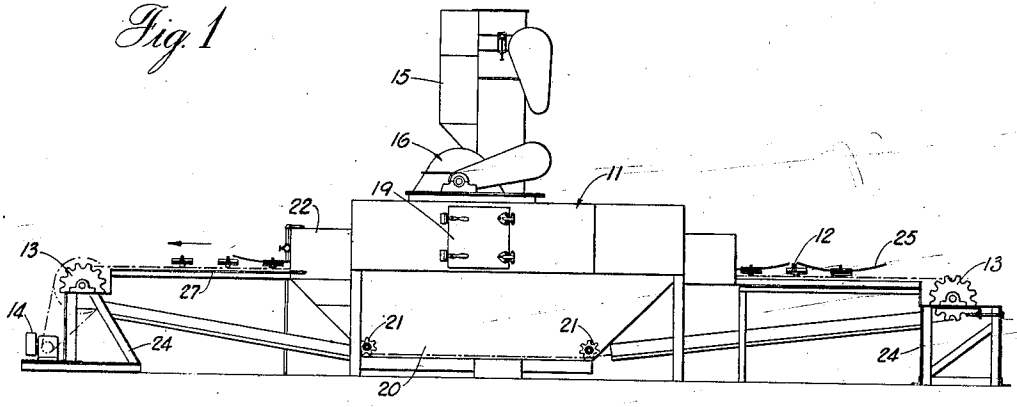
Jan. 4, 1944. W. J. LEARMONTH 2,338,591

SHOT BLASTING APPARATUS

Filed Nov. 17, 1941 2 Sheets-Sheet 1

Fig. 1



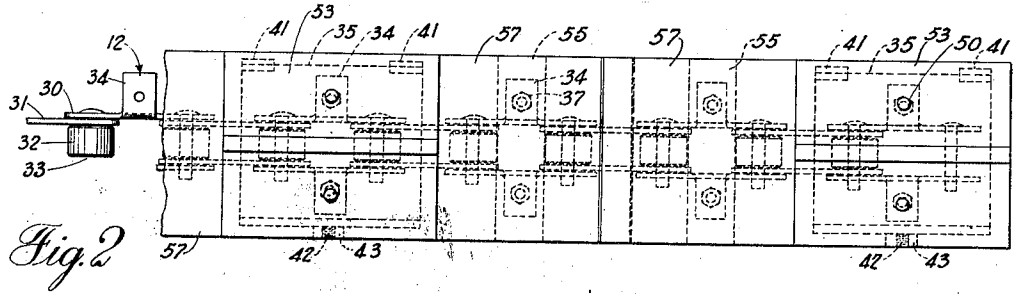


Fig. 2

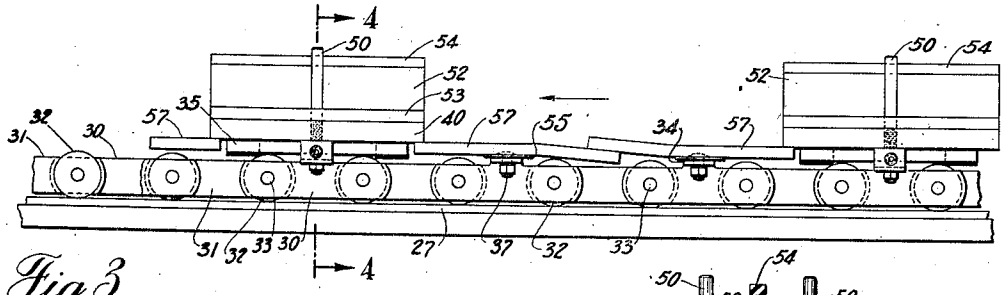


Fig. 3

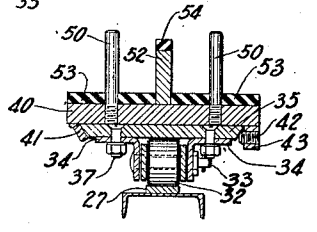


Fig. 4

INVENTOR

William J. Learmonth

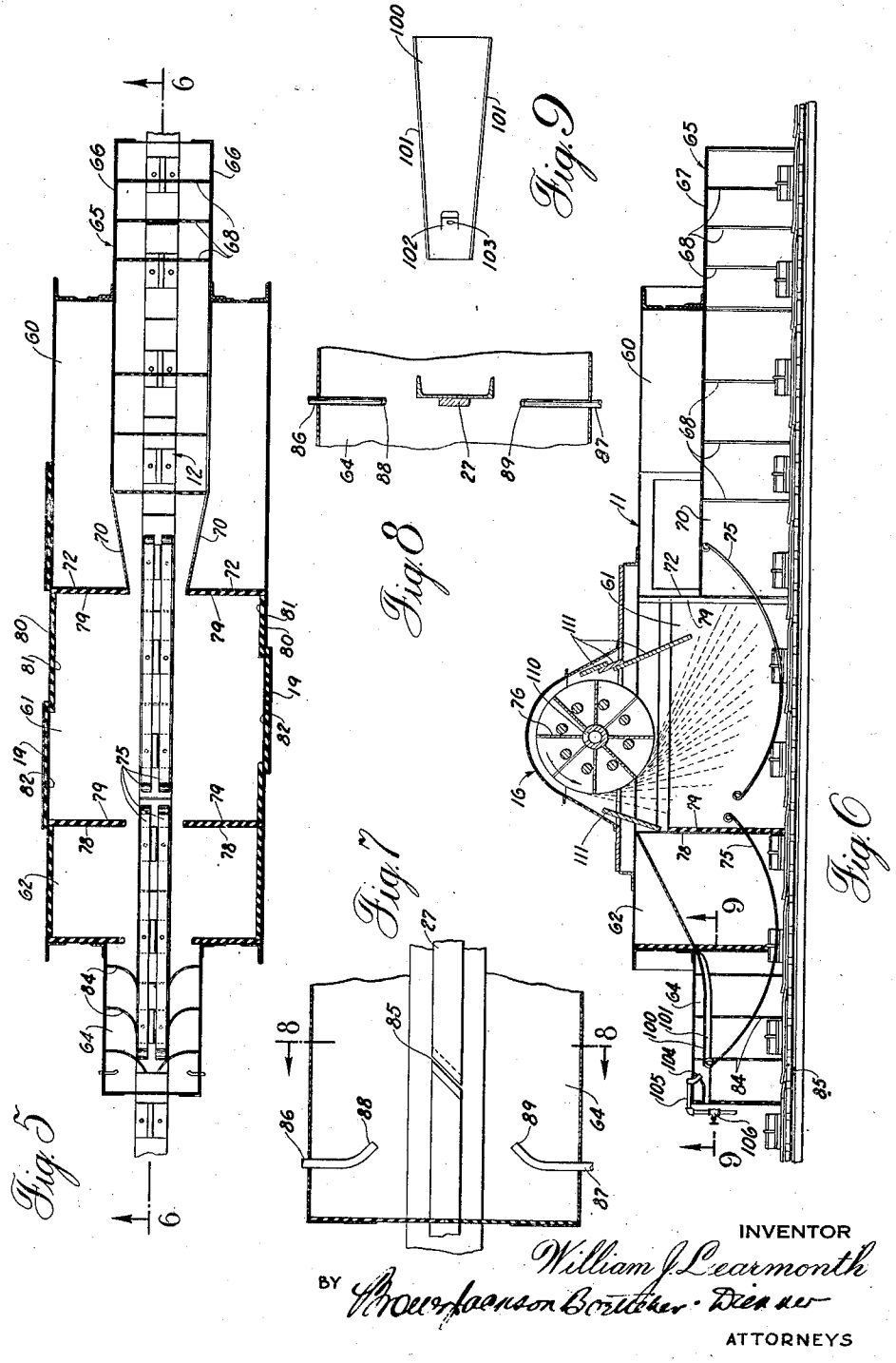
BY Mowtaeson Bowen & Deane

ATTORNEYS

Jan. 4, 1944. W. J. LEARMONTH 2,338,591

SHOT BLASTING APPARATUS

Filed Nov. 17, 1941 2 Sheets-Sheet 2



INVENTOR

William J. Learmonth

BY Wells, Mason, Gorsuch, Dienner

ATTORNEYS

Patented Jan. 4, 1944

2,338,591

UNITED STATES PATENT OFFICE

2,338,591

SHOT BLASTING APPARATUS

William J. Learmonth, South Bend, Ind., assignor to The Studebaker Corporation, South Bend, Ind., a corporation of Delaware

Application November 17, 1941, Serial No. 419,411

5 Claims. (Cl. 51—9)

The present invention relates to an improvement in an apparatus for shot blasting metal articles, and more particularly is directed to an apparatus for shot blasting spring leaves.

It is now well known in the art that by shot blasting a spring leaf its life and resiliency are greatly increased. In order to satisfactorily shot blast a leaf spring, for example, the shot must be discharged so that it impinges the leaf spring with great force. This immediately creates a serious and dangerous problem. The blast of shot must be confined to prevent injuries to the workman, and hence necessarily requires that the shot blasting be accomplished within a closed housing. In apparatus now known in the art the force of the shot will, in a relatively short time, puncture the wall of the housing necessitating a shutting down of the apparatus for repair. Further, the shot, due to the force imparted to it, will be expelled from the discharge end of the housing and, in addition, will lodge in the links of the conveyor and about the sprockets over which the conveyor chain is trained. The shot is of an abrasive character and a conveyor chain and sprocket will be damaged beyond the point of usefulness in a short time, necessitating their replacement. This is objectionable in that in addition to shutting down the apparatus for repair, the conveyor chain and sprockets are costly to replace.

The primary object of my invention is to provide an improved shot blasting apparatus which is safe and economical in operation.

A further object is the provision of means for preventing damage to the conveyor and housing by the shot.

A further object is to provide a shot blasting apparatus in which substantially all of the shot will be retained within the housing.

In order to attain the above objects, I propose to provide a resilient shock absorbing covering for the conveyor chain to protect it from discharging shot. Further, I propose to line the inner surfaces of the housing of the apparatus with suitable resilient shock absorbing material to prevent the shot from wearing through and destroying the walls of the housing.

Preferably, suitable means is provided adjacent the discharge end of the housing of the apparatus for retaining the shot within the housing.

A specific feature of my invention resides in providing a slot in the track for the conveyor adjacent the outlet of the housing into which the shot accumulated between the links of the conveyor will drop to be expelled into a suitable receptacle and returned to a feed hopper for further use.

A further feature of my invention resides in the provision of a guide means adjacent the discharge outlet of the housing for assuring that objects being shot blasted will not jam the machine.

Now, in order to acquaint those skilled in the art with the manner of constructing and operating an apparatus of my invention I shall describe in connection with the accompanying drawings a preferred embodiment of the invention.

In the drawings:

Figure 1 is a side elevational view, largely diagrammatic, of an apparatus embodying my invention;

Figure 2 is an enlarged detail plan view of a portion of the conveyor chain;

Figure 3 is a side elevational view of the chain of Figure 2;

Figure 4 is a detail vertical sectional view taken substantially on the line 4—4 of Figure 3 and looking in the direction indicated by the arrows;

Figure 5 is a plan view, partly in section, of the housing and a portion of the conveyor chain shown in Figure 1;

Figure 6 is a detail vertical view taken substantially on the line 6—6 of Figure 5 and looking in the direction indicated by the arrows;

Figure 7 is an enlarged plan view of a portion of the conveyor track, showing in section a portion of the outlet end of the shot blasting housing, and of the means for directing an air stream inwardly of the discharge outlet of the housing;

Figure 8 is a detail sectional view taken substantially along the line 8—8 of Figure 7, looking in the direction of the arrow; and

Figure 9 is an enlarged detail view taken substantially on the line 9—9 of Figure 6 and showing the guide means for guiding a leaf spring out of the outlet end of the apparatus.

Referring now to Figure 1, the apparatus therein shown comprises a housing 11, and an endless conveyor chain 12 which is adapted to be trained about a pair of sprockets 13. Suitable driving means 14 is disposed adjacent the sprockets 13, at the left of Figure 1, for driving the conveyor chain in a counterclockwise direction as viewed in the figure. Disposed above the housing 11 is a suitable feed chamber or hopper 15 for storing the shot which is adapted to be discharged by a suitable centrifugal discharge means 16 which may be driven by any suitable means (not shown). It will be understood that the re-

ceptacle 15 and shot-discharging means 16 are well known in the art and for the purposes of the present invention need not be described in further detail.

Suitable inspection doors 19 are provided, one in each of the side walls of the housing 11. A receptacle 20 is disposed below the housing 11 for receiving the spent shot. A pair of idler sprockets 21—21 are disposed adjacent the lower end of the receptacle 20 for guiding the conveyor chain along its lower turn. The housing 11 also comprises a reduced outlet portion 22 which will be described in more detail hereinafter. The pair of sprockets 13 are disposed a sufficient distance away from each end of the housing 11 to provide loading and unloading stations for objects to be treated in the housing. The sprockets 13 are each carried by a suitable supporting platform 24 so that the upper link of the chain is disposed substantially at waist height.

In the embodiment of my invention herein disclosed I have shown in several figures of drawings an apparatus suitable for shot blasting leaf springs. The leaf springs shown at 25 are adapted to be disposed upon the conveyor chain 12 at the right hand end of the machine as shown in Figure 1, and after passing through the housing 11 wherein they are shot blasted, they are removed at the left hand end of the apparatus shown in this figure.

The track 27 extends longitudinally through the housing 11 and terminates adjacent each of the sprockets 13 which are suitably supported at either end of the apparatus by the frame members 24.

Referring now to Figures 2 through 4, it will be seen that the conveyor chain 12 comprises a plurality of outer links 30 and a plurality of inner links 31, the inner and outer links being pivotally connected to each other adjacent their ends. A plurality of rollers 32 are disposed between each pair of inner links 31, and are mounted for rotation about the axis of a pin 33 which connects the ends of adjacent pairs of links 30 and 31. Each of the links 30 are provided with suitable lugs 34 to which are secured metal plate members 35 by means of the nuts and bolts 37. A leaf spring supporting member 40 is adapted to be detachably secured to each of the plate members 35. Disposed adjacent each end of each of the plate members 40 are a pair of lug members 41 which are adapted to be disposed in engagement with a tapered shoulder of the plate member 35. The opposite side of each of the plate members 40 is provided with a screw 42 extending through a suitable lug 43. The screw 42 is adapted to have engagement with a tapered edge of the plate member 35 for holding the several members 41 in engagement with the opposite tapered edge of the plate 35 to retain the several plate members 40 in assembled position upon the conveyor chain.

A pair of pins 50 are disposed substantially midway of and opposite each of the plate members 40, and at each side thereof. One end of each of the pins 50 are threaded for securing them in suitably threaded openings in the plate members 40. A suitable partition 52, preferably of metal, extends upwardly from the plate member 40 to which it may be suitably secured as by welding. A pair of resilient shock absorbing coverings 53 are provided on either side of the partition 52, and the upper edge of the partition 52 is also provided with a suitable resilient shock absorbing covering 54.

In Figures 2 and 3, it will be seen that in the embodiment herein disclosed that each third link is provided with a work supporting member 40 and covering therefore as described in connection with Figure 4. It will be seen that the link structures intermediate the work supporting links each comprise a transversely extending metal bar 55 secured to the lugs 34 of the outer pairs of links 30. The several plate members 55 are suitably secured as by bolting to their associated lugs 34. A covering 57 of a resilient shock absorbing material is secured to the transverse members 55 in any suitable manner to protect the several intermediate links of the chain from the discharging shot. Preferably, the resilient coverings 53, the coverings 54 and the coverings 57 are of soft rubber, but it will be apparent that they may be made of any other suitable material of like character.

In Figures 5 and 6 it will be seen that the housing 11 comprises a first or inlet compartment 60, a second or shot blasting compartment 61, a third compartment 62, and an outlet or discharge compartment 64. A suitable guideway 65 comprising side walls 66 and a top wall 67 define a guiding means through which articles to be shot blasted are carried by the conveyor 12. A plurality of bifurcated rubber sheeting members extend substantially vertically within the guide 68 to prevent shot from being discharged outwardly of the guide 65. Adjacent the inner end of the member 65 are a pair of plate members 70 which extend inwardly from the outer walls 66 toward the conveyor chain and terminate adjacent the end wall 72 defining the inlet end of the chamber 61.

In the embodiment of the invention herein disclosed, a plurality of leaf springs 75 are adapted to be disposed upon the conveyor chain by positioning a suitable opening formed substantially intermediate the ends of each of the springs 75 about each of the pins 50 of each of the work supporting members 40.

In Figure 6 it will be seen that the shot discharging means comprises the centrifugal wheel 76 for directing shot downwardly upon the leaf springs as they pass through the chamber 61. The tapering inner end walls 70 of the housing 65 are adapted to aline the several leaf springs 75 as they approach the shot blasting housing 61 and as shown in Figure 6 it will be seen that the eye of the spring is guided by the upper wall 67 for guiding the spring from the housing 65 into the shot blasting chamber 61. The inner surfaces of the end wall 72 of the chamber 61, and the end wall 78 adjacent the outlet of the chamber 61 are each provided with a layer of resilient shock absorbing material 79 for absorbing the shock of the shot thrown thereagainst by the shot discharging means 76. Also, the inner side walls 80 of the chamber 61 are provided with suitable coverings of resilient shock absorbing material 81. The inner surfaces of the inspection doors opening into the shot blasting chambers 61 are also provided with a suitable layer of shock absorbing material 82. The shock absorbing material shown at 76, 81 and 82 preferably comprises soft rubber. If desired, other material of like character may be used.

From the above it will be clear that all exposed surfaces of the walls defining the chamber 61, and all exposed surfaces of the conveyor chain are provided with suitable shock absorbing coatings to prevent the discharging shot from im-

pinging directly on any metal parts except the leaf springs being treated.

The outlet compartment 64 of the housing 11 comprises a plurality of vertically extending sheet members 84, preferably bifurcated sheet rubber, which partially prevent the expulsion of shot from this end of the apparatus. It will be seen that the conveyor track adjacent one end of the housing 65 is provided with a diagonally extending slot 85 into which shot accumulated by the wheeled links of the conveyor chain are dropped. A pair of conduits 86 and 87 extend from either side of the housing 64 adjacent the outlet end thereof and are provided with tips 88 which extend inwardly of the housing 64. The conduits 86 and 87 are connected to any suitable source of air under pressure, and the tips 88 and 89 are directed to discharge an air stream adjacent either side of the track inwardly of the apparatus. These air streams are effective to retain the spent shot within the apparatus and cause it to be returned to the receptacle 20 from which it is conveyed by any suitable means, such as bucket conveyors, to the supply chamber 15 to again be used. It will be seen that the discharge tip 89 of the conduit 87 lies substantially in alinement with the groove 85 of the track so that a blast of air is directed through this slot to return to the hopper 20 spent shot accumulated therein.

Disposed adjacent the upper wall and suitably secured thereto is a guide trough 100 shown in detail in Figure 9. The guide member 100 comprises a pair of downwardly extending flanges 101 which converge toward each other adjacent the outlet over the compartment 64. In the position of the forwardmost spring 75 shown in Figure 6 it will be seen that shot is being directed upon the trailing end thereof which tends to rock the spring about the pin 50 as a fulcrum and unless a guide of the character of 100 is embodied in the upper end of the compartment 64 the leading end of the spring will bind in the apparatus and cause serious damage and delay. The converging flange of 101 serves to guide the leading ends of the springs out of the housing 11. A suitable lug 102 preferably formed integral with the guide member 100 extends downwardly and inwardly of the compartment 64. The lug 102 is provided with a suitable opening at 103 for receiving a discharge nozzle 104 of a suitable conduit 105 which is connected to a source of air under pressure for discharging a stream of air inwardly and downwardly of the compartment 64 to drive spent shot back into the apparatus and into the hopper 20 which would otherwise be carried out of the housing. A suitable valve 106 may, if desired, be incorporated in the conduit 105 for regulating or shutting off the flow of air through the nozzle 104.

It will be understood that the shot discharging wheel 76 is of a type well known in the art and comprises a discharge recess or slot 110 which is in communication with the discharge end of the hopper 15 for discharging the shot within the compartment 61. Also, devices of the character referred to comprise a plurality of removable baffles 111 to aid in guiding the shot upon the articles being treated.

Also, it will be understood that a suitable screw conveyor extends from the lower portion of the hopper 20 for returning the spent shot to a suitable elevating means for returning it to the feed hopper 15. These several elements have only been illustrated diagrammatically in elevation since they are well known in the art.

While I have shown what I consider to be the preferred embodiment of my invention, it will be understood that various modifications and rearrangements may be made therein without departing from the spirit and scope of the invention.

I claim:

1. In an apparatus of the character described, the combination of a housing, means for discharging shot in said housing, an endless wheeled conveyor for conducting objects to be shot blasted through said housing, a track upon which the wheels of said conveyor are adapted to travel having a slot therein adjacent the discharge end of said housing, and means for directing an air stream through said slot inwardly of said housing.

2. In an apparatus of the character described, the combination of a housing, means for discharging shot in said housing, an endless conveyor comprising a plurality of pivoted wheeled links, a track for said conveyor extending through said housing, said track having a slot for receiving spent shot accumulated by said wheeled links, a receptacle for receiving the spent shot, and means for directing an air stream adjacent the outlet end of said housing for returning spent shot into said receptacle, said means being adapted to direct an air stream through the slot of said track for forcing the spent shot therein into said receptacle.

3. In an apparatus of the character described, the combination of a housing, means for discharging shot in said housing, an endless conveyor comprising a plurality of pivoted wheeled links, a track for said conveyor extending through said housing, said track having a slot for receiving spent shot accumulated by said wheeled links in passing through said housing, means for directing air streams inwardly of the housing and into the discharge end thereof and adjacent each side of the conveyor, one of said air streams being adapted to expel the spent shot in the slot in said track, and means for directing the air stream from above said conveyor downwardly and inwardly of the housing from the discharge end thereof.

4. In an apparatus of the character described, the combination of a housing, means for discharging shot in said housing, an endless conveyor for conducting objects to be shot blasted through said housing, guide means adjacent the discharge end of said housing for engaging the leading portions of the objects while the rear portions thereof are being shot blasted to guide the same outwardly of said housing, and means carried by said guide means for directing an air stream inwardly of said housing.

5. In an apparatus of the character described, the combination of a housing, means for discharging shot in said housing, endless conveyor for conducting objects to be shot blasted through said housing lengthwise thereof, and a guide trough extending lengthwise of said housing adjent the discharge end thereof, said guide trough comprising sidewalls converging toward each other adjacent the discharge end of said housing for engaging the objects being shot blasted to retain them in their lengthwise positions at the discharge end of said housing.

WILLIAM J. LEARMONTH.