May 13, 1952 K. F. PIETZSCH 2,596,432

METHOD AND APPARATUS FOR OPENING SHEET METAL CONTAINERS

Filed Aug. 4, 1949 3 Sheets-Sheet 1

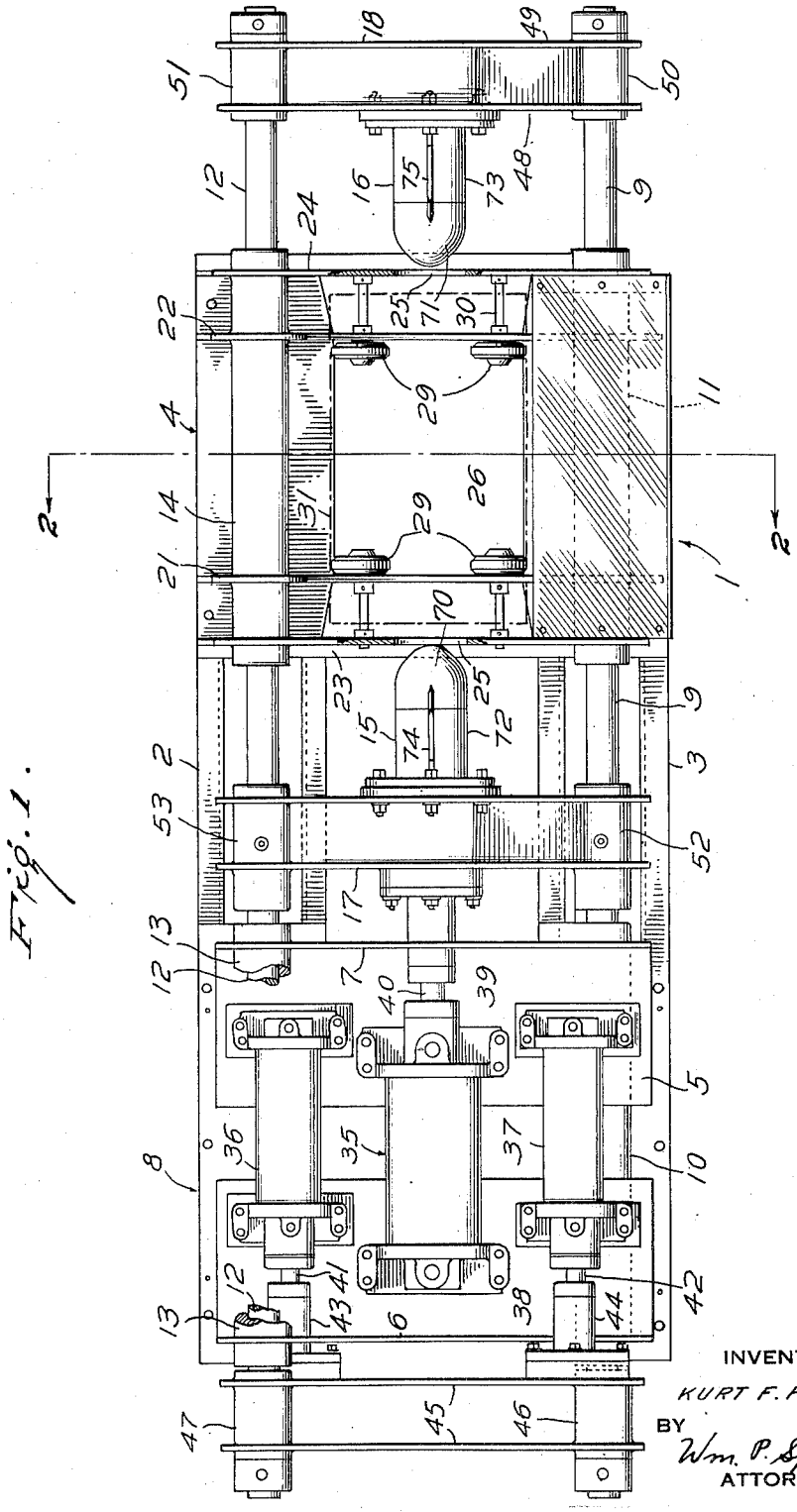


Fig. 1.

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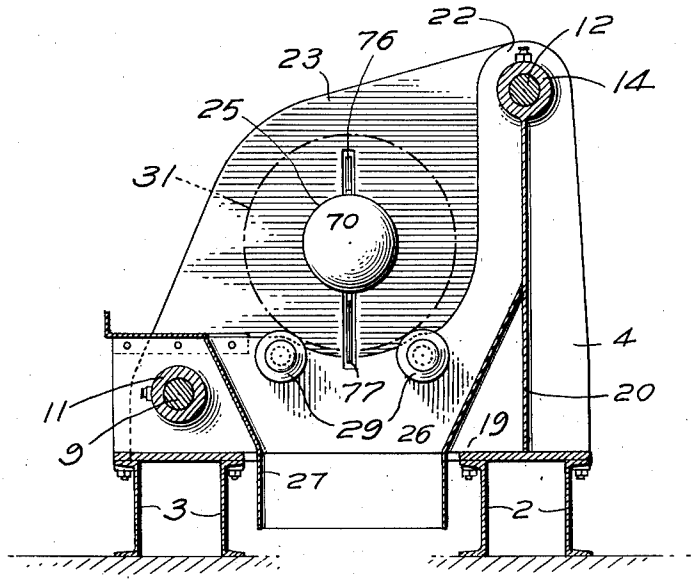


Fig. 2.

Fig. 4.

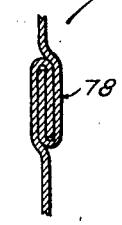


Fig. 3.

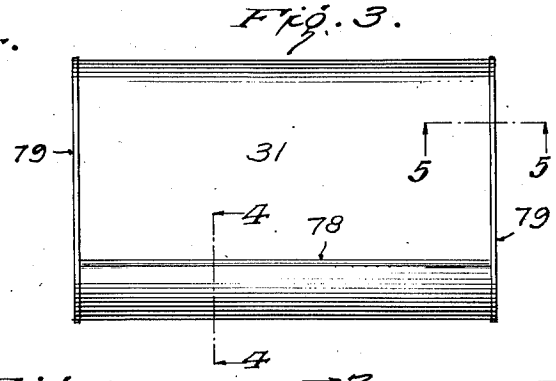


Fig. 5.

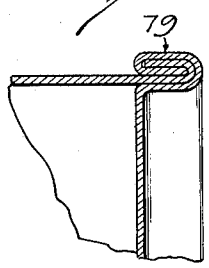


Fig. 7.

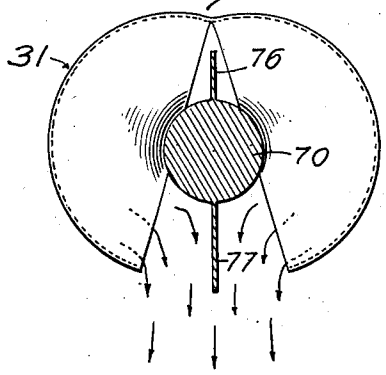
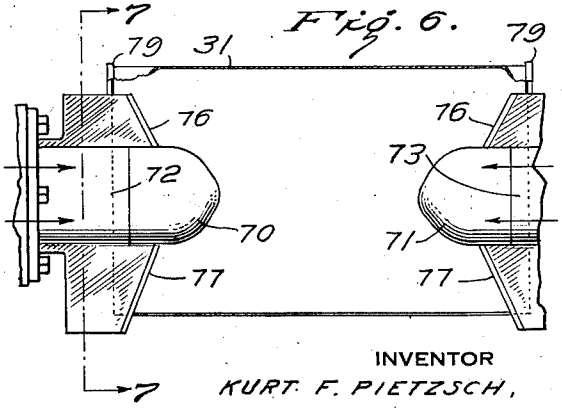


Fig. 6.



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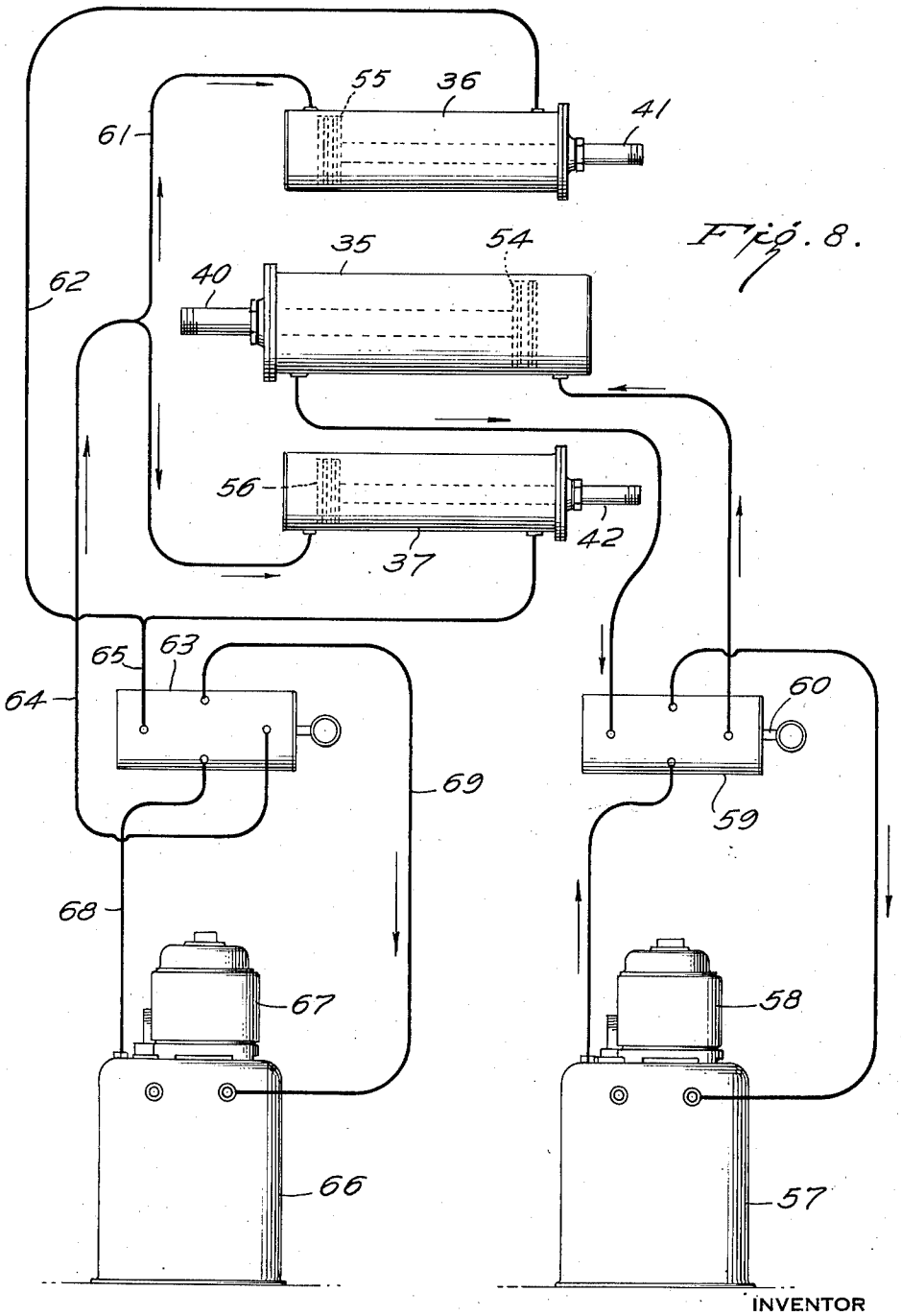


Fig. 8.

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METHOD AND APPARATUS FOR OPENING SHEET METAL CONTAINERS

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3 Claims. (Cl. 214—1.1)

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This invention relates to a method and apparatus for opening sheet metal containers such as ordinary sheet metal drums of rolled or pressed seam construction when these containers are filled with frangible solid material such as a hardened rosin, caustic soda and the like.

In packaging and shipping such commodities as wood or gum rosin, synthetic resins, caustic soda and the like, it is now the practice to charge the material to be packaged into a sheet metal container while it is in liquid form, the material becoming hardened or set after the container has been filled. It is a principal object of the present invention to provide an improved method and apparatus for opening such sheet metal drums, a particular advantage being that the sheet metal of the side wall is not damaged by the opening procedure, and can be recovered intact. A further advantage of the method and apparatus of the invention is the fact that the solid contents of drums of the foregoing type are broken into pieces and can be removed rapidly and completely, even in cases where the hardened material has stuck to the interior walls of the drum.

The method of my invention consists essentially in the steps of thrusting a pair of oppositely disposed plungers of suitable size through the end pieces of the sheet metal drum and thereby causing a sufficient lateral displacement of its solid contents to burst the longitudinal seam of the drum, while simultaneously or subsequently cutting radially through the end pieces and end seams of the drum so that the drum can be spread open along its side and the contents discharged through the opened side wall. With the drum spread open in this position any rosin or other solidified material adhering to its inner walls can readily be dislodged and discharged by tapping the outer walls with a hammer. After the open drum has been removed from the drum splitting machine the end pieces can be easily separated and the side wall recovered as a single sheet of metal, which sheet can be spread out flat and used for siding or roofing of buildings or for other purposes.

To the accomplishment of the foregoing and other objects which will appear from the following description, the invention consists in the process steps and in the combination and arrangement of parts hereinafter more particularly

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described with reference to the accompanying drawings.

Referring to the drawings:

Fig. 1 is a plan view of a drum splitting press embodying the invention.

Fig. 2 is a section on the line 2—2 of Fig. 1, in the direction of the arrows.

Fig. 3 illustrates a drum having a rolled side seam and rolled end seams, as dealt with by the invention.

Figs. 4 and 5 are sections on the lines 4—4 and 5—5 respectively of Fig. 3, showing the seams of the drum.

Fig. 6 is a detail showing the extreme inner positions of the plungers and knives, and

Fig. 7 is a similar detail taken on the line 7—7 of Fig. 6.

Fig. 8 is a diagrammatic illustration showing the connections of the oil lines and valves in the hydraulic pressure unit.

Referring to Figs. 1 and 2 of the drawings the drum splitting press indicated generally by reference numeral 1 is supported on a base made up of pairs of channel beams 2 and 3 connected by transverse beams that are not shown. At one end of this base an angular drum-holding frame 4 is bolted while a platform 5 having elevated sides 6 and 7 and carrying a power transmission system 8 is attached to the other end. A lower rod 9 is so supported in a sleeve 10 in the front wall of the platform 5 and in a sleeve 11 in the frame 4 that it can be moved longitudinally in these sleeves. An upper rod 12 is similarly supported in a sleeve 13 welded in the side walls 6 and 7 and in a sleeve 14 in the frame 4. Oppositely disposed plungers 15 and 16 are attached respectively to supports 17 and 18 which are carried by the rods 9 and 12.

As is shown in Fig. 2 the drum-holding frame 4 is made up of a floor 19 and a back 20 with bracing ribs 21 and 22 and sides 23 and 24 containing openings 25 for the plungers 15 and 16. The sleeves 11 and 14 are welded into these sides and ribs. The floor 19 has an opening 26 in which a chute 27 may be located. Rollers 29 are mounted in this opening on the ends of shafts 30 which are journalled in the horizontal portions of the ribs 21 and 22 and in the side walls 23 and 24. These rollers are so spaced that a drum, indicated at 31 by dotted lines, may be

supported thereon with its horizontal axis aligned with the centers of the plungers 15 and 16.

The power transmission system 8 consists of a central hydraulic cylinder 35 and a pair of outer hydraulic cylinders 36 and 37 all of which are bolted to floor plates 38 and 39. The central cylinder 35 actuates the plunger 15 by the lateral movement of its shaft 40, the height of the platform 5 being such that the cylinder and plunger are in alignment. The outer cylinders 36 and 37 actuate shafts 41 and 42, these being fastened by connecting arms 43 and 44 to a truss 45 containing collars 46 and 47 which are pinned to the ends of the rods 9 and 12 respectively.

The outer plunger support 18 is similar in its construction to the truss 45, being made up of a pair of plates 48 and 49 connected by collars 50 and 51 that surround and are pinned to the ends of rods 9 and 12. The inner plunger support 17, on the other hand, is slidably mounted on the rods 9 and 12 by means of bearings 52 and 53. Movement of the shafts 41 and 42 therefore causes a corresponding lateral movement of the rods 9 and 12, the plunger support 18 and the plunger 16, while the plunger 15 and its support 17 are moved in the opposite direction by the shaft 40 working in cylinder 35.

As is shown diagrammatically in Fig. 8, the cylinders 35, 36 and 37 contain pistons 54, 55 and 56 which move by the pressure of oil in the oil lines illustrated diagrammatically by the flow lines on the drawings. The oil supply for the central cylinder 35 is held in a reservoir 57 containing an oil pump (not shown) driven by a motor 58. The direction of flow of the oil to and from the cylinder 35 is controlled by a four-way valve 59, which is preferably a piston valve controlled by a rod 60. The outer cylinders 36 and 37 are connected in parallel by oil lines 61 and 62, which lines are in turn connected to a piston valve 63 by lines 64 and 65. An oil reservoir 66 containing an oil pump driven by the motor 67 is connected by oil lines 68 and 69 to the valve 63. It will thus be seen that the outer cylinders 36 and 37 work together to impart a uniform lateral movement to their rods 41 and 42, while rod 40 can be moved simultaneously in the opposite direction by the cylinder 35. By this means, the plungers 15 and 16 are caused to move into or out of engagement with the drum 31 when the valves 59 and 63 are operated.

The plungers 15 and 16 are constructed with rounded ends 70 and 71 to penetrate the sheet metal ends of the drums and break up the solid contents thereof and with cylindrical body portions 72 and 73 carrying pairs of knives 74 and 75. As is shown in Fig. 6, the upper knife 76 of each pair is relatively short and terminates below the sheet metal side wall of the drum 31. The lower knives 77, on the other hand, extend below the bottom of the side wall of the drum so that their lateral movement will cut through the end seams thereof. By this arrangement the knives 74 and 75 are caused to make radial cuts through the end walls of the drum 31, these cuts including the end seams but leaving the upper side wall of the drum intact.

The advantages of the method of my invention will become apparent from a consideration of Figs. 3–7 of the drawings and the foregoing description. In Fig. 3 a conventional sheet metal drum is shown. This type of drum is constructed with a rolled or crimped side seam 78, as shown in Fig. 4, and with similar rolled or crimped end seams 79 that are shown in Fig. 5 of the drawings.

In opening such a drum by the process of my invention the drum is placed on the rollers 23 and rotated until its horizontal seam 78 is at the bottom of the drum. The plungers 15 and 16 are then pressed into the end walls of the drum. The resulting lateral displacement of the frangible solid material contained in the drum causes the seam 78 to burst open. Simultaneously or immediately thereafter the knives 74 and 75 cut through the end walls of the drum, the lower knives 77 severing the end seams 79 at the points where these end seams were originally joined by the side seam 78. Inasmuch as this side seam has been opened, the knives 77 do not damage the sheet metal composing the side wall of the drum. The condition of the drum after this operation has been completed is shown in Fig. 7 of the drawings.

With the drum as shown in Fig. 7, the two ends can easily be detached from the body portion thereof, if desired, and the originally cylindrical body portion can then be spread out to form a flat sheet metal plate. A number of such plates can easily be stacked and stored or shipped in a minimum of space and find a ready market as sidings for barns or sheds, as roofing material, and for other similar purposes.

Although the invention has been described with reference to the opening of sheet metal drums of rolled end construction, it will be understood that its principles are not limited thereto. On the contrary, the process of my invention may be applied to any drum having a side seam that can be opened by lateral internal pressure, regardless of the construction of the end seams thereof. The particular advantage obtained with a drum having a rolled end seam construction is the fact that the end pieces can be most readily removed in the manner described above; however, it will be evident that drums having sealed or soldered end seam constructions can be similarly treated.

What I claim is:

1. A method of opening a sheet metal container filled with frangible solid material and having end pieces and a side wall containing a longitudinal seam which comprises supporting said container with said longitudinal seam positioned horizontally beneath, thrusting a pair of oppositely disposed plungers into said container through said end pieces and thereby causing a sufficient lateral displacement of its solid contents to burst said longitudinal seam, cutting said end pieces radially from the points where they are joined by the side seam, and thereby spreading the container to permit its contents to discharge through said burst longitudinal seam.

2. A machine for opening a sheet metal drum containing frangible solid material which comprises in combination means for supporting said drum on its side and for rotating said thus supported drum about its longitudinal axis a pair of oppositely disposed plungers adapted to penetrate the ends of said drum and cause a lateral displacement of the solid material contained therein, knives on said plungers adapted to cut the ends of said drum, and means for moving said plungers laterally into and out of engagement with said drum.

3. A machine for opening a sheet metal drum containing frangible solid material comprising in combination a drum-holding frame, rollers in said frame for rotatably supporting said drum on its side, a pair of rods slidably mounted adjacent said rollers and movable parallel to the axis of a drum supported thereon, a plunger support

attached to said rods at one side of said frame and carrying a plunger adapted to engage one end of a drum on said rollers, a second plunger support slidably mounted on said rods on the opposite side of said frame and carrying a second plunger adapted to engage the opposite end of said drum, knives on said plungers adapted to cut the ends of said drum, means for moving said rods and thereby bringing said first plunger into and out of engagement with said drum, and means for sliding said second plunger support on said rods and thereby bringing said second plunger into and out of engagement with said drum.

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