Sept. 17, 1963 A. H. FREEMAN ETAL 3,103,766

CORE CLEANUP AND BLAST MACHINE

Filed Jan. 26, 1961

FIG. 1

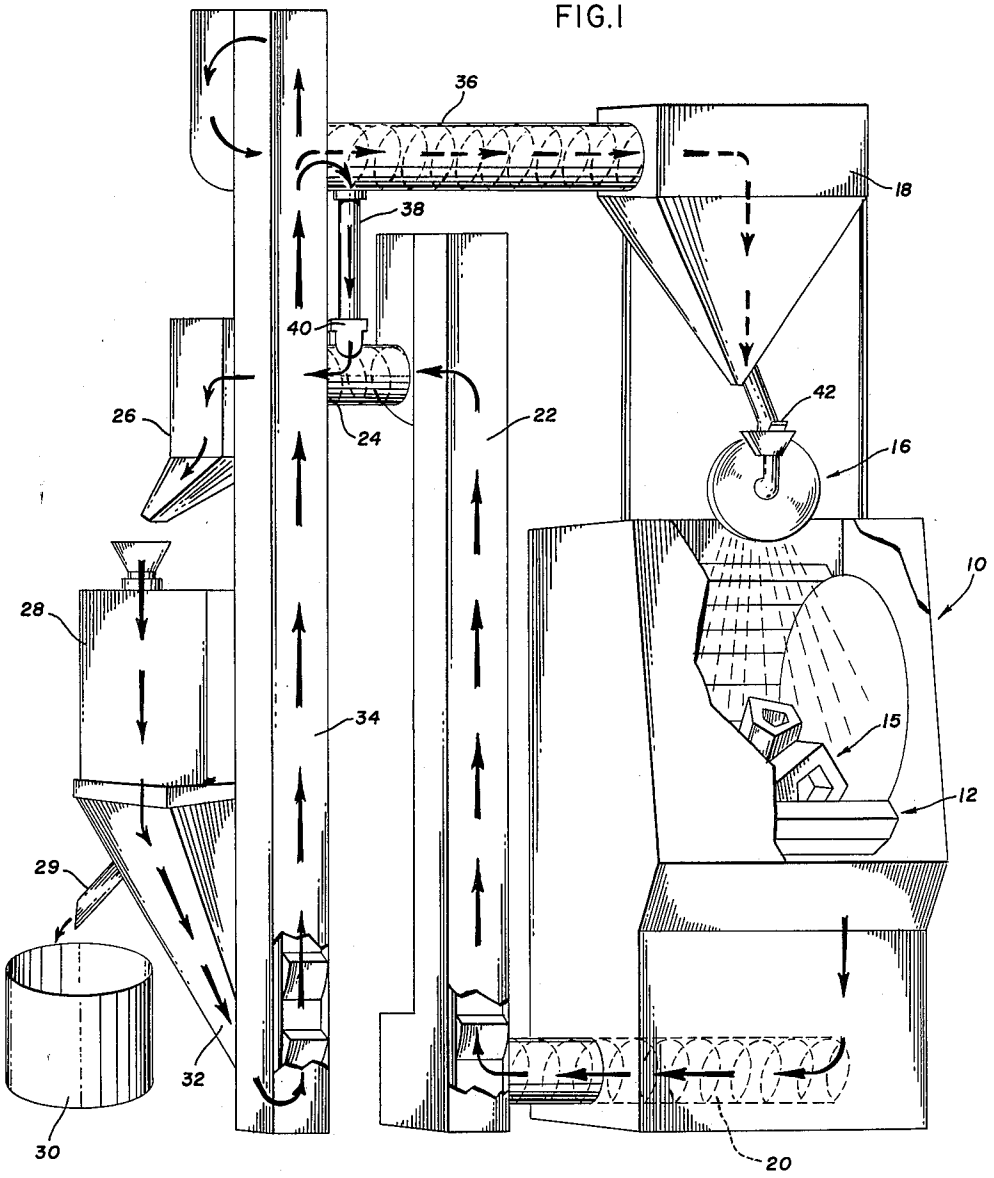
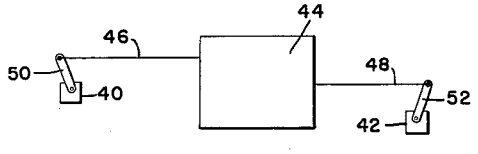


FIG. 2



INVENTOR.
ARDEE H. FREEMAN
FREDERICK JOHN PICHARD

BY

Beau, Brooks Buckley & Beam

United States Patent Office 3,103,766 Patented Sept. 17, 1963

3,103,766

CORE CLEANUP AND BLAST MACHINE

Ardee H. Freeman, Granger, and Frederick John Pichard, South Bend, Ind., assignors to Beil Intercontinental Corporation, South Bend, Ind.

Filed Jan. 26, 1961, Ser. No. 85,045
3 Claims. (Cl. 51—13)

This invention relates to machines for knocking out cores from castings and otherwise cleaning up such castings; and more particularly to an improved system having a dual cycling arrangement whereby a single, low cost machine may be efficiently employed to perform core knockout and rough cleaning and finish clean-up processes on castings of widely different shapes and sizes.

Previously, because of the greatly varying sand loads incident to core knockout and finish cleaning operations, centrifugal blast type machines have not been found feasible for single process treatment of castings direct from the molds. The present invention provides however, in a single shot blast machine system, means for selectively passing the spent shot and refuse through alternative cycling systems which are ideally suited to recondition the blast media during successive stages of the casting treating process; whereby the machine is adapted for efficient overall processing of castings incidental to only one loading thereof. More specifically, the machine is efficiently operable to sequentially "knock out" the cores and otherwise "rough-clean" the castings, and then to "finish-clean" the castings without requiring any intermediate handling of the castings. Hence, the time loss and labor and capital expenses heretofore necessarily incidental to use of multiple machines for such purposes are eliminated. Other objects and advantages of the machine system of the invention will be apparent from the specification hereinafter, having reference to the accompanying drawings wherein:

FIG. 1 is a somewhat schematic elevational view with portions broken away to show interior details, of one form of machine system of the invention; and FIG. 2 is a diagrammatic view illustrating sequential operation of the control valves.

As shown in the drawing, a machine system of the invention may be constructed generally to comprise a workpiece support and carrying device such as a tumble blast unit 10 including a cradle type conveyor 12 which supports and tumbles the load of castings which are to be processed, as indicated at 15. A shot throwing machine as indicated at 16 is disposed above the load of castings and operates to sling shot or other blast media against the workpieces at certain stages of the process as will be more fully explained hereinafter. The hopper and feed chute for supplying blast media to the unit 16 is indicated at 18, and the conveyor for carrying away spent media and debris is indicated at 20.

With a view to simplification of this specification the workpiece support and centrifugal blast machine components referred to will not be illustrated and described in further detail; the construction and operation of typical examples thereof being fully disclosed and explained respectively in U.S. Patents 2,104,055 and 2,819,562. However, it is to be understood that in lieu of the specific form of workpiece supporting and tumbling and shot throwing devices illustrated herein and disclosed in the referenced patents, any other suitable form of blast equipment may be employed; such as for example swing table machines as disclosed in U.S. patent application S.N. 14,903, filed March 14, 1960, by Alfred Schnetzer, now Patent No. 3,041,786.

In any case in accord with the present invention the blast machine 10 is coupled into a blast media and debris

circulating and separation system which may include an elevator 22 shown as discharging the debris and abrasive mixture from the machine 10 through a cross conveyor 24 to a hopper and chute unit 26 delivering to a separator 28. The construction and operation of a separator of the preferred form is illustrated and described in full detail for example in my copending U.S. patent application Serial No. 831,525, filed August 4, 1959. The separator includes a sand or "refuse" discharge spout 29 delivering into any suitable take-away device as indicated at 30; and a reconditioned blast media discharge chute 32 delivering into the foot of a second elevator 34. Elevator 34 delivers to a cross conveyor 36 which has a primary delivery into the hopper 18 and a by-pass delivery through conduit 38 to the cross conveyor 24 as controlled by a valve 40. Also a control valve 42 is disposed in the feed line to the centrifugal blast machine 16, for purposes which will now be explained.

The Core Knock-Out Cycle

In accord with the present invention, when the castings have been stripped from their molds a suitable batch of castings is loaded by any suitable means into the blast cabinet of the machine. The door of the cabinet is then closed and if the castings contain appreciable quantities of loose sand the castings are then tumbled and/or turned for a predetermined time to cause the more easily displaced sand and core material to fall out of the castings. During this phase of the process the blast unit 16 remains idle, and the valve 42 is closed and the valve 40 is open; whereby all of the sand and debris falling into the conveyor 20 is passed to the separator 28 for discharge through the outlet 29. The separator overload material is automatically recycled through the elevator 34, conduit 38, and cross conveyor 24 to the separator; again and again, until the system is substantially cleared by discharge of all the waste material to the device 30. The blast unit 16 is then activated and the valve 42 is then opened, and reconditioned blast media from the hopper 18 feeds to the blast machine 16 while the workpiece support continues to tumble the castings. This initial blast operation usually dislodges a relatively heavy surge of sand from interior portions of the castings which goes to the separator as explained hereinabove. When this "knock-out blast" phase of the process is completed the valve 42 is closed but the contaminated blast media continues to recycle through the by-pass valve 40 until all sand and contaminants are removed from the useful media.

Blast Cleaning Cycle

The valve 42 is now reopened and the valve 40 is closed, and the blast media now circulates through the separator 28 and the blast machine; the separator functioning to discard from the system the worn out abrasive and fine debris resulting from the finish-cleaning of the castings. When the process is complete the castings are preferably tumbled for an additional period of time to allow all sand and blast media to drain from the mill and from the castings before they are unloaded from the mill. It will of course be apparent that the sequential control of the process as outlined above may be performed either manually or automatically or semi-automatically as preferred, by any suitable sequencing device such as a timer which is adjustable to variable time settings for the various phases of the process. As shown in FIG. 2, such sequencing device 44 may have connections 46 and 48 to means, such as levers 50 and 52, for opening and closing the respective valves 40 and 42. Thus, the optimum duration of each phase of the process may be empirically determined and the control system then set to provide the most efficient com-

bination of sequential steps for every work load program; and if desired one or more of the above described steps may even be omitted, such as for example the pre-blast tumbling operation, according to results of previously run trial tests.

Thus, it will be appreciated that the present invention involves the use of only one machine organization, the components of which are substantially at all times in constant use and at their peaks of efficiency. It is also a feature of the present invention that the blast media coming to the throwing device **16** is always clean and free from debris, thereby rendering the blast operation most efficient and prolonging the life of that equipment. Although only one form of the invention has been shown and described in detail, it will be apparent to those skilled in the art that the invention is not so limited but that various changes may be made therein without departing from the spirit of the invention or the scope of the appended claims.

We claim:

1. A unit machine for sequentially knocking out hard to dislodge cores from castings and then finish-cleaning the same, said machine comprising, a casting receiving device adapted to tumble the casting, a blast device arranged to throw blast media at the casting as it is tumbled, a feeder delivering blast media to said blast device, a separator having an intake receiving debris and spent media falling away from said casting, said separator having a debris discharge and a reusable media discharge separate therefrom, said reusable media discharge normally delivering to said feeder, a by-pass conveyor providing a return link between said media discharge and said separator intake, a first valve controlling passage through said by-pass conveyor, a second valve controlling passage through said feeder, and control means operable to sequentially control said valves so as to initially block passage of media through said feeder while circulating all material falling away from said casting through said separator and subsequently cycling the reusable media therefrom through said feeder and said blast device against said casting.

2. A unit machine for cleaning out cores and heavy surface debris from castings and then finish-cleaning the same, said machine comprising, a casting receiving receiving device adapted to tumble the casting, an airless

blast device arranged to throw loose blast media at the casting as it is tumbled, a feeder delivering media to said blast device, a separator having an intake receiving debris and spent media falling away from said casting, said separator having a debris discharge and a reusable media discharge separate therefrom, said reusable media discharge delivering to a main conveyor leading to said feeder, a by-pass conduit providing a return link between said main conveyor and said separator intake, a first valve controlling passage through said by-pass conduit, a second valve controlling passage through said feeder, and control means operable to alternatively set said valves so as to initially block passage of abrasive through said feeder while circulating all material falling away from said casting through said separator and subsequently cycling the reusable media from said separator through said feeder and said blast device against said casting.

3. A unit machine for sequentially knocking out hard-to-dislodge cores from castings and then finish-cleaning the same, said machine comprising, a casting receiving device operating to tumble the castings, a blast device operating to throw blast media at the castings as they are tumbled, a feeder delivering blast media to said blast device, a separator having an intake receiving debris and media falling away from said casting, said separator having a debris discharge and a reusable media discharge separate therefrom, said reusable media discharge normally delivering to said feeder, a by-pass conveyor providing a return link between said media discharge and said separator intake, a first valve controlling passage through said by-pass conveyor, a second valve controlling passage through said feeder, and control means operable to selectively control said valves whereby passage of media through said feeder may be initially blocked while all material falling away from said casting circulates through said separator and whereby the reusable media therefrom may be subsequently cycled through said feeder and said blast device and against said castings.

References Cited in the file of this patent

UNITED STATES PATENTS

2,424,955	Potter	July 29, 1947
2,440,819	Evans	May 4, 1948