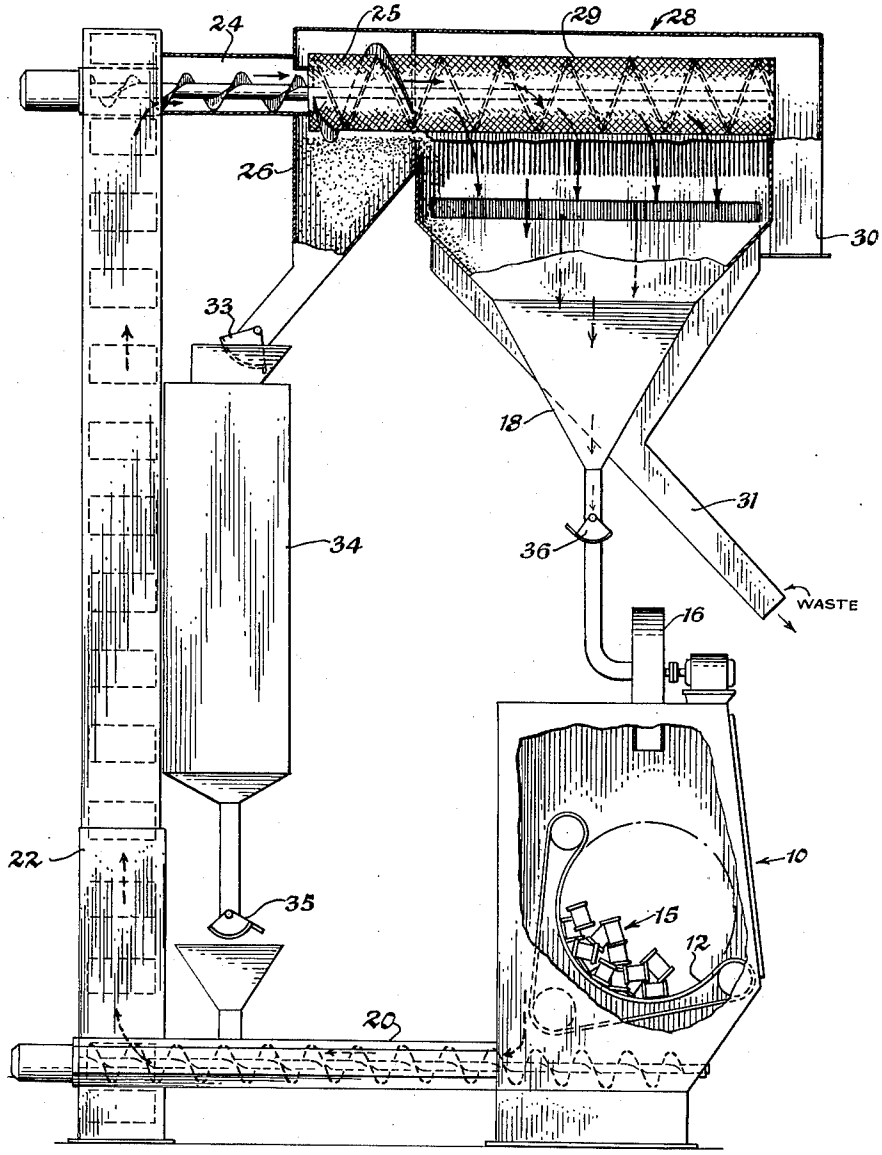
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CASTING CORE KNOCK-OUT AND CLEANING MACHINE AND METHOD

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Fig. 1.



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CASTING CORE KNOCK-OUT AND CLEANING MACHINE AND METHOD

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This invention relates to machines and methods for sequentially processing rough castings or the like through rough-cleaning and finish-cleaning operations, by means of a single, low cost machine. Such machines may be effectively employed for example to perform, in sequence, core knockout and rough cleaning and finish clean-up processes, on castings of widely different shapes and sizes. More specifically, the present invention relates to further improvements in the art which is dealt with by our prior application Serial No. 85,045.

The present invention provides in a single blast machine system, improved means for selectively passing the refuse and blast media mixture through alternative cycling systems for more efficient use of the blast media reconditioning components during successive stages of the workpiece treating process; whereby the system is adapted for more efficient overall processing of the workpieces incidental to only one loading thereof, and without requiring any intermediate handling of the workpieces. 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 drawing 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.

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 or other workpieces which are to be processed, as indicated at **15**. A blast 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 equipment for this purpose may be employed; such as for example a swing table machine as disclosed in U.S. 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** as shown at FIG. 1 discharging the debris and abrasive mixture from the machine **10** through a cross conveyor **24** to a screen and hopper and separator combination designated **25**, **26** and **28**, respectively. The construction and operation of a separator of the preferred form for this purpose is illustrated and described in full detail for example in U.S. Patent No. 3,005,547. As shown herein, the separator includes a scalping screen **29** which conveys coarse debris to a waste chute **30**, and a sand or fine "refuse" discharge spout **31** delivering also into any suitable take-away device; and a reconditioned blast media discharge chute delivering into the blast machine feed hopper **18**. The hopper **26** delivers through a valve **33** to a surge tank or bin **34** which in turn delivers through a valve **35** to the conveyor **20**. The hopper **18** includes a by-pass control valve **36** delivering feed material through a conduit to the blast machine **16**. Operation of the system will now be explained.

The Rough Cleaning Cycle

When castings or the like are to be processed they are first stripped from their molds and loaded by any suitable means into the blast cabinet **10** of the machine; the valve **33** being open. The door of the cabinet is then closed and if the castings contain appreciable quantities of loose sand or other core or mold materials, the castings may first be tumbled and/or turned for a predetermined time to cause the more easily displaced sand and/or core materials to fall out of the castings. During this phase of the process the blast unit **16** remains idle. Hence, the sand and debris falling from the workpieces into the conveyor **20** is passed to the surge tank **34**. In some cases this "preblast" tumbling operation will not be employed, but in any case the blast unit **16** will now be activated and the valve **36** is opened, whereby a predetermined charge of blast media is introduced through the hopper **18** and 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 is also bypassed to the surge bin **34**. When the bulk of the sand and debris is thus removed from the castings then valve **33** is closed and valve **35** is opened to meter out the contents of bin **34**.

Thus the debris and spent blast media now circulates through the separator **28** and the blast machine **16**; the separator functioning to discard from the system the worn out shot and the fine debris resulting from the operation. When this 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 control of the process as outlined above may be performed either manually or automatically or semi-automatically as preferred, by any suitable manual or automatic sequencing devices such as a timer which is adjustable to variable time settings for the various phases of the process. Thus, the optimum duration of each phase of the process of the invention may be empirically determined and the control system then set to provide the most efficient combination of sequential steps for every work load program.

By virtue of this machine arrangement the large initial surge loads of sand and debris which occur when the cores are being dislodged from the castings are temporarily sidetracked to the surge bin, whereby flooding of the separator is avoided. Also, in accord with the present invention the flow of sand and abrasive through the separator and its associated circulation system may be easily maintained at a substantially constant rate. This avoids the possibility of sand passing through the separator to the blast machine, and also prevents static accumulations of sand at various points in the system such as would otherwise result in statification and periodic dumping (due to vibration) of harmful surges of sand into the system.

Thus, it will be appreciated that the process of 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. The method for sequentially removing cores and coarse surface debris from castings or the like and then finish-cleaning the same, which method comprises placing a casting requiring to be cleaned on a support arranged to tumble said casting for shaking out the casting core material and other relatively loose debris thereby producing a temporary overload of debris in the system, conveying said debris to a separator having a normal debris discharge while by-passing the separator overload to a surge bin, then shot-blasting said casting while being tumbled to remove residual core material and delivering the spent shot and fine debris materials to said separator, and finally surface-cleaning said casting by the same shot-blasting machine while recycling back to the separator the accumulation of overload debris collected in said surge bin while redelivering to said blast machine from said separator the reconditioned blast media segregated from the process debris by said separator.

2. A machine system for sequentially knocking out cores and heavy surface debris from castings and then finish-cleaning the same, said machine comprising a casting receiving device adapted to turn the casting, a centrifugal blast machine arranged to bombard the casting as it is turned, a feed device delivering blast media to said blast machine, a separator receiving debris and spent blast media falling away from said casting, said separator having a debris discharge and a reusable blast media discharge separate therefrom, said reusable blast media discharge delivering to said feed device, a by-pass conduit conveying overload material from said separator to a temporary storage bin, a first valve controlling passage through said by-pass conduit, a second valve controlling discharge from said bin for recycling to said separator, said valves being operable so as to initially divert passage of overload debris from said separator to said bin while permitting circulation of material falling away from said casting through said separator, and for subsequently recycling the overload debris and reusable blast media from said bin through said separator and said blast device against said casting.

3. A machine for sequentially knocking out cores and large volume surface debris from castings or the like and then finish-cleaning the same, said machine comprising a workpiece receiving device adapted to turn the same, a centrifugal blast machine arranged to bombard the workpiece as it is turned, a separator receiving debris and spent blast media falling away from said workpiece, said separator having a debris discharge and a reusable blast media discharge separate therefrom, said reusable blast media discharge delivering to said blast machine, a by-pass conveying overload material from said separator to a temporary storage bin, a first valve controlling passage through said by-pass, a second valve controlling discharge from said bin for recycling to said separator, said valves being operable so as to initially divert passage of overload debris from said separator to said bin while permitting circulation of material falling away from said workpiece through said separator, and for subsequently recycling the overload debris and reusable blast media from said bin through said separator and said blast device against said workpiece.

4. A method for sequentially removing cores and coarse debris from workpieces such as castings or the like and then finish-cleaning the same, which method comprises placing a workpiece requiring to be cleaned on a support arranged to tumble said workpiece for shaking out the relatively loose debris, conveying said debris to a separator while by-passing the separator overload to a surge bin, then shot-blasting said workpiece while being tumbled to remove residual debris material while delivering the spent shot and fine debris materials to said separator, and finally surface-cleaning said workpiece by the same shot-blasting machine while recycling back to the separator said overload debris and redelivering to said blast machine from said separator the reconditioned blast media segregated from the process debris by said separator.

5. A machine for sequentially rough cleaning and then finish-cleaning workpieces, said machine comprising a workpiece receiving device adapted to turn the workpiece, a centrifugal blast machine arranged to bombard the workpiece as it is turned, a feed device delivering blast media to said blast machine, a separator receiving debris and spent blast media falling away from said workpiece, said separator having a debris discharge and a reusable blast media discharge separate therefrom, said reusable blast media discharge delivering to said feed device, a by-pass conveying overload material from said separator to a temporary storage bin, a first valve controlling passage through said by-pass, a second valve controlling discharge from said bin for recycling to said separator, said valves being operable so as to initially divert passage of overload debris away from said separator to said bin while permitting circulation of material falling away from said workpiece through said separator, and for subsequently recycling the overload debris and reusable blast media from said bin through said separator and said blast device against said workpiece.

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