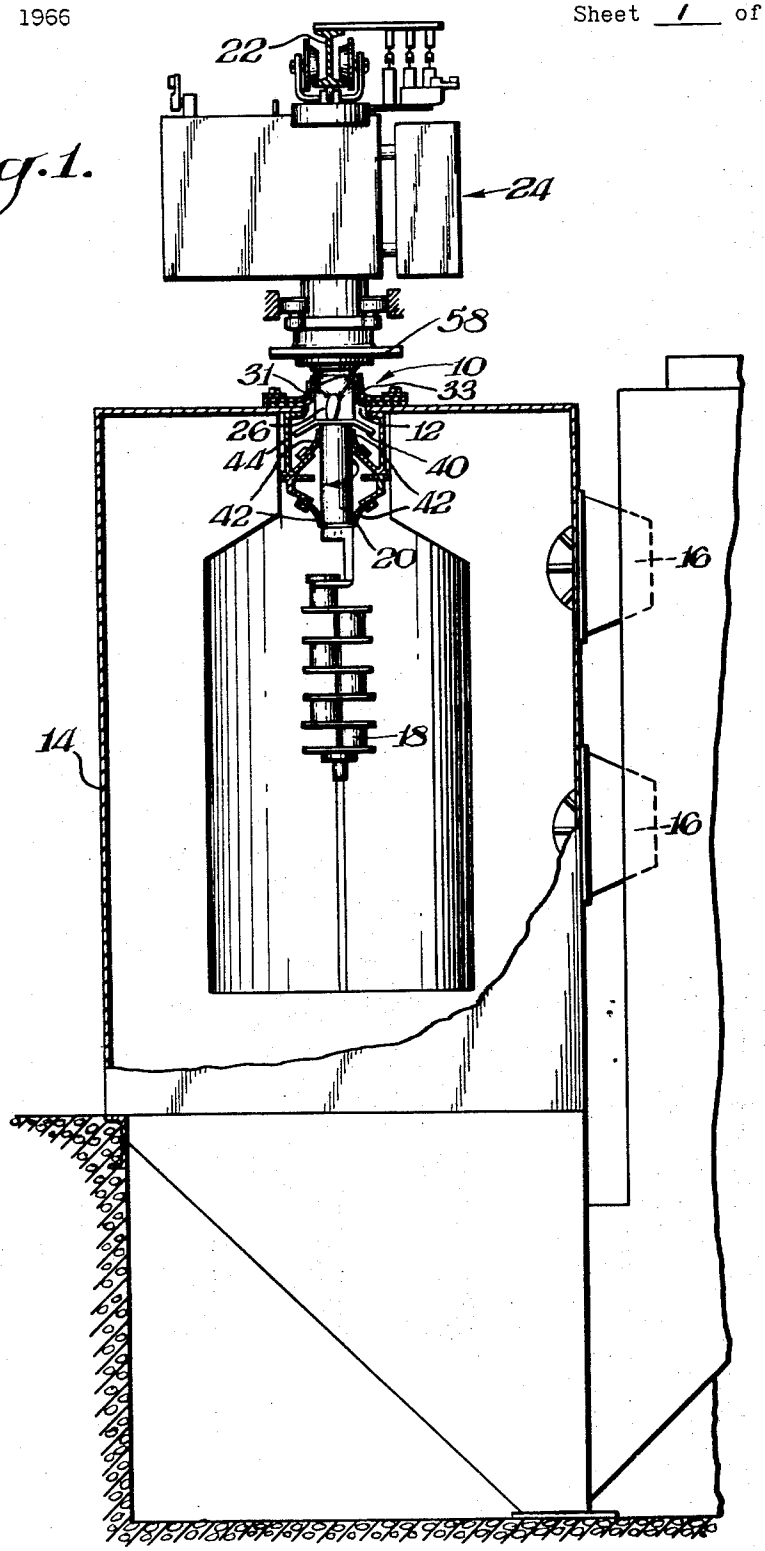
Dec. 31, 1968 D. L. BAUGHMAN ET AL 3,418,756

APPARATUS FOR USE IN TREATING WORKPIECES

Filed July 7, 1966 Sheet 1 of 2

Fig. 1.



APPARATUS FOR USE IN TREATING WORKPIECES

Filed July 7, 1966 Sheet 2 of 2

Fig. 2.

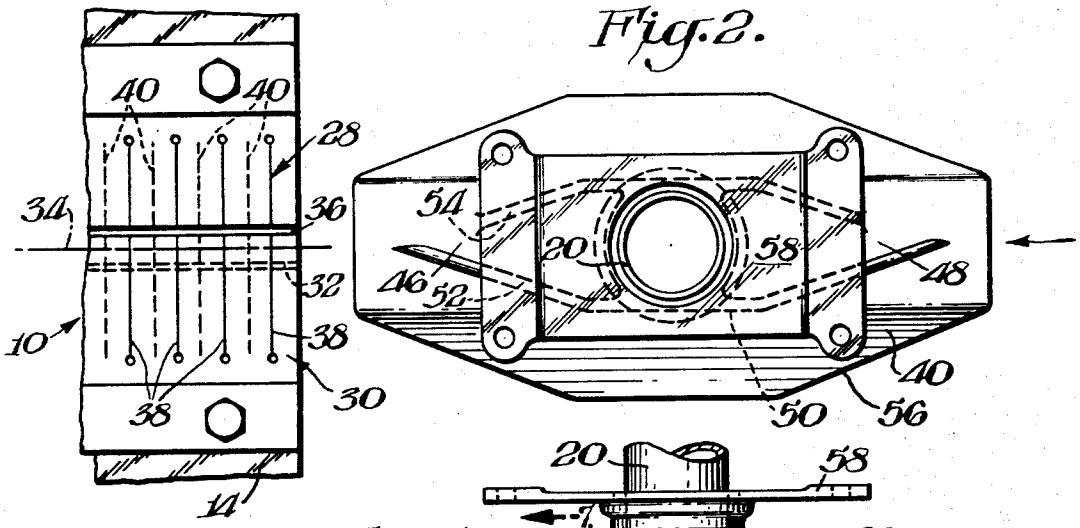


Fig. 3.

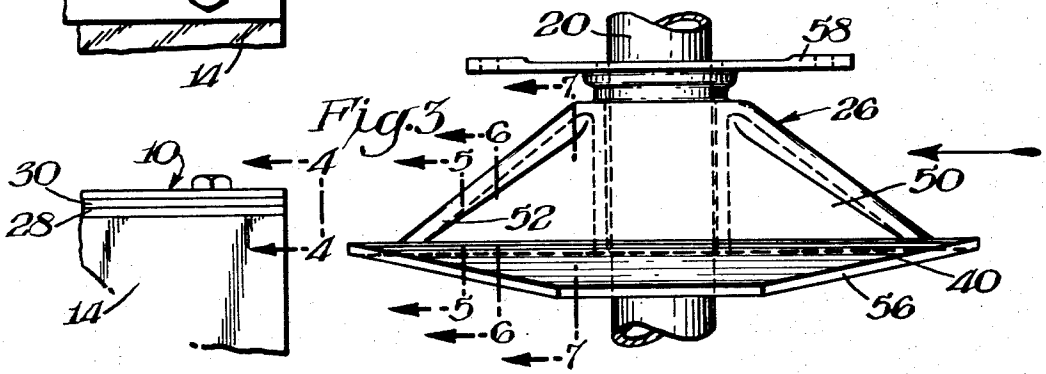


Fig. 4.

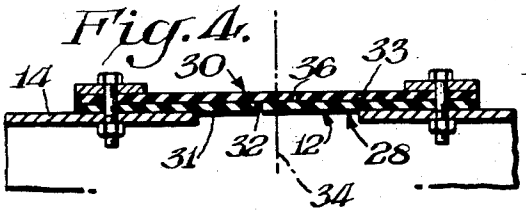


Fig. 5.

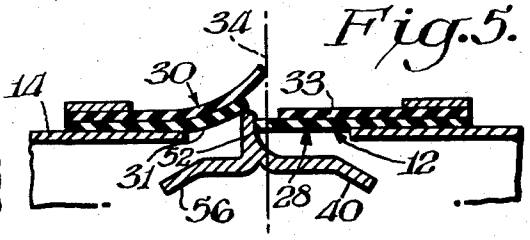


Fig. 6.

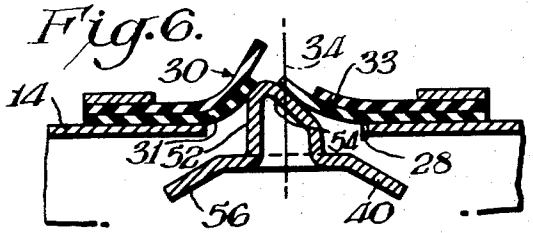


Fig. 7.

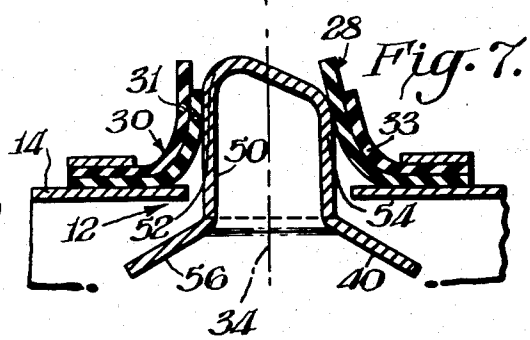
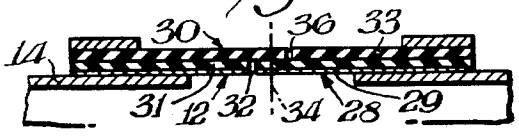


Fig. 8.



United States Patent Office 3,418,756 Patented Dec. 31, 1968

3,418,756

APPARATUS FOR USE IN TREATING WORKPIECES

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Filed July 7, 1966, Ser. No. 597,184
(Filed under Rule 47(a) and 35 U.S.C. 116)
12 Claims. (Cl. 51—14)

ABSTRACT OF THE DISCLOSURE

An apparatus for use in treating workpieces includes a treating cabinet which has an elongated opening along one wall so that a workpiece holder may project therein and travel through the opening. The opening is sealed by a first layer of resilient material facing the interior of the cabinet and a second layer of resilient material in face to face contact with the first layer but being outermost with respect to the cabinet interior. The first layer is longitudinally slit to one side of the opening center line and the second layer is longitudinally slit to the other side of the opening center line.

This invention relates to a sealing system for closing an elongated opening in a treating cabinet, and more particularly to such a system which permits a workpiece to be inserted in the treating cabinet and moved therein while its holder projects out of the cabinet.

Many treating cabinets such as for example abrasive blasting cabinets utilize a system whereby a workpiece is suspended from a holder so that the workpiece can be moved about the cabinet for treatment therein. The holder in turn projects through an elongated opening in the cabinet with its moving mechanism being disposed externally of the cabinet so as not to be subjected to the treating process. One such system employs a monorail disposed above a blasting cabinet. The workpiece holder rides on the monorail and extends into the cabinet through an elongated opening at the top end of the cabinet. Most present monorail blast cleaning machines use a series of these supporting holders or hooks which hang from a monorail conveyor. The hooks are evenly spaced and are driven by attachment to a drive chain. The top of the cabinet through which the hooks extend, in order to pass the work through the blast cleaning machine, should be sealed to prevent the abrasive particles from being thrown out of the cabinet. One type of seal heretofore employed is to use a labyrinth seal in which the abrasive particles are made to travel through a tortuous path in order to escape from the cabinet. The seal is composed for example of overlapping metal traveling seals attached to and interconnected by the work hook shaft. The metal to metal joints of this seal however are subject to high wear and jamming by the abrasive.

In another type of seal employed in prior systems, the elongated opening at the top of the cabinet is covered by a layer of rubber. The rubber in turn is slit along its center so that the workpiece holder can move therethrough. This system is subject to a number of disadvantages. For example, after a period of use the rubber layer loses its ability to return to its original shape. Accordingly, its sealing effectiveness is drastically reduced, since gaps are present at the slit of the layer. These gaps present problems not only where the workpiece is moving through the layer but also when the workpiece is not present in that portion of the blast cabinet. This problem is especially serious since the abrasive particles can easily escape through these gaps.

A recently developed effective monorail blast cleaning system which is described in copending application Ser. No. 543,616, filed Apr. 19, 1966, utilizes individually motorized hook trolleys. As described therein the individually motorized hook trolley system has a number of advantages over the prior systems which use chain driven workpiece holders. An advantage, for example, of the recently developed system is that the workpiece holders may operate independently from each other to give each workpiece an individualized treatment where necessary. This feature however precludes the use of interconnected and overlapping metal seals since the distance between workpiece hooks can and will vary greatly throughout the machine.

An object of this invention is to provide a sealing system for the above indicated recently developed blasting machine as well as prior blasting machines.

A further object is to provide such a system which can be effectively used with any type of treating cabinet in which there is a desire to prevent flying objects from escaping from the cabinet.

A still further object of this invention is to provide a novel workpiece holder which is particularly effective with the travelling seal.

In accordance with this invention the elongated slot or opening at the top of the treating cabinet is closed by a pair of resilient layers. The layers are slit longitudinally in a staggered fashion. For example, the innermost layer facing the interior of the cabinet is slit to one side of its center line, while the outermost layer is slit to the other side of the center line. Accordingly, the layers overlap each other in such a manner that each of the layers covers the slit of the other layer similar to the arrangement of shingles on a roof. The flexibility of the seal is enhanced by the formation of a plurality of fingers therein which are formed by periodically slitting each layer in a direction transverse to its longitudinal slit. The slits forming the fingers of each layer are likewise staggered with respect to the other layer so that each layer again covers the finger-forming-slits of the other layer. As a result of these staggered slits, there are effectively no open areas in the seal. Advantageously, the work hook carries a plow which is particularly adapted for the above described seal. The plow is formed in such a manner that as it moves through the seal it progressively lifts one side of the seal by its eccentric leading edge before the other side is being lifted. This is accomplished by forming a progressively upwardly sloping shape on its leading edge so that the leading edge will open the seal for bending the seal fingers upward to permit passage of the work hook shaft. After passage of the work hook shaft, the diminishing slope of the plow gradually lowers the seal fingers back to their original position.

In an advantageous form of this invention, a base plate is made integral with the plow and passes under the seal to effectively block any opening to the passageway of abrasive that may occur as the seal fingers are opened and closed. For extreme abrasive conditions, the seals may be protected by incorporating thin hard metal strips or other wear resistant materials bonded to their wearing surface. Additional seals and/or deflectors may also be provided to assure the highest degree of sealing possible.

The sealing system of this invention has a number of advantages over prior systems. For example, the work hook can drive through the blast cabinet without the necessity of maintaining a given hook spacing. This allows the use of individually propelled work hook trolleys or support parts of varying lengths. Additionally, the work hook can drive back and forth in small areas in front of the blast wheels to obtain maximum cleaning effect without reducing the effectiveness of the seals.

Moreover, the sealing system provides for positive closure against flying abrasive when the work hook is not present in the blast cabinet, when the work is present but not moving, and when the work hook is moving either backward or forward in the blast cabinet. Additionally, when the seal carries its own shield plate, it masks against flying abrasive, the area where the seal is being opened and closed. The seal also requires no metal to metal joints which are almost impossible to maintain free and which are therefore subject to jamming, wear and other problems. The sealing system is also applicable for sealing any blast cleaning machine or, in fact, any other machine where abrasives or dust must be contained within its cabinet but where the enclosure must be broken to allow the passage of work supporting devices or loading mechanisms.

Novel features and advantages of the present invention will become apparent to one skilled in the art from a reading of the following description in conjunction with the accompanying drawings wherein similar reference characters refer to similar parts and in which:

FIG. 1 is a cross-sectional view in elevation of one embodiment of this invention;

FIG. 2 is a plan view of the sealing arrangement and plow formed in accordance with this invention;

FIG. 3 is a side view of the sealing arrangement and plow shown in FIG. 2;

FIGS. 4–7 are cross-sectional views taken through FIG. 3 showing various phases of operation; and

FIG. 8 is a cross-sectional view similar to FIG. 4 of a modified form of this invention.

In accordance with this invention, the sealing system **10** is used for sealing an elongated slot or opening **12** at for example the top of treating housing **14**. Treating housing **14** may for example be a blast cleaning cabinet which includes blast wheels **16** for cleaning the work piece **18**. Work piece **18** is suspended by holder **20** which projects through opening **12** and is movably supported on monorail **22**.

Advantageously, monorail **22** supports a self motorized trolley **24** of the type described in co-pending application Ser. No. 543,616, filed Apr. 19, 1966. The work piece holder and its self motorized trolley are identical to that in the aforementioned application. Accordingly, the details of this monorail system will not be described except where necessary to facilitate an understanding of this invention.

As shown most clearly in FIG. 4 the sealing arrangement includes a pair of resilient layers **28**, **30**. The lowermost layer **28** which is exposed to the interior of the treating cabinet **14** is slit (at **32**) longitudinally to one side of its longitudinal center line **34**. Upper layer **30** in turn is slit at **36** to the other side of center line **34**.

As indicated in FIG. 2 layers **28**, **30** have a series of staggered transverse slits **38**, **40** which form a plurality of seal fingers in the layers. One set of fingers in layers **28**, **30** is indicated at **31**, while the other set is indicated at **33**.

By the staggered arrangement of slits **32**, **36** and slits **38**, **40** each slit of one layer is closed by the other layer. Since the slits are staggered the layers also cooperate with each other in retaining their normal sealed relationship. In this sense if the composite layers were slit along the same line, such as at their center line, the area of the slit would be weakened which would inhibit their self retaining effect. Layers **28** and **30** are advantageously made of rubber. Any suitable material, however, may be used which has the sufficient flexibility and resiliency.

To safeguard against any abrasive escaping from cabinet **14** a number of auxiliary seals are provided. These include for example deflecting plates **40** and **58** on workpiece holder **20**, as well as rubber seals **42** secured to the metal abrasive deflector **44** secured to cabinet **14**.

Workpiece holder **20** is provided with a plow **26** which is particularly designed to open and close the seal **10** in such a manner that the layers are raised and lowered without the sets of fingers **31** and **33** becoming tangled with each other. This is accomplished by providing eccentric projections **46**, **48** on the body **50** of the plow. In this respect projection **46** includes a ridge **52** which begins to rise at the center line **34** of the plow. At this center position however ridge **52** is below layer **28** (FIG. 3). Ridge **52** progressively slopes upward in such a manner that when it first contacts the seal the contact is made at slit **32** (FIG. 5) to gently raise set of fingers **31**, while the remaining set **33** is left in its normal condition. The projection **46** slopes downwardly from ridge **52** to small ridge **54**. Thus as shown in FIG. 6 after the leading edge **52** of plow body **50** contacts the seal **10** and raises one set of rubber fingers **31**, the other fingers **33** are raised to a lower elevation by the downward slope of projection **46**. Both sets of fingers **31** and **33** are thereby progressively raised in this manner until they reach their maximum separation as indicated in FIG. 7. The opening of seal **10** is thus accomplished without tangling fingers **31** and **33**.

The trailing projection **48** of plow **50** is formed as a mirror image of the lead projection **46** so that the seal fingers **31**, **33** begin to progressively lower and are guided back to the original position in the reverse manner of their being raised. This action thus can be understood by again referring to FIGS. 7, 6 and 5, respectively.

The skirted base **56** (FIG. 3) of body **50** provides an additional safeguard below the seal system, in that the base **56** acts as a deflector through the area of the opening and closing of seal fingers **31**, **33**. Additionally, deflector plate **58** provides a further safeguard against escape of flying abrasive.

FIG. 8 shows a modified form of the seal of this invention wherein the exposed face of layer **28**, which faces the interior of the cabinet **14**, is provided with a wear layer **29**. Layer **29** may for example be a thin hard metal strip or other suitable material bonded to the under or wearing surface of layer **28**.

Obviously, many modifications and variations of the present invention are possible in the light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. An apparatus comprising a treating cabinet, an elongated opening along a wall of said cabinet whereby a workpiece holder may project therein and travel through said opening, sealing means closing said opening, said sealing means including a first layer of resilient material facing the interior of said cabinet, a second layer of resilient material in face to face contact with said first layer, said second layer being outermost with respect to said interior of said cabinet, said first layer being longitudinally slit to one side of the center line of said opening, and said second layer being longitudinally slit to one side of the center line of said opening whereby each slit of each layer is covered by the other layer.

2. An apparatus as set forth in claim **1** wherein a plurality of fingers are formed in said first and said second layers, said fingers being formed by a plurality of transverse slits in each of said layers, and said transverse slits of one layer being staggered with respect to the transverse slits of the other layer whereby the tranverse slits of each layer are covered by the other layer.

3. An apparatus as set forth in claim **2** wherein a protective wear layer is secured to the exposed face of said first layer.

4. An apparatus as set forth in claim **2** wherein a workpiece holder projects into said opening, a plow being on said workpiece holder, and said plow including eccentric raising and lowering means for raising and lowering one set of fingers substantially on one side of said center line before the other set of fingers is raised and lowered to prevent said fingers from being tangled.

5. An apparatus as set forth in claim 4 wherein said raising and lowering means includes an eccentric projection on the leading end of said plow, said projection extending away from the base of said plow a greater distance to one side of said center line than on the other side of said center line.

6. An apparatus as set forth in claim 5 wherein a projection is formed on the trailing end of said plow, said trailing end projection being formed as a mirror image of said leading end projection, and said leading end projection being disposed for making first contact with said first layer at its longitudinal slit.

7. An apparatus as set forth in claim 4 wherein deflecting means is secured to said workpiece holder, said deflecting means including a deflecting plate disposed above said projections and a deflecting plate disposed below said projections.

8. An apparatus as set forth in claim 4 including a self motorized trolley, and said workpiece holder being suspended from said self motorized trolley.

9. An apparatus as set forth in claim 8 wherein said treating cabinet is an abrasive blasting cabinet, abrasive blasting means being disposed in said cabinet, and auxiliary seal means being disposed in said cabinet under and along said opening.

10. An apparatus comprising a workpiece holder, a base member on said holder, said base member having a leading end and a trailing end, a longitudinal center line traversing said leading end and said trailing end whereby a portion of said leading end and a portion of said trailing end are on one side of the said center line and the remaining portions of said leading end and of said trailing end are on the other side of said center line, an upstanding projection being on said leading end of said base, said upstanding projection being eccentric with respect to said center line and extending away from said base a greater distance to one side of said center line than to the other side, a projection being on said trailing end, and said trailing end projection being a mirror image of said leading end projection.

11. An apparatus as set forth in claim 10 wherein a deflecting plate is secured to said holder below said projections and a second deflecting plate being secured to said holder above said projections, and said projections gradually sloping away from said base of said plow toward each other.

12. An apparatus as set forth in claim 10 including drive means for said workpiece holder, and said drive means being an individually motorized trolley.

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LESTER M. SWINGLE, *Primary Examiner.*

U.S. Cl. X.R.

34—242; 51—9; 277—166, 237