

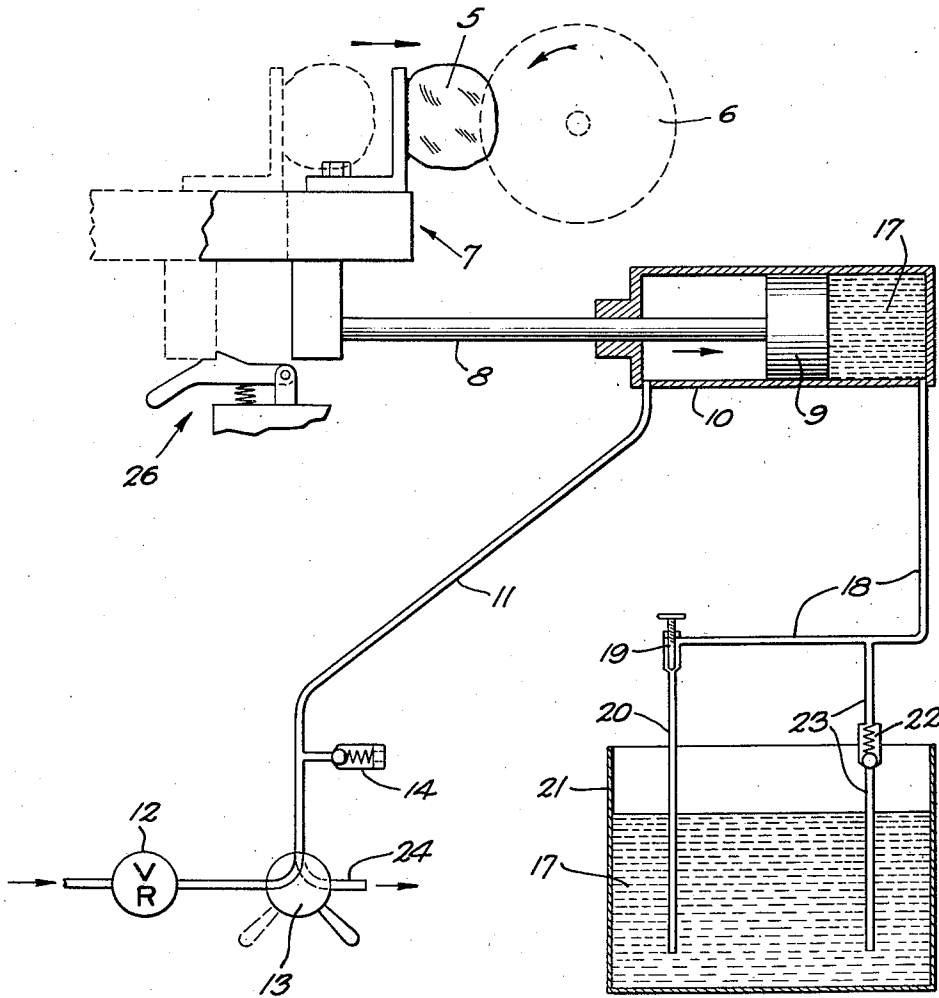
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APPARATUS FOR HANDLING ARTICLES

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APPARATUS FOR HANDLING ARTICLES

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This invention relates to a method of and apparatus for handling articles, and more particularly to a method and apparatus for feeding articles.

In some article working operations, it may be desirable to feed the article at a rate not to exceed a certain predetermined maximum. For example in sawing crystals, the saw sometimes encounters areas in the crystal where the resistance to cutting is higher than in others. If the rate with which the crystal is advanced against the saw is not reduced in these areas the crystal may be cracked or otherwise damaged. At the same time, however, it is desirable that the pressure remain substantially constant and under a certain maximum limit.

Objects of the present invention are to provide an effective and efficient method of and apparatus for feeding articles.

In accordance with one embodiment of this invention, an article feeding apparatus may be provided comprising an article holder movable by a piston associated therewith. The piston is reciprocally positioned in a cylinder. Air pressure is used to advance the piston and the maximum rate of advance is regulated by a needle valve through which hydraulic medium in the cylinder is expelled into a tank as the piston moves forward. When the piston is returned to starting position, the hydraulic medium is drawn back into the cylinder through a check valve.

Other objects and advantages of this invention will be apparent from the following detailed description taken in conjunction with the drawing, wherein the single figure shows schematically a feeding apparatus constructed in accordance with this invention.

A crystal 5, which is to be cut by a saw 6, is glued or otherwise affixed to a holder on a frame 7 which, in turn, is connected to one end of a piston rod 8. A piston 9 associated with this rod is reciprocally positioned in a cylinder 10. In order to move the crystal into engagement with the saw, air pressure is applied to one side of the piston through a pipe 11 which may be connected to a suitable supply of compressed air through a pressure regulating valve 12 and through a two-way valve 13. A spring valve 14 is provided to limit the maximum air pressure which may be exerted on the piston and is connected to the pipe 11.

The rate of advance of the piston is held within a predetermined maximum limit by a needle valve 19 through which a hydraulic medium 17, such as a light oil, is expelled from the cyl-

inder through a pipe 18 and into a tank 21. A pipe 20 extends from the valve 19 beneath the surface of the liquid in the tank so as to maintain a closed hydraulic system. A return pipe 23 also extends into the liquid in the tank and is connected to the pipe 18 through a check valve 22.

In the operation of this device, the crystal 5 is mounted on the frame 7 at the end of the piston 8 and air pressure applied to advance the piston. As the piston moves forward, the oil 17 in the cylinder is expelled through the needle valve 19. It will be apparent that the maximum rate of advance will be determined by the pressure exerted on the oil in the cylinder and by the size of the orifice in the needle valve 19. While the rate at which the oil may be expelled from the cylinder 19 will vary as the resistance encountered by the saw as the crystal is advanced into engagement therewith varies, the maximum rate of advance of the crystal or alternatively the rate with which the oil is expelled, is always a function of the viscosity of the oil and of the pressure exerted on the piston and of the size of the orifice through which the oil is expelled.

Thus, in effect, the rate may be controlled either by changing the size of the orifice, by adjusting the valve 19, or by varying the pressure by adjusting the regulating valve 12. A lower air pressure gives a somewhat more elastic or resilient feed, while a higher pressure and a smaller outlet orifice gives somewhat more accurate control of the rate of advance of the crystal. When the saw encounters a hard spot in the crystal, increasing thereby the resistance to advance of the crystal and consequently reducing the pressure on the oil in the cylinder, the piston may slow down, thereby providing a variable rate of feed. Since the air pressure provides a resilient force, it is possible for the piston to yield, should this be necessary, merely by compressing the air in the cylinder. Thus, in a sense, this apparatus is designed to adapt itself automatically to changing conditions in the crystal.

As the oil in the hydraulic system is virtually incompressible, the maximum rate of advance of the crystal does not increase even though the resistance encountered by the saw diminishes to zero, the maximum rate of advance being, as aforesaid, a function of the pressure on the piston and the size of the orifice through which the oil is expelled. On the other hand, the feeding rate

can decrease to zero if the resistance increases sufficiently.

When the piston has been advanced the full length of the cylinder, it may be returned either automatically or by hand to the starting position. The check valve 22 opens as the piston is moved in the reverse direction and permits oil to be drawn back again into the cylinder through the return pipe 23, the valve 13 being rotated so as to disconnect the air line from the compressed air supply and to connect the air line to an exhaust line 24. A latch 26 may be provided to engage the frame in starting position to prevent it from accidentally advancing. In some cases using low feeding pressures the valve 13 may be omitted as the manual return of the carriage will force the air in the system out through the valve 14, the latch holding the carriage in its initial position until the next feeding operation.

While this invention has been described and shown in connection with the sawing of crystals, it will be understood that this invention has numerous other applications, and that many changes and modifications may be made in the apparatus shown and described without departing from the spirit or scope of the present invention.

What is claimed is:

1. An apparatus for feeding and cutting crystals comprising a rotary saw, a crystal support, a cylinder, a reciprocable piston in said cylinder,

5 said piston being operatively connected to engage the rotary saw with the crystal, means for supplying a compressible medium to one side of said piston to advance said piston, a valve for limiting the maximum pressure which may be exerted on said piston by said compressible medium, a relatively incompressible medium on the other side of said piston, means for limiting the rate at which said latter medium may be expelled from said cylinder by said piston, storage means for the expelled medium, and means for returning said expelled medium to said cylinder including a check valve.

15 2. An apparatus for feeding and cutting crystals comprising a rotary saw, a crystal support, a cylinder, a reciprocable piston in said cylinder, said piston being operatively connected to engage the rotary saw with the crystal, means for supplying a compressible medium to one side of said piston to advance said piston, a valve for limiting the maximum pressure which may be exerted on said piston by said compressible medium, a relatively incompressible medium on the other side of said piston, an adjustable needle valve for limiting the rate at which said latter medium may be expelled from said cylinder by said piston, storage means for the expelled medium, and means for returning said expelled medium to said cylinder including a check valve.

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