MAGNETIC CONVEYOR BELT SHOT PEENING MACHINE

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ABSTRACT

A magnetic conveyor belt system for lifting and propelling steel shots is proposed. The system uses a nonmagnetic flexible belt which has grooves on its upper surface. The shots fill the grooves and are held in position due to the force exerted by permanent magnets. The permanent magnets are placed underneath the belts. The belt passes from three wheels, of which two lie at the bottom and one at the top. The shots are carried to the upper wheel and are released due to the absence of magnetic force and change in the direction of the movement of the belt. Shots after striking the work are returned back to the shot hopper due to gravity as the system does not require electricity in lifting and propelling the shots, and conventional drive can be used for the purposes of peening.

The present paper describes a shot peening machine which uses a magnetic conveyor belt.

KEY WORDS

Magnetic wheel, permanent magnet

1. THEORY

![Diagram of conveyor belt system]

**Fig. 1. The arrangement of belt over wheels**

A conveyor belt for transporting steel shots as shown in Fig. 1, is made of flexible non-magnetic material. The belt has grooves on its upper surface in which the shots are held during the belt movement. The belt passes from three wheels as shown in Fig. 1, and of the two wheels lying at the bottom, one is a magnetic
The shots are picked up from the shot hopper and held in the grooves by the force exerted by permanent magnets. During the movement of the belt the shots are carried in the grooves. The magnetic poles are made by using a number of permanent magnets which are attached to common pole plates as shown in Fig. 2. At the end of the lower pole surfaces the shots are delivered to the magnetic wheel.

**Fig. 2. The arrangement of magnets and pole plates**

The construction of the magnetic wheel is shown in Fig. 3. The magnetic wheel prevents the shots from flying off due to the change in the direction of the belt movement. The shots are further carried to the upper wheel by the use of permanent magnets as shown in Fig. 1. The pole surfaces end at the upper wheel, therefore in the absence of magnetic force and change in the direction of the movement of .1 ml. the belt, as shown in Fig. 4., the shots are released.

The released shots, flying at the linear velocity of the belt are reflected as shown in Fig. 4, towards the work piece.
2. DISCUSSION

Shots are propelled over the work piece either by pneumatic mehtod or by the use of centrifugal force. The pneumatic systems used compressed air for the propulsion of the shots. The computer aided design of centrifugal wheel has been described by Meguid and Kair, 1986. In these centrifugal systems a shot elevator is required for the purpose of lifting the shots. The requirement of compressor in a pneumatic system and shot elevator in centrifugal system, increase the bulk of the completed systems.

A part of the total power consumed is wasted in the friction which occurs due to relative movements of the shots which are in contact. The high pressures involved in pneumatic systems increase the overall cost and maintenance of machines. As the length the travel of the shots increases more power is required to propel the shots in pneumatic systems as well as in the systems which use the centrifugal wheel. This requires the use of high power handling machines which need more maintenance.

The shots undergo impact twice in a centrifugal peening system which uses a wheel for propulsion of the the shots. These impacts occur at the wheel and at the work piece. The double impacts impair the shot life. The centrifugal magnetic peening system described by Sharma et al, 1990, uses centrifugal peening method. In this system the relative movement among the shots is reduced and also the shots undergo single impact at the work piece. The system besides being portable consumes electricity for lifting and propelling the shots. The present system does not use electricity for the purpose of lifting and accelerating the shots.
The pole plates made of soft iron or mild steel can be used in the magnetic circuit of the machine. The advantages in using the present system are given below:

The system is cheap and portable, the wear is minimised due to less relative movements of the shots, a variety of shots size can be used, economical due to low maintenance, reliable due to simple mechanism, easy assembled, using electromagnets in place of permanent magnets, the mass flow control is possible, shot velocity control is possible by controlling the speed of the drive, low noise, in-built non-magnetic dust separation, the system can be used in place of the conventional shot elevator.

3. REFERENCES
