US007291058B2

(12) **United States Patent**
Champaigne

(10) **Patent No.: US 7,291,058 B2**
(45) **Date of Patent: Nov. 6, 2007**

(54) **METHOD AND APPARATUS FOR IMPROVING MEDIA FLOW**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 546 days.

(21) Appl. No.: **10/819,728**

(22) Filed: **Apr. 7, 2004**

(65) **Prior Publication Data**

US 2004/0259473 A1 Dec. 23, 2004

Related U.S. Application Data

(60) Provisional application No. 60/461,845, filed on Apr. 10, 2003.

(51) **Int. Cl.**
B24B 1/00 (2006.01)
B24C 9/00 (2006.01)

(52) **U.S. Cl.** **451/38**; 451/60; 451/99; 451/101

(58) **Field of Classification Search** 451/36, 451/38, 39, 56, 60, 91, 99, 101; 72/53, 430
See application file for complete search history.

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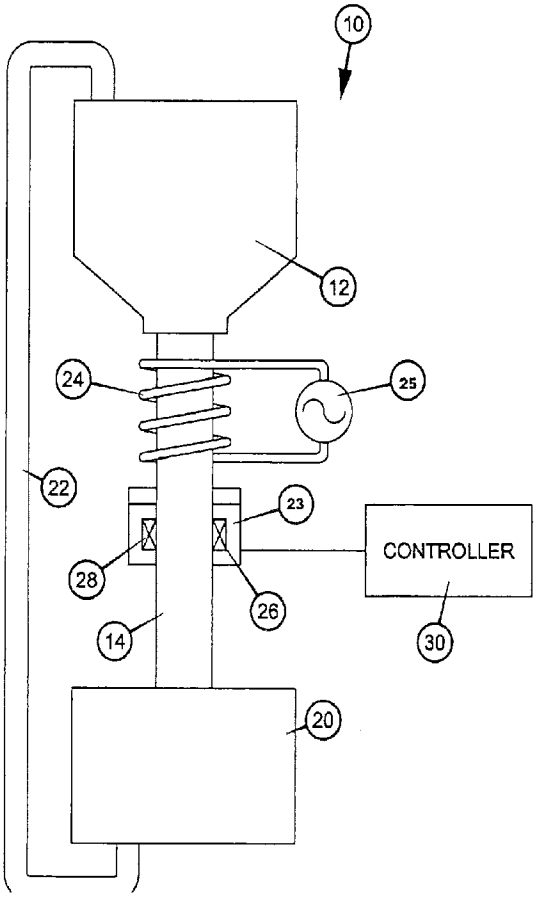
(57) **ABSTRACT**

The flow of media in shot peening, blast cleaning, and similar equipment is improved by applying a time varying magnetic field to the media to thereby degauss the media, allowing the media to flow through equipment without clogging and clumping due to magnetic attraction between the media.

10 Claims, 4 Drawing Sheets



The de-gaussing can also be achieve by alteration of the neutral field current signal controlling the electromagnetic coil **26** within the valve **23** in a time-varying fashion. This can be accomplished by applying a complex electrical current to the coil **28**. Accordingly, instead of applying a steady-state field condition, a dynamic time-varying field, is imposed on the steady state magnetic field. The average value of this time-varying portion of the field is zero, and thus the combination of the steady-state signal and the time-varying signal operates similar to just the steady-state signal alone except the presence of the time-varying portion of the signal performs a degaussing function. The steady-state portion of the signal is sufficient to provide the regulation of the flow rate of the media through the valve **23**, while the time-varying portion of the neutral field signal is sufficient to effect the degaussing action desired. This technique has the advantage of not requiring an additional element such as the degaussing coil in order to achieve demagnetization.

Although continuous degaussing of the media as it flows through the flowpath is preferred, media may also be degaussed in bulk and then added back into the system. Referring to FIG. **5**, a container **32** is filled with media into the system. Referring to FIG. **5**, a container **32** is filled with media and placed within a coil **34**. Current is applied to the coil to degauss the media in the container. The media is then returned to the hopper **12**.

Referring now to FIGS. **3** and **4**, the effects of degaussing can be seen on the media. FIGS. **3** and **4** are microphotographs of fine steel shot media, before and after degaussing respectively. Magnetized media exhibit "stringing", which is clearly present in FIG. **3**. As shown in FIG. **4**, the "strings" are absent from the degaussed media. The effects of degaussing media are also illustrated in Tables 1 and 2. Table 1 sets forth data with respect to a fine powder steel media, and Table 2 sets forth data for an industry standard "cut wire" shot. In both instances, the degaussed media exhibited substantially greater flow rates than either the magnetized media (which had been used in production), and the virgin media which had not been used in production and which was magnetized only to that extent occurring naturally in the manufacture and shipping of the media.

TABLE 1

	Fine Powder	
	Magnetic Condition	Flow rate pounds/min
0.250 orifice	virgin	2.48
	magnetized	1.43
	degaussed	3.15
0.125 orifice	virgin	0.47
	magnetized	0.19
	degaussed	0.50

TABLE 2

	CW20 Shot	
	Magnetic Condition	Flow rate pounds/min
0.250 orifice	virgin	2.70
	magnetized	2.30
	degaussed	3.14
0.125 orifice	virgin	0.34
	magnetized	0.26
	degaussed	0.37

The invention claimed is:

1. Method of optimizing flow of media used in shot peening, blast cleaning and similar apparatus by minimizing the magnetic attraction between the media by applying a time varying magnetic field to the media, said media being conveyed through a flow path extending between a media storage hopper and a treatment chamber, said method including the steps of removing a portion of said media, placing said portion of said media in a magnetic container, treating said media by applying a magnetic field to said container and to the media therewithin, and replacing said portion in said flow path.

2. Method of optimizing flow of media used in shot peening, blast cleaning and similar apparatus by minimizing the magnetic attraction between the media by storing said media in a hopper, dropping said media from said hopper and into a conduit, permitting said media to drop through said conduit and into a treatment chamber, accelerating said media in the treatment chamber and impacting said media on a target surface, recirculating media from said treatment chamber back into said hopper wherein said media is again stored in said hopper and dropped therefrom into said conduit, passing said media through a flow regulating device as the media passes through the conduit to limit flow of media through the conduit and into said chamber, and enhancing flow of the media in said conduit and through said flow regulating device by applying an alternating electrical signal to a magnetic coil wrapped around said conduit to thereby apply a time varying magnetic field to said media as it drops through said conduit to reduce magnetic remnance of the recirculated media due to impact of the media on the target surface.

3. Method of optimizing flow as claimed in claim **2**, wherein said flow regulating device is an orifice in said flow path.

4. Method of optimizing flow as claimed in claim **2**, wherein said flow regulating device is a magnetic valve responsive to application of an electric current to regulate flow of media through the flow path.

5. Method of optimizing flow as claimed in claim **4**, wherein a steady state electrical signal is applied to a magnetic means within said valve to control flow of media through the valve and a time varying signal is imposed on the steady state signal to cancel magnetic remnance in the media.

6. Method of optimizing flow as claimed in claim **2**, wherein said flow regulating device is a magnetic valve responsive to application of an electric current to regulate flow of media through the flow path and a separate magnetic coil surrounds said flow path offset from said magnetic valve, and applying a time varying electrical signal to said coil.

7. Media flow improvement apparatus comprising a hopper for storing and dispensing media, and media being dropped from the bottom of the hopper into a conduit communicating the bottom of the hopper with a treatment chamber, means in the treatment chamber for accelerating said media and impacting the media on a target surface, a return line connecting said treatment chamber with the hopper for returning media to the hopper after impact on the target surface, a flow control apparatus in said conduit between the hopper and the treatment chamber to limit flow of media through said conduit, a coil having multiple turns wrapped around said conduit, and an alternating current electrical source energizing said coil to apply a time varying

magnetic field to said media in the conduit to reduce magnetic remnance of the media.

8. Media flow improvement apparatus as claimed in claim **7**, wherein said flow control apparatus is a flow restricting orifice in said flow path.

9. Media flow improvement apparatus as claimed in claim **7**, wherein said flow control apparatus is a magnetic valve responsive to application of an electric current to regulate flow of media through the flow path.

10. Media flow improvement apparatus as claimed in claim **7**, wherein said flow regulating device is a magnetic valve responsive to application of an electric current to control magnets regulating flow of media through the flow path and a separate magnetic coil surrounds said flow path offset from said magnetic valve, and applying a time varying electrical signal.

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