United States Patent

Long, III

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[54] **BLAST CLEANING ARRANGEMENT**

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[52] **U.S. Cl.** .....**51/14,** 51/9, 104/172 S

[51] **Int. Cl.**.....**B24c 3/00**

[58] **Field of Search** .....51/14, 15, 9; 104/172 S

[56] **References Cited**

UNITED STATES PATENTS

2,239,714	4/1941	Hammell	51/9
2,975,729	3/1961	Stechbart et al	104/178
3,119,348	1/1964	Margiloff	104/173
3,194,177	7/1965	Bishop	104/172 S X
3,246,609	4/1966	Westfall	105/145
3,247,806	4/1966	Dehne	104/172
3,353,499	11/1967	Sutherland	104/172
3,495,720	2/1970	Mann et al.	51/14 X

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Attorney—Robert E. Walter and David E. Dougherty

[57] **ABSTRACT**

An abrasive blast cleaning arrangement includes a variable speed tractor for moving individual workpiece holders into and out of a blast station in such a manner that the tractor may move at an accelerated speed until it approaches a group of stacked holders whereupon the tractor may decelerate and discharge its holder at the rear of the stack to subsequently become engaged with the holder at the front of the stack.

7 Claims, 2 Drawing Figures

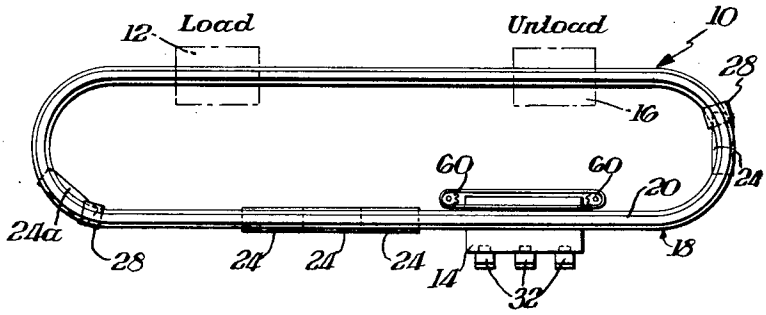
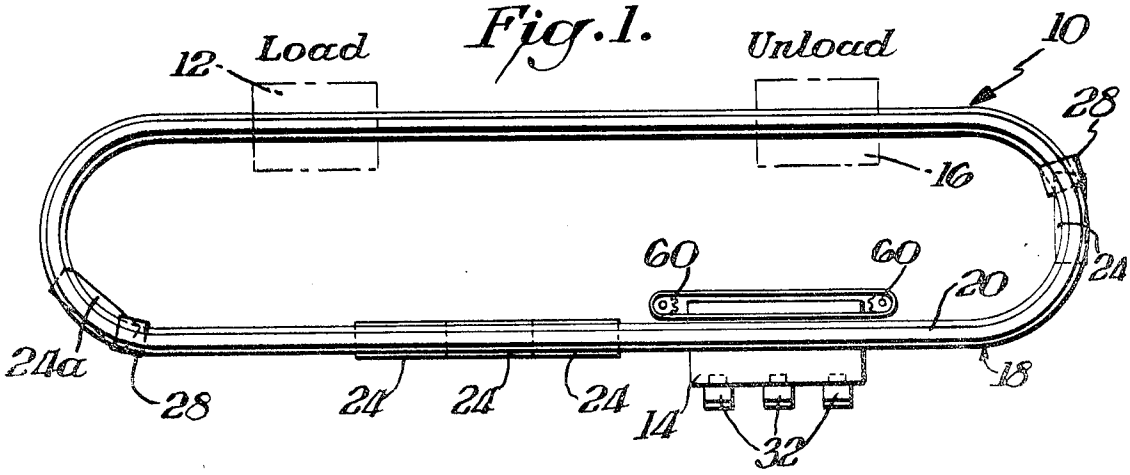


Fig. 1.


12
Load
Unload
10
28
16
60
60
20
24
24a
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24
24
24
14
32
18

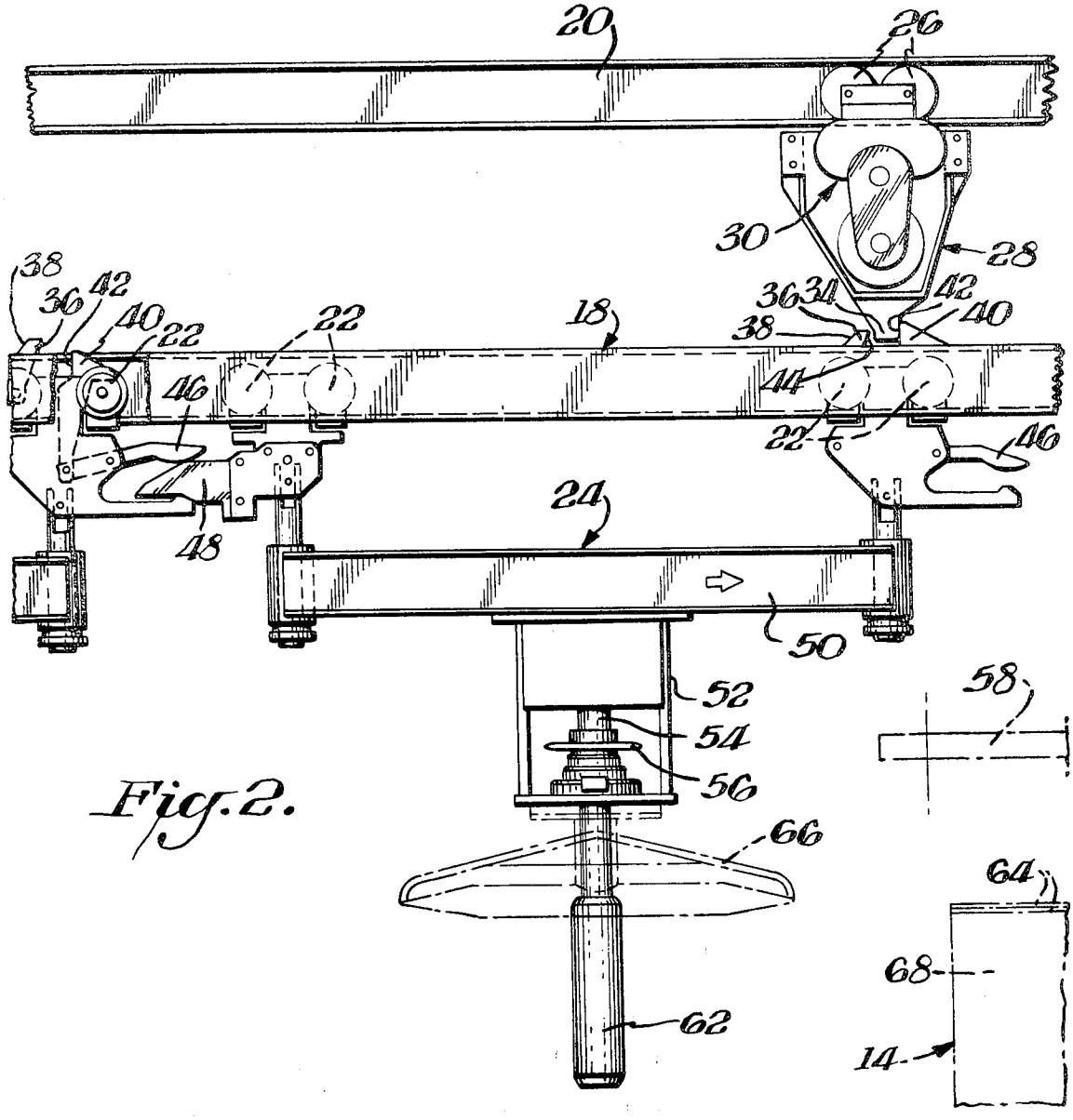

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Fig. 2.

BLAST CLEANING ARRANGEMENT

BACKGROUND OF INVENTION

Various conveying arrangements exist for moving workpieces to different areas for various purposes. One such arrangement is known as the power and free system. For example with such a system workpieces are transported from one work station to another by being mounted on a holder on a monorail. Often it is required to move the holder by power driven means while at other times the holder is to be free from the driving means. Hence the expression power and free relates to this class of equipment.

Generally power and free arrangements utilize a continuously moving chain which incorporates a pusher member to selectively engage individual workpiece holders. For example as shown in U.S. Pat No. 3,353,499 the workpiece holders may include means whereby a particular holder becomes disengaged from its conveying chain when the holder contacts a downstream holder which may be arranged at the rear of such a stack of such holders. The disengaged chain continues to move in a forward direction until it engages and pushes the front holder of the stack so that this foremost holder would then be conveyed by the chain until it too strikes another holder.

While such an arrangement as described above may be suitable for certain purposes it is unsuitable for use as a means for conveying workpieces into and out of an abrasive blast station. In this respect if the chain continuously moves at a high rate of speed there is a sudden impact caused by a holder striking against the prior holder of a stack. This impact may cause damage to the workpieces held thereon. This is particularly disadvantageous when considering some types of workpieces which undergo an abrasive blast cleaning treatment. In order to avoid these sharp impacts one might consider moving the chain at a slower speed. This, however, does not provide an acceptable solution because much of the movement of the workpiece holder takes place between stations and thus between stacks of other holders. Accordingly, a good deal of time would be wasted by the slow movement between these stations when nothing else is being accomplished other than the movement of the workpiece. There is, therefore, a need for some type of arrangement which will render the power and free equipment suitable for use in conjunction with abrasive blast cleaning. This invention is, therefore, concerned with fulfilling these needs.

Other prior art patents of interest in this field are U.S. Pat. Nos. 3,495,720; 3,246,609; 3,247,806; 3,194,177; 3,119,348 and 2,975,729.

SUMMARY OF INVENTION

An object of this invention is to provide an abrasive blast cleaning arrangement which utilizes the power and free concepts.

A further object of this invention is to provide an arrangement which minimizes the magnitude of impact of the workpiece holders against each other to avoid jarring of the workpieces.

A still further object is to eliminate the conventional chain from such an arrangement.

In accordance with this invention an abrasive blast cleaning arrangement includes a variable speed tractor for moving individual workpiece holders or carriers into and out of a blast station in such a manner that the tractor may move at an accelerated speed until it approaches a group of stacked holders whereupon the tractor may decelerate and discharge its holder at the rear of the stack to subsequently become engaged with the holder at the front of the stack.

In an advantageous form of this invention, rotation means are provided at the blast station for rotating the holder to expose all surface of the workpieces to the blast action. The monorails may be closed loops with one monorail disposed above the other. The tractor may include a tongue which pushes against a dog on the holder with means being provided to retract the dog when the holder contacts a prior downstream holder.

THE DRAWINGS

FIG. **1** is a plan view schematically showing an arrangement in accordance with this invention; and

FIG. **2** is an elevation view of a portion of the arrangement shown in FIG. **1** illustrating the pick-up of a holder by the tractor.

DETAILED DESCRIPTION

The abrasive blast cleaning arrangement **10** illustrated in FIG. **1** includes a load station **12**, a blast station **14** and an unload station **16**. Of course various other treating stations may be provided between the load and unload stations. The stations are interconnected by a closed loop monorail system which includes a first monorail **18** disposed under and parallel to a second monorail **20**. The monorails may take any suitable form. For example monorail **18** may be a pair of channel shaped members with the open channels facing each other so that wheels **22** on holders or carriers **24** may ride between the channel shaped members. Monorail **20**, however, may simply be an I-beam thus providing a pair of back-to-back channels in which rollers **26** of tractor **28** may ride.

Tractor **28** is of any suitable construction as long as it includes a variable speed drive which preferably is remotely controlled. The drive is schematically indicated by the reference numeral **30**. Since the details, per se, of this drive do not form a part of this invention it suffices to say that the drive is of variable speed so that the tractor or trolley may move at an accelerated speed between stations and may slow down when approaching a stack of holders or when traveling in a particular station.

As illustrated in FIG. **1**, generally a plurality of holders **24** is stacked at the entrance to treating station **14**. Although not illustrated similar stacks of holders would also be located at load station **12** and at unload station **16**. The holders are moved by engagement with tractor **28**. In operation tractor **28**, for example, picks up a holder at load station **12** and conveys the holder and its workpiece at a rapid speed until it approaches the stack of holders at the entrance to blast station **14**. The speed is decreased and at a slow speed trolley **28** continues to move on its track **20** until its holder **24***a* contacts the last holder of the stack. As later described, however, holder **24a** is then disengaged from tractor **28** and holder **24***a* thus becomes the last holder of the stack. Tractor **28** continues to move in a forward direction and becomes engaged with the first holder of the stack to carry that holder through blast station **14**. Ad-

vantageously, not only the speed but also the forward or backward direction of tractor **28** can be regulated in blast station **14**. Additionally, means are provided for rotating the holder to thereby assure the proper exposure of all surfaces of the workpiece to the blast stream from abrasive particles projected by suitable centrifugal blast wheels **32**. After the workpiece is sufficiently cleaned it is conveyed by tractor **28** out of blast station **14** at accelerated speed toward unload station **16**. As the tractor approaches the unload station, which would also have a plurality of holders stacked at that station, the speed of tractor **28** is reduced and the tractor is disengaged from its holder to pick up the first holder of the stack. The workpiece can then be unloaded from the holder at unload station **16**. In the meantime tractor **28** continues to move at accelerated speed until it reaches load station **12**. At load station **12** a stack of previously empty holders is being loaded with new workpieces and the tractor then picks up the first loaded holder of the stack to repeat the process. Any number of tractors and holders may be provided. Additionally, the distance between the different stations might also be varied which of course would determine the times that tractor **28** moves at its accelerated speed and at its slower speed.

FIG. **2** shows the details of the coupling mechanism for tractor **28** and holder **24**. As indicated therein tractor **28** includes a downwardly projecting tongue **34**. Each holder includes an upwardly projecting lug **36** which is pivotally mounted to the holder and is disposed in the path of movement of tongue **34**. The upstream side **38** of lug **36** is tapered to provide a camming surface so that the lug **36** rotates in a clockwise direction when it is contacted by tongue **34** to permit the tongue to move past the lug. Suitable means such as a spring (not shown) is provided to then return the lug to its original position. Stops (not shown) may be provided to confine the pivoting action of lug **36** back and forth in a preset arc.

Each holder also includes a dog **40** spaced from lug **36** and disposed in the path of movement of tongue **34**. The upstream surface **42** of dog **40** provides a stop shoulder for abutting against tongue **34** so that the tongue pushes against the shoulder during forward movement of the tractor thereby also causing holder **24** to move in a forward direction. While in the blast chamber it is sometimes desirable to move the holder back and forth in accordance with the particular cleaning operation. This may be accomplished by the downstream side **44** of lug **36** acting as a stop shoulder for tongue **34**. Thus while in the blast chamber tongue **34** is effectively trapped between spaced lug **36** and dog **40** to move holder **24** in accordance with the direction of movement of tractor **28**.

Advantageously means are provided to disengage a holder **24** from tractor **28** when the tractor reaches a stack of similar holders. This disengaging means includes a pivoted operating link **46** connected to dog **40** in such a manner that upon upward or counterclockwise pivotal movement of link **46** dog **40** is caused to retract. This retracted position is illustrated in the left hand portion of FIG. **2**. The actuation of operating link **46** is brought about by a cam tail **48** arranged in the path of motion of link **46** but located on the prior downstream holder. Accordingly, each holder is thereby provided with a cam tail for disengaging the subsequent holder when there is impact and contact between both holders as would occur when the holders are stacked together. In this manner only the front holder of a stack would not have its operating link contacted by a cam tail on a prior downstream holder. Accordingly, only the front holder of a stack would have its dog **40** in an unretracted position for contact by tongue **34** of tractor **28** thereby assuring that the tractor will disengage its holder upon reaching a stack of holders and then pick up the foremost holder of the stack as the tractor continues to move in a forward direction.

Holder **24** may be of any suitable construction in accordance with the type of workpiece it is intended to hold. As shown in FIG. **2** holder **24** includes a load bar **50** mounted between the pairs of conveying rollers **22**. A rigid work housing **52** is centrally mounted on load bar **50** and includes a central shaft **54** upon which is mounted a sprocket **56**. In and around the blast station **14** sprocket **56** is engaged by sprocket chain **58** which is driven by sprockets **60** (FIG. **1**) thereby causing shaft **54** to rotate. Shaft **54** has secured thereto the actual workpiece holder which is schematically indicated by the reference numeral **62** so that the workpiece also rotates.

In the illustrated embodiment blast station **14** includes a blast chamber **68** with a pair of slit sealing lips **64** at its top which are opened by plow **66** in a known manner to permit the workpiece to enter the blast chamber **68** while preventing abrasive particles from escaping therefrom.

By the term stack is meant at least two holders. Thus a single holder may become part of a stack of holders when a tractor brings another holder into contact with it.

What is claimed is:

1. An abrasive blast cleaning arrangement comprising a blast station, abrasive blast means in said blast station, a load station on one side of said blast station, an unload station on the other side of said blast station, a first monorail between said load and said unload stations and extending through said blast station, a second monorail parallel to said first monorail, a variable speed tractor on said second monorail, a plurality of individual workpiece holders on said first monorail, each of said holders being disposed for carrying a workpiece into and out of said blast station for treatment by said blast means, disengageable coupling means on said tractor and each of said holders for selective engagement of said tractor with a holder whereby a plurality of said holders may be stacked together to form a stack of holders having a foremost holder and said tractor may convey one of said holders at elevated speed and then decrease its speed as said tractor approaches the stack of holders to release its holder and become coupled with the foremost holder of the stack.

2. An arrangement as set forth in claim **1** wherein each holder includes disengaging means for inactivating the coupling means on the subsequent holder when contacted by the subsequent holder whereby said tractor will be engaged with only the foremost holder in a stack of holders.

3. An arrangement as set forth in claim **2** including means at said blast station for rotating each of said holders when the holder is in said blast station.

4. An arrangement as set forth in claim 3 wherein said monorails are closed loops.

5. An arrangement as set forth in claim 4 wherein said second monorail is disposed above said first monorail.

6. An arrangement as set forth in claim 5 wherein said coupling means includes a downwardly projecting tongue on said tractor, an upwardly projecting lug on each holder in the path of motion of said tractor tongue, pivot means connecting said upwardly projecting lug for rotational movement caused by contact with said tractor tongue when said tractor tongue moves in a forward direction and for returning to its upstanding position when said tractor tongue moves past said lug to act as a stop for said tractor tongue when said tractor tongue moves in its backward direction, an upwardly projecting dog on each holder downstream from its lug in the path of motion of said tongue to abut against said tongue when said tongue moves in a forward direction to thereby cause its holder to move with said tractor, said disengaging means including an operating link connected to its dog for retracting its dog out of contact with said tongue upon actuation of said operating link, a cam tail on each holder in the path of motion of the operating link on the subsequent upstream holder for actuating that operating link when the adjacent holders are stacked together.

7. An arrangement as set forth in claim 6 wherein each of said holders includes sets of spaced wheels rollably mounted on said first monorail, a load bar interconnecting said sets of wheels, a rigid housing suspended from said load bar, a rotatable shaft in said housing, an exposed sprocket on said shaft for causing said shaft to rotate, work engaging means on said shaft, and said rotating means being a sprocket chain at said blast station for engaging said sprocket to cause said sprocket to rotate upon movement of said chain.

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