June 10, 1947. P. J. POTTER 2,421,849

ABRASIVE BLASTING

Filed March 13, 1945

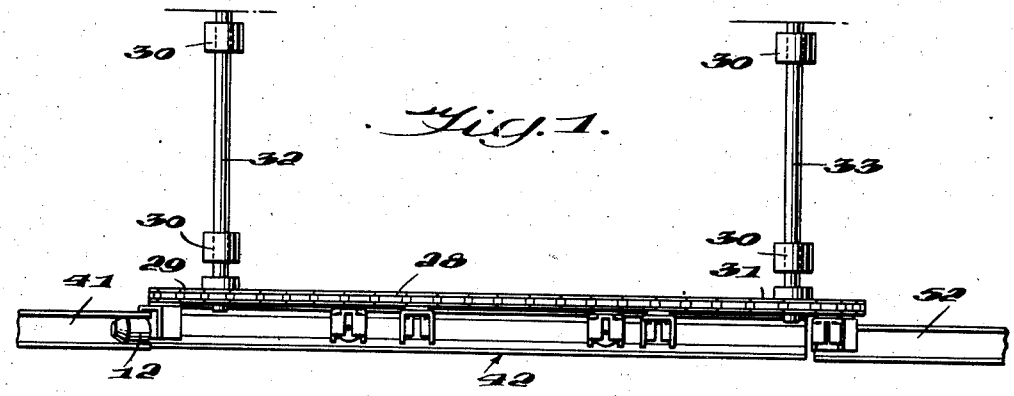


Fig. 1.

Fig. 2.

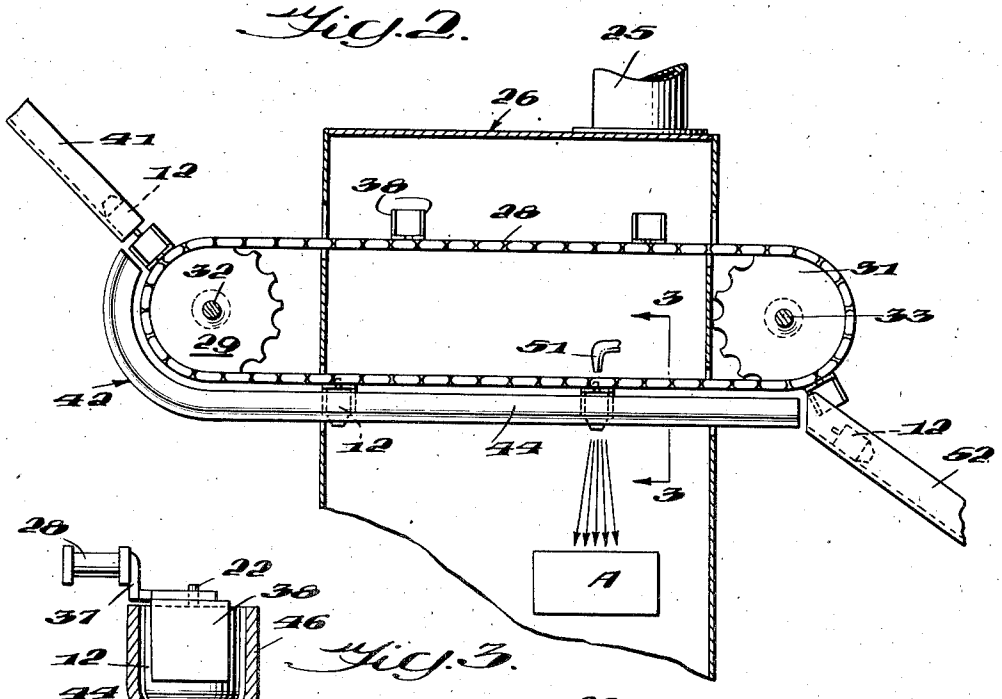


Fig. 3.

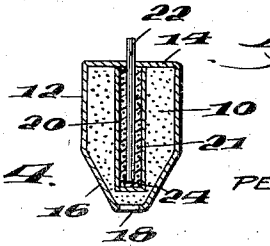


Fig. 5.

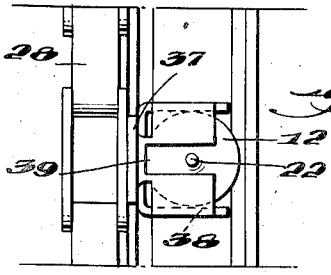


Fig. 4.

Inventor
PERCY J. POTTER,

By William P. Hall

Attorney

Patented June 10, 1947

2,421,849

UNITED STATES PATENT OFFICE

2,421,849

ABRASIVE BLASTING

Percy J. Potter, Hagerstown, Md., assignor to Pangborn Corporation, Hagerstown, Md., a corporation of Maryland

Application March 13, 1945, Serial No. 582,531

7 Claims. (Cl. 51—282)

1

The present invention relates to the surface treating of articles such as castings, springs, or plates, for the surface cleaning thereof, or for removing surface portions of the same, or for subjecting the articles to a peening operation.

The object of the present invention is to provide a simple, inexpensive and highly efficacious method for performing any of these operations.

The aforesaid objects have been attained in the past by airless blasting operations and by operations in which the blasting or peening medium is carried or propelled by air, or liquid, under pressure. In any reference herein to an abrasive, or an abrasive material or medium, it is intended to include any material suitable for use in a peening operation, such as steel shot.

As distinguished from these known means or methods for propelling the abrasive medium, or the peening medium, the present invention pertains to a method in which such medium is projected at a sufficiently high velocity to effect the stated purpose by means of a propellant medium, or explosive, which upon deflagration effects the generation of a gaseous pressure sufficient to carry, or propel, the medium into impingement at the desired velocity with the article or material to be treated.

These objects and characteristic features of the invention will be more clearly understood and appreciated upon consideration of the accompanying drawing and the following detailed description wherein an exemplary method of carrying out the invention is disclosed.

In the drawing:

Fig. 1 is a plan view of a conveyor mechanism which may be used in practising the invention.

Fig. 2 is a side elevational view of the apparatus shown in Fig. 1 including a sectional view of the housing within which the blasting operation may be performed.

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2.

Fig. 4 is an enlarged plan view of one of the carrier elements for the abrasive cartridges.

Fig. 5 is a sectional view of an abrasive cartridge that may be employed in carrying out the invention.

This invention is directed generally to a method of propelling granular abrasive material at blasting velocities for cleaning articles, cutting or abrading a surface, or peening articles to increase the fatigue life. In carrying out the present invention, the granular abrasive material is arranged in the presence of a propellant which upon deflagration generates gases rapidly, and

2

the consequent increase in the gaseous pressure is employed to move the granular material into engagement with the articles or surfaces to be abraded or blasted. The granular material propelled in accordance with the present invention may therefore be employed for blast cleaning castings or other articles, abrading or peening articles, or the surface of any type of material.

In carrying out the invention, the abrasive is arranged within a container or cartridge along with a suitable charge of a propellant which is ignited so that the expanding gases generated during combustion serve as a propelling medium to accelerate the abrasive and urge it at the requisite velocity into engagement with articles or material to be treated with the granular material. A quantity of abrasive 10 may therefore be arranged in a container 12, as shown in Fig. 5. The abrasive may be steel shot, steel grit, sand, or any suitable granular material. The container may be constructed of an appropriate material, such as of a reinforced paper construction, so as to provide the container 12 with sufficient strength to withstand the heat and pressure generated therein during combustion of the explosive materials. The container is closed at one end 14 and the other end terminates in a frusto-conical shaped portion 16. An opening 18 is provided in the smaller end of the cartridge.

A tube 20 or other receptacle may be positioned within the container 12, and this tube contains a propellant 21 adapted to generate a gaseous pressure upon deflagration and thereby serve as a medium for moving the abrasive 10 from the container 12. Any suitable propellant may be employed as hereinafter described. The receptacle 20 may also be formed of a paper construction so as to be readily consumed upon deflagration of the propellant material 21. The cartridge arrangement includes a fuse 22 which extends into the receptacle 20 so as to ignite the material at the lower end thereof. The fuse 22 is preferably of a type so as to be relatively fast burning, and an instant after being ignited at the outer end causes the propellant material 21 to be ignited whereby burning of the propellant generates a relatively high gaseous pressure which escapes through the opening 18. The kinetic energy developed by the expanding gases through the opening 18 draws the abrasive material 10 from the container 12 and projects the abrasive against an article or surface to be blasted or abraded, or to be otherwise treated.

Any type of mechanism may be employed for handling the cartridges or containers 12. In the

apparatus illustrated in the drawing these cartridges are moved to a position within a substantially closed housing 26 by means of an endless conveyor. The conveyor mechanism is formed of a chain 28 which is trained about two sprocket wheels 29 and 31. The shafts 32 and 33 for the sprocket wheels are mounted for rotation in suitable bearings 30. The shaft 33 may be driven by an indexing mechanism (not shown) so as to advance the conveyor chain 28 in steps sufficiently for moving one of the cartridges to the blasting position and one of the cartridge holders to a loading station.

The conveyor chain 28 carries a plurality of cartridge holders. These cartridge holders are mounted on brackets 37 which extend laterally from a link of the chain 28 at spaced intervals therealong. The brackets carry lugs 38 which form a substantially cup-shaped holder when the holders are moving along upper course between the two sprocket wheels. The bracket 37 is formed with a slot therein as shown at 39 in Fig. 4 through which the fuse 22 extends when the cartridges are introduced into the holders. A loading station is represented by the chute 41 into which the cartridges 12 are deposited. Thus when one of the holders is in the loading position, a cartridge 12 may slide downwardly in the guide chute 41 and to a position between the lugs 38 so as to be moved by the conveyor.

The apparatus for carrying out the invention includes suitable means for retaining the cartridges in a position between the lugs 38 as the conveyor mechanism is moved to advance the cartridges to a position for carrying out a blasting operation. Thus a trough 42 extends from a position adjacent the loading station as represented by the chute 41 to a position where the cartridges 12 are to be removed from the conveyor chain. The trough includes side walls 44 and 46 which converge inwardly at their lower ends to prevent the cartridges 12 from falling from a position between the lugs 38 as the conveyor chain moves along the lower course of its travel between the sprocket wheels 29 and 31. The housing 26 is provided with suitable openings to permit the conveyor mechanism to extend therethrough. The housing 26 may be ventilated by means of a conduit connection shown at 25.

When the conveyor mechanism is operated to move one of the cartridges in a position over an article or material A to be blast treated, the conveyor mechanism stops its forward movement and another of the cartridge holders is in a position to receive a cartridge 12 from the loading chute 41. When the cartridge is over the article A the fuse 22 may be ignited in any suitable manner. The igniting device may be a small flame produced at the end of the gas pipe 51, or any suitable device for igniting the fuse. The fuse 22 is preferably one of a rapid burning type so that the combustion material 21 is almost instantaneously ignited at the point 24. The rapid burning of the explosive material generates a relatively high gas pressure within the cartridge 12 which escapes through the opening 18 and thereby causes the abrasive 16 from the container 12 to impinge with the desired force upon the article or material A. After the blasting operation performed by one of the cartridges 12 is completed, the conveyor moves on so as to bring a fresh cartridge into discharging position and to move the exhausted cartridge to a position beyond the end of the trough 42 whereby this cartridge drops into an unloading chute as represented at 52.

Any suitable type of propellant material may be employed in association with the abrasive for generating a gaseous pressure for propelling the abrasive material towards the article or material to be blasted, or otherwise treated. Thus the combustible material may be formed of a mixture of potassium nitrate, charcoal and sulphur forming what is generally known as black gunpowder. The propellant may also comprise a pressure generating explosive having a nitrocellulose base, such as grains of colloidal nitrocellulose having a relatively slow speed of deflagration. These materials may be arranged within the receptacle 20 along with an igniting charge, such as black powder adjacent the inner end of the fuse 22. The invention is not limited to any particular type of combustible material, but any explosive charge that may be readily ignited to provide a rapid expansion of gases may be employed as the means for propelling the abrasive into engagement with the article or material to be treated. Accordingly the propelling charges employed in rockets now in use may be utilized as the pressure generating material.

While the invention has been described with reference to a specific type of apparatus for carrying out the method of propelling abrasive by means of propellant materials, it will be appreciated that changes may be made in the apparatus and in the specific manner in which the abrasive is associated with the combustible material. Such modifications may be made and any type of propellant may be employed without departing from the spirit or scope of the invention as set forth in the appended claims.

I claim:

1. A method of blasting which comprises, arranging the object to be blasted within a housing, moving a container having abrasive and a propellant material therein into the housing, igniting the propellant material within the housing to generate a gaseous pressure within the container whereby the abrasive is propelled into engagement with the object to be blasted.

2. A method as described for subjecting an article to be surface treated to a stream of granular material travelling at the requisite velocity comprising, positioning the article to be treated, providing a container with a discharge outlet, said container holding in juxtaposition the granular material and an explosive propellant, providing a support for the container, moving the support to bring the discharge opening of the container into registration with the article to be treated, and effecting the ignition of the explosive at said registration point.

3. A method as described for subjecting an article to be surface treated to a stream of granular material comprising, providing a plurality of individual units each including a container with a discharge outlet and a treating medium and a propellant explosive within the container, positioning the article to be treated at a treating station, effecting relative movement between the containers and said station for successively bringing the containers into position for registering the discharge outlets thereof with the article to be treated, and igniting the explosive in each container at said station.

4. A method of propelling abrasive particles into blasting engagement with an article to be treated which comprises, arranging an abrasive medium and a dry explosive propellant in juxtaposition

within a container having a discharge outlet, effecting relative positioning of the container and the article for bringing the discharge outlet into registration with the container, and deflagrating the explosive.

5. A method of surface treating an article by an abrasive or peening operation which comprises, providing a plurality of individual units each including a container having a discharge opening and each holding an abrasive or peening medium and a dry explosive medium, positioning the article to be treated, moving the units from a station at one side of the article to a position in which the discharge from the container registers with the article, igniting the explosive at said station, and moving the container to a discharge station at the opposite side of the article.

6. The method of subjecting an article to be surface treated to bombardment by a granular material comprising, providing a container with a discharge outlet, said container holding a supply of granular material and an explosive propellant, effecting relative movement of the article to be

treated and the outlet of the container to bring the two into registration, and igniting the explosive at said point of registration.

7. A method of abrasive blasting which comprises burning a gas generating propellant in a confined space containing abrasive particles and having an orifice, permitting the expanding gases to escape from said confined space through said orifice as a forceful jet containing said abrasive particles, and utilizing said particles to blast an object.

PERCY J. POTTER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,058,298	Gregg	Apr. 8, 1913
1,582,203	Willett	Apr. 27, 1926
1,890,164	Rosenberger	Dec. 6, 1932
2,328,581	Quinn	Sept. 7, 1943