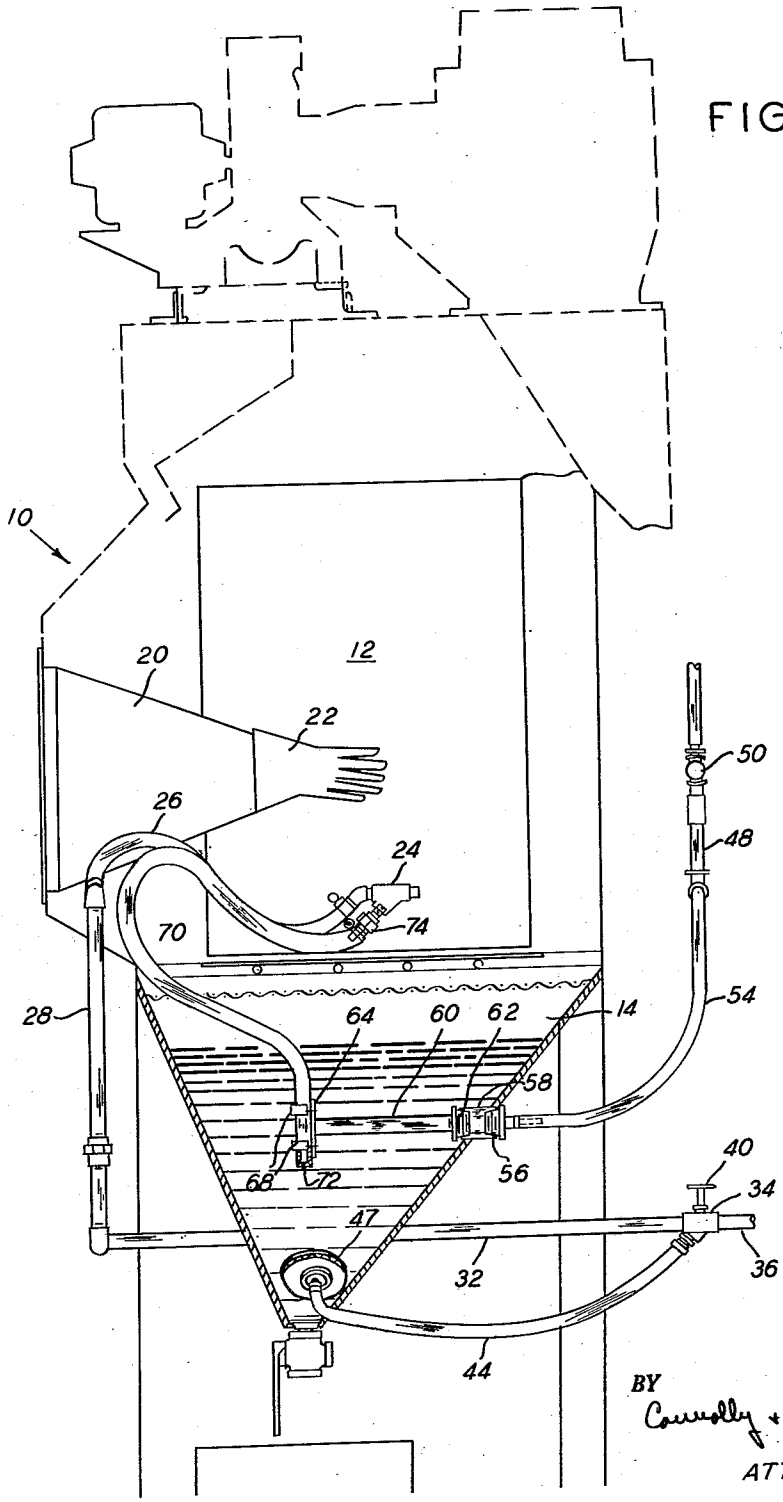
July 2, 1957 R. R. GARVER 2,797,530

SLURIATOR

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FIG. 1



INVENTOR.

BY Connolly & Hutz

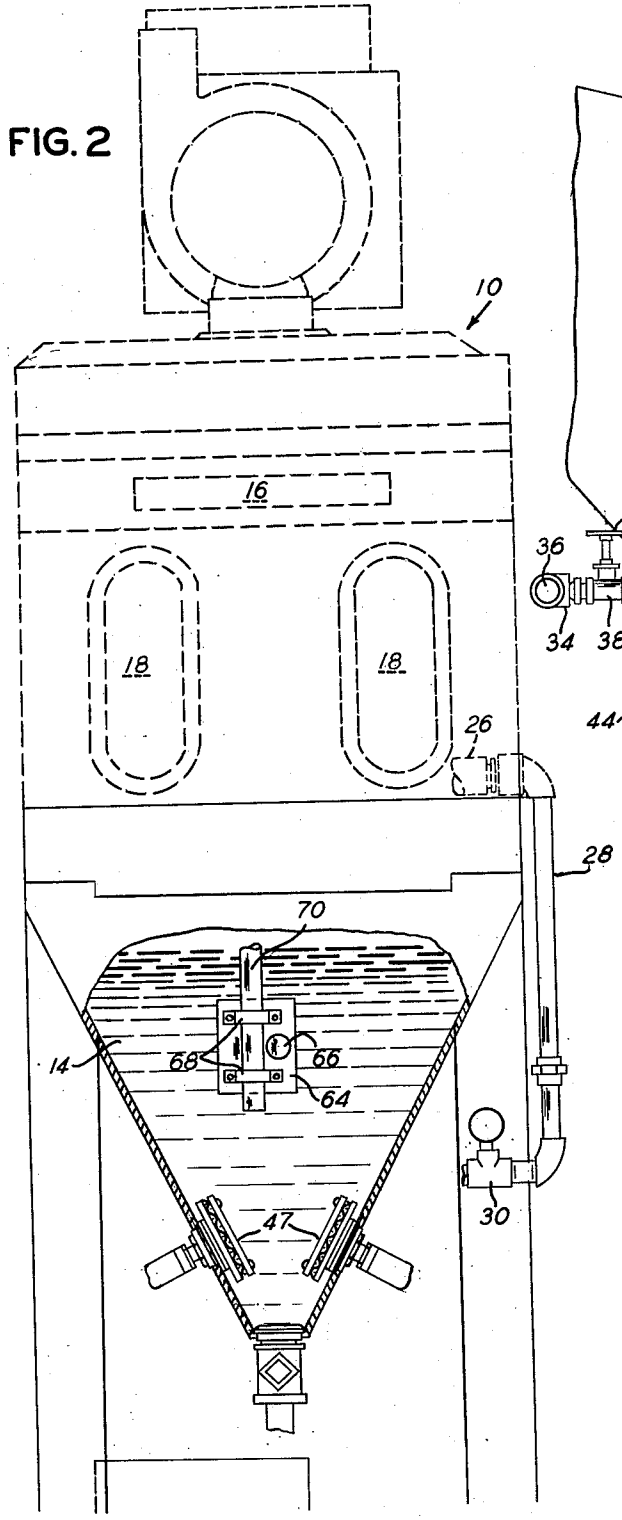
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SLURIATOR

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FIG. 2



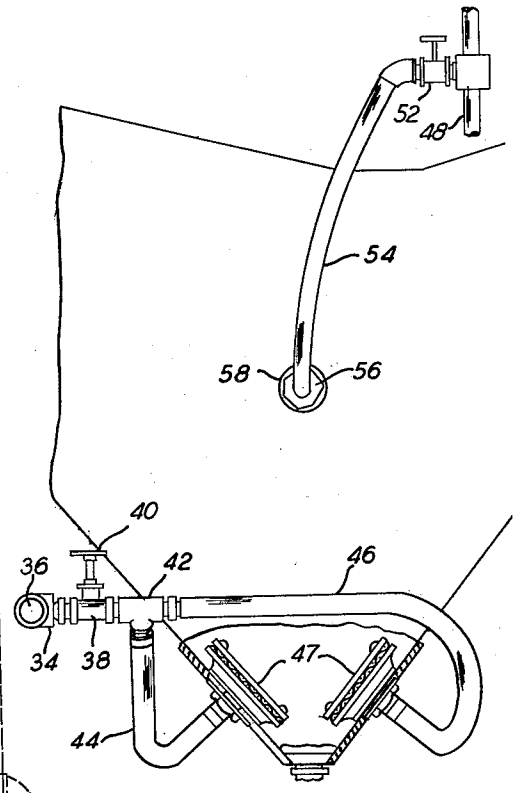


FIG. 3

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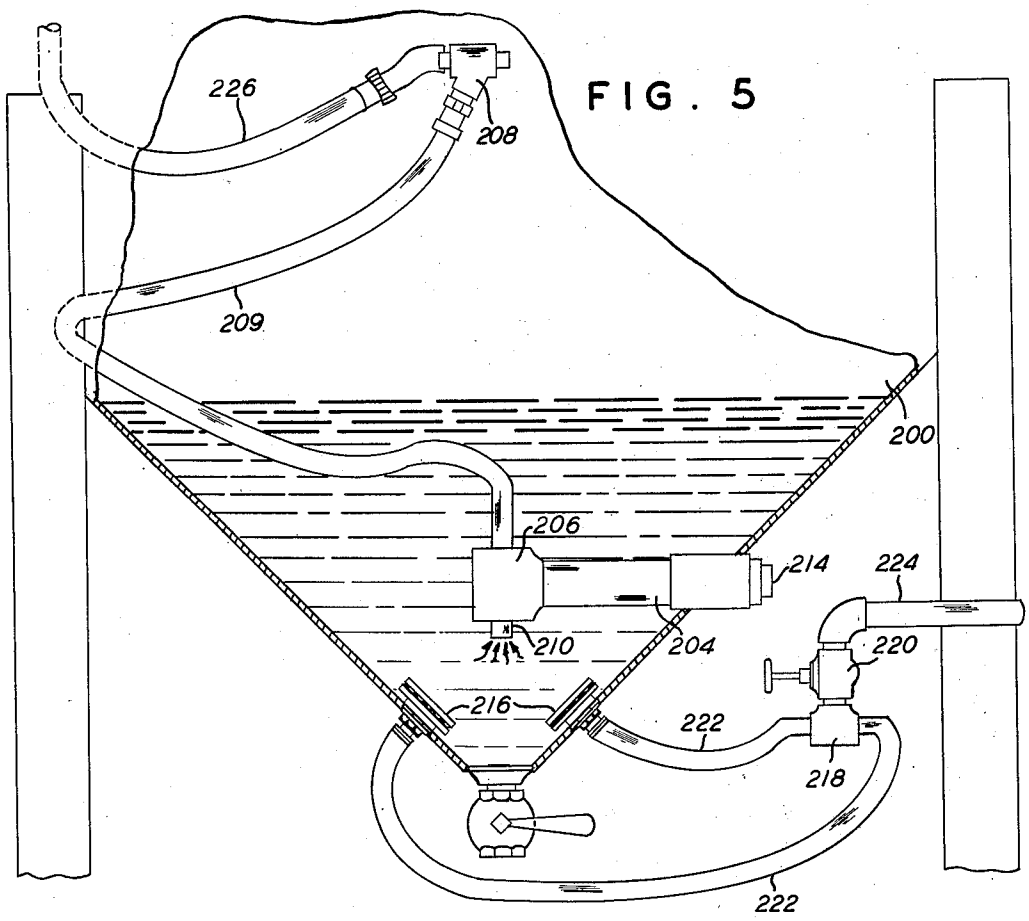


FIG. 5

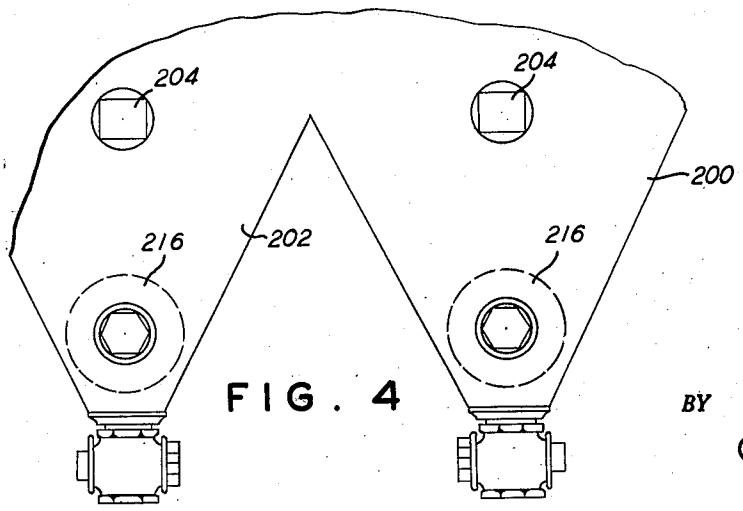


FIG. 4

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FIG. 7

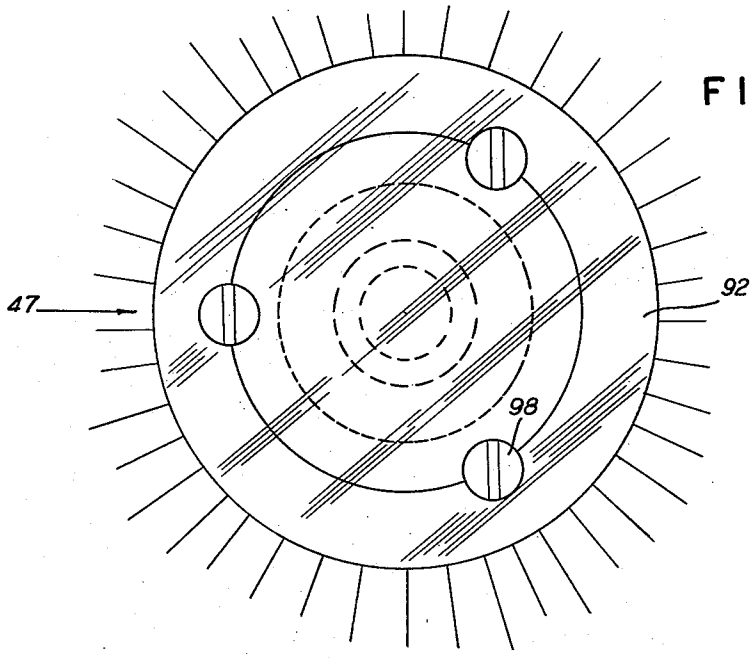


FIG. 6

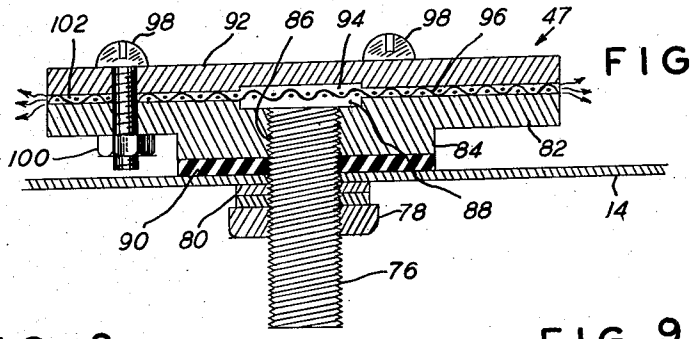


FIG. 8

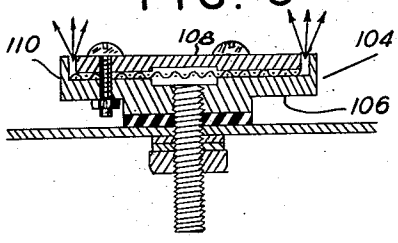
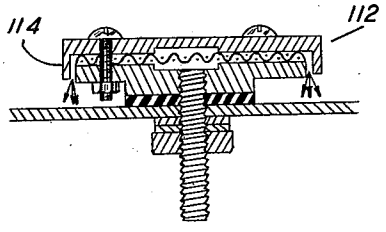


FIG. 9



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2,797,530

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2,797,530

SLURIATOR

Ralph R. Garver, Hagerstown, Md., assignor to Pangborn Corporation, Hagerstown, Md., a corporation of Maryland

Application August 17, 1954, Serial No. 450,323

9 Claims. (Cl. 51—8)

This invention relates to blasting machines and particularly relates to a method and apparatus for maintaining the abrasive particles which perform the blasting work in suspension during the blast cleaning process.

The present invention constitutes an improvement over such prior mechanisms as that disclosed in U. S. Patent 2,576,008 granted November 20, 1951 to W. I. Gladfelter et al.

In blasting devices of the type disclosed in the above mentioned Gladfelter et al. patent, the abrasive material is maintained in suspension through agitation of the slurry caused by a continuous circulation of the abrasive-containing slurry through a system of pipes, pumps and valves. Among the disadvantages of this system is the complicated arrangement of mechanically intricate parts which not only increase the cost of manufacture and maintenance but which are also subject to frequent breakdowns. Furthermore, the pump, valves, etc. require constant flushing with clear water to prevent clogging thereof by the abrasive particles which are constantly passing therethrough. This requires frequent interrupting of the blasting process so that this cleaning can take place.

Heretofore, attempts were made to overcome the above disadvantages by using a direct flow of compressed air to agitate the slurry, such direct flow being provided either through a pipe or tube provided with minute circular holes or through the outlet end of single or multiple pipes. However, all such prior devices caused the abrasive material to settle and build up on certain portions of the hopper walls, the areas of such build-up depending on the fixed position or positions of the pipes and the direction in which they extended.

The above, as well as other disadvantages, have been overcome by the present invention wherein a continuous supply of a compressed fluid such as air is ejected into the slurry from all radial directions substantially parallel to the adjacent walls of the hopper, thereby providing a continuous and complete agitation of the slurry and, at the same time, preventing any accumulation or build-up of abrasive materials on particular portions of the hopper walls.

It is, therefore, one object of this invention to provide for the maintenance within a hopper of a suspension of abrasive material in a slurry in such manner that there is substantially no build-up of the abrasive material on the hopper walls.

Another object of this invention is to provide for the maintenance of a suspension of abrasive material in a slurry without the necessity for using a complicated system of pipes, pumps and valves.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Fig. 1 is a somewhat diagrammatic side view of a machine embodying the present invention, partly in elevation and partly in section.

Fig. 2 is a front view of the machine of Fig. 1 partly in elevation and partly in section.

Fig. 3 is a fragmentary partly sectional rear view of the machine showing the hopper assembly and the water inlet thereto.

Fig. 4 is a fragmentary side elevational view of a second embodiment of the invention wherein two hoppers are provided.

Fig. 5 is a cross-sectional view of one of the hoppers of Fig. 4 showing it in association with a blast gun device.

Fig. 6 is a sectional view of one of the sluriators embodied in the present invention for the purpose of discharging an agitating fluid into the hopper.

Fig. 7 is a top plan view of the device of Fig. 6.

Fig. 8 is a sectional view of a second form of sluriator.

Fig. 9 is a sectional view of a third form of sluriator.

Referring now in greater detail to the drawings wherein similar reference characters refer to similar parts, there is illustrated a blasting machine generally designated **10**. This machine is generally similar to that disclosed in the aforementioned Gladfelter et al. patent, and, therefore, except for those parts which are new, need not be described in any great detail here. The machine, generally, comprises a housing or cabinet enclosing a blasting chamber **12** at the bottom of which is provided a conical hopper **14** for holding an abrasive slurry. There is also provided a vision window **16** and armholes **18** with which are associated flexible sleeves **20** terminating in gloves **22**. The gloves are provided so that the operator may hold and manipulate the work, or the blast gun, or both, within the machine.

The blast gun nozzle **24** is positioned within the blasting chamber and is connected through a flexible hose **26** and a pipe **28** to a T coupling **30**. An air line **32** connects the T coupling **30** to a second T coupling **34**. There is also connected to the coupling **34** an air line **36** which leads to the source of compressed air. A suitable valve, not shown, but preferably of the trigger type, is adapted to be interposed in the compressed air line leading to the gun nozzle for the purpose of operating the gun. The third arm of the T **34** is connected to one end of a valve housing **38** having a needle valve **40** therein. Connected to the other end of the valve housing is a T coupling **42** to which are connected air hoses **44** and **46**, as best seen in Fig. 3. These hoses **44** and **46** are each connected to an externally threaded nipple, each nipple projecting through a wall at the lower end of the hopper **14**, as best seen in Figs. 2 and 3. A compressed air flow-regulator generally designated **47**, and hereinafter referred to as a "sluriator" is connected to each of these externally threaded nipples within the hopper for a purpose to be hereinafter more fully set forth.

A conduit **48**, which may be provided with connections to a window wash valve and to a filter cleaning spray device, such as more specifically illustrated in the aforementioned Gladfelter et al. patent, is provided with a water inlet **50** and with a valve coupling **52** to which is connected a hose **54**. This hose **54** is provided with a threaded bushing **56** at its other end, this bushing being adapted to be threadedly connected to one end of a coupling **58** extending through the hopper wall.

A pipe **60**, having a threaded bushing **62** at one end, is adapted to be threadedly connected to the other end of the coupling **58** within the hopper. The opposite end of the pipe **60** is integral with a plate **64** which has an opening **66** coinciding with the end of the pipe **60**. This pipe **60**, having its outlet at **66**, is used for replenishing the hopper **14** with fresh water when necessary.

The plate **64** is provided with clamps **68** which retain one end of a hose **70**, the outlet portion of this end of the hose being beveled, as at **72**. This beveled end of the hose **70**, which extends into the abrasive slurry in the

hopper **14**, is, therefore, supported on the plate **64** which is, itself, supported by pipe **60**. The opposite end of the hose **70** is coupled, as at **74**, to the gun nozzle **24**.

Referring now more specifically to the air flow regulators or "sluriators" generally designated **47**, each of these sluriators is, as described above, mounted on an externally threaded nipple extending through the hopper wall. Each of these nipples is designated **76** and, as best shown in Fig. 6, is held in position on the hopper wall by means of a nut **78** bearing against a washer or washers **80** held against the external surface of a wall of hopper **14**.

At the internal end of the nipple **76**, within the hopper, is provided a plate **82** which is preferably circular and which has a centrally depending portion **84**. The portion **84** is provided with a centrally positioned, internally threaded bore **86**. At the upper end of the bore **86** is provided a counterbore **88** forming a central recess in the plate **82**. The nipple **76** is threadedly engaged within the bore **86** and supports the plate **82** upon a resilient washer **90** made of rubber or the like, which is interposed between the depending portion **84** and the internal wall surface of the hopper **14**.

Connected to the plate **82** in spaced face-to-face relationship is a second plate **92** which is provided with a central recess **94** in opposed relationship to recess **88**. A fine, mesh wire screen **96** is positioned between the two plates **82** and **92** which are clamped together by means of bolts **98** and nuts **100**.

In the operation of the sluriators, a fluid under pressure, such as compressed air, is supplied through the nipple **76** and flows through the recess **88** into the slot **102** formed between the plates **82** and **92** and in which the screen **96** is positioned. The screen acts as a baffle to diffuse the compressed air in the radial plane, this air being then emitted peripherally from the sluriator in all radial directions which are generally parallel to the adjacent wall surfaces. This radial stream of compressed air acts to agitate the mixture of water and abrasive forming the slurry and, thereby, acts to keep the abrasive in suspension so that it may be properly delivered to the blasting gun. The above noted radial emission of the compressed air prevents the accumulation or built-up of slurry in any particular areas of the hopper walls since no one area is subject to any greater part of the air stream than any other area. It should here be noted that the provision of the central pocket formed by recesses **88** and **94** is of special importance since it not only provides an area for equal air distribution but also provides a pocket for collecting any foreign matter that may be carried by the compressed air line and which would tend to clog the apparatus if such a pocket were not provided.

A modified form of the sluriator is illustrated in Fig. 8. The sluriator **104**, shown in Fig. 8, is similar to the sluriator **47** described above except that the plate **106** extends radially somewhat beyond the plate **108** and is provided with an upstanding peripheral flange **110**. This construction permits the compressed air to flow in a radially inward direction relative to the hopper. In Fig. 9, still another modification of the sluriator is shown at **112**. This sluriator **112** is similar to that illustrated in Fig. 6 except that the peripheral flange **114** extends in an opposite direction from the flange **110**. The forms of the invention illustrated in Figs. 8 and 9 may be used where it is preferable to have a relatively greater turbulence but where the accumulation of abrasive on the hopper walls is a secondary consideration. The lateral direction of the compressed air stream relative to the slurry and the impingement of the air stream on the hopper walls provides a large amount of turbulence in the slurry and thereby sustains the suspension.

Figs. 4 and 5 illustrate a modification of the invention which is adapted to be used in conjunction with an apparatus wherein a plurality of blasting guns are used.

The form of the invention illustrated in Figs. 4 and 5 shows an apparatus wherein two separate slurry hoppers, each serving a separate blasting gun, are provided; these hoppers being illustrated at **200** and **202**. The water inlet to each hopper may, if desired, be generally similar to that shown in the above described form of the invention, with a hose, similar to that shown at **54** in Figs. 1 and 2, leading to each hopper, and each hose being connected to a pipe, similar to that shown at **60** in Figs. 1 and 2, at the end of which is a clamping plate for the slurry supply hose for the nozzle, similar to that shown at **70** in Figs. 1 and 2. On the other hand, however, the water inlet hoses may be free from any attachment to the nozzle supply hose and, instead, a separate support pipe **204** may be provided in each hopper. Each support pipe **204** is provided with a laterally extending head **206** having an opening therethrough. The nozzle **208** is provided with a slurry supply hose **209** which extends through the opening in the head **206**, and into the slurry, as shown at **210**. The external end of the support pipe **204** is plugged as at **214**. This type of support means may also be used in the first form of the invention having the single hopper.

At the bottom portion of each of the hoppers **200** and **202** are provided a pair of sluriators **216** similar to the sluriators **47**. Each pair of sluriators **216** in one hopper are connected to a coupling unit **218** of a valve **220** by flexible hoses **222**. The valve **220** is connected by means of an air line **224** to a similar valve, not shown, in the other hopper. This similar valve is connected to the sluriators in the other hopper in the same manner as the valve **220** is connected to its corresponding sluriators. The air valves are all connected by suitable means to a source of compressed air, not shown. The air hose **226**, leading to the gun nozzle **208**, may be connected to the source of compressed air by any suitable means and a suitable actuating valve may also be interposed in the air line between the gun nozzle and the source of compressed air. Although two hoppers have been illustrated, it is within the scope of the invention to provide as many gun nozzles and as many hoppers as desired.

In the operation of either embodiment of the machine herein disclosed, the maintenance of a compressed air flow through the sluriators provides a constant agitation of the slurry and, therefore, keeps the abrasive particles in suspension at all times.

The blasting gun used here is preferably of the type disclosed in the U. S. Patent to Keefer, No. 2,369,576, dated February 13, 1945. When the blasting gun is to be operated, the operating valve, which is preferably a trigger-type valve, is actuated to open the compressed air line to the nozzle. The flow of the compressed air through the nozzle sets up a partial vacuum within the gun barrel and, thereby, draws slurry through the slurry line from the hopper into the nozzle, where it is directed by the blast of compressed air against a workpiece being treated. Cut-off valve such as shown at **40** and **220** may be used to cut off flow of the compressed air to prevent accidental actuation of the blasting gun when the machine is not in use, such as when it is being cleaned or when there is no workpiece in position.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed in this invention is:

1. A blasting apparatus comprising a work blasting chamber, blasting means in said chamber for projecting a stream of abrasive particles against a workpiece positioned in said chamber, a hopper for holding a slurry of abrasive particles, means for conducting slurry from said hopper to said blasting means, and agitating means for projecting a fluid under pressure into said hopper for agitating the slurry therein, said agitating means com-

prising a head provided with a peripherally positioned annular slot adapted to project said fluid under pressure in an unbroken annular pattern, there being a screening material positioned in said slot, said screening material comprising a plurality of openings spaced from each other by webs, the total surface area of said openings being substantially greater than the total surface area of said webs.

2. The blasting apparatus of claim 1 wherein said blasting means comprises a plurality of blasting devices, each of which is in fluid connection with a separate hopper, each of said hoppers being provided with an agitating means, and the agitating means in each hopper being connected to each other and to a common source of fluid under pressure.

3. The blasting apparatus of claim 1 wherein said agitating means comprises at least one annular body having a peripheral slot therein through which the fluid under pressure is adapted to flow.

4. The blasting apparatus of claim 1 wherein said annular slot extends radially through the peripheral wall of said head.

5. The blasting apparatus of claim 1 wherein said annular slot is intersected by a second annular slot which extends in a plane substantially perpendicular to said first slot, said slots intersecting at a position adjacent the periphery of said head.

6. In a blasting apparatus, an agitating device for maintaining the abrasive particles of an abrasive slurry in suspension therein, said device comprising a pair of relatively flat plates connected to each other in spaced, face-to-face relationship to form a peripheral slot, a central recess on the opposing faces of each of said plates, said central recesses coinciding with each other, a mesh screen positioned between said plates, an opening extending through one of said plates into the central recess on the face thereof, and a conduit positioned in said opening, there being a screening material positioned in said slot, said screening material comprising a plurality of opening spaced from each other by webs, the total surface area of said openings being substantially greater than the total surface area of said webs.

7. The apparatus of claim 6 wherein one of said plates extends laterally beyond the other of said plates and is provided with a peripheral flange which is laterally spaced from the peripheral wall of the other of said plates to form a peripheral passage.

8. The apparatus of claim 6 wherein said peripheral flange is provided on the plate having the opening in which the conduit is positioned.

9. The apparatus of claim 6 wherein said peripheral flange is provided on the plate which is opposite the plate having the opening in which the conduit is positioned.

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