June 28, 1927. 1,634,196

L. JONES

SHEET PILER

Filed Jan. 17, 1927

Fig. 3.

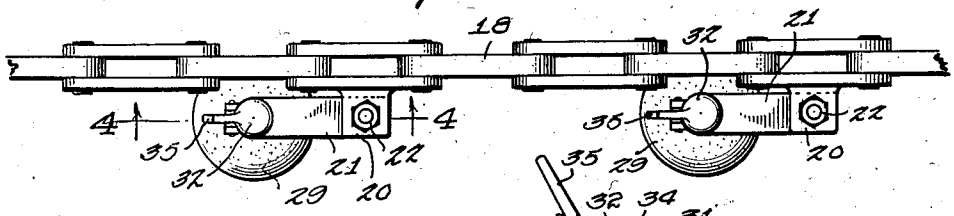


Fig. 4.

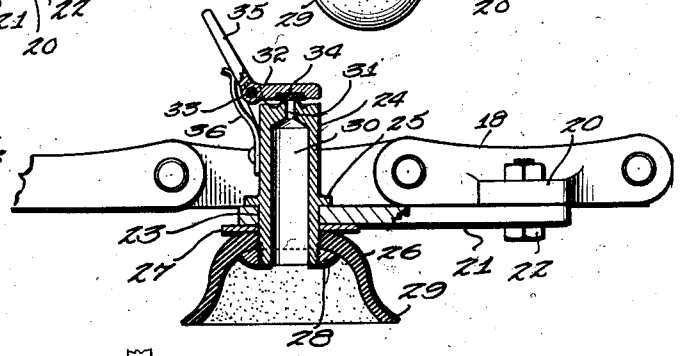


Fig. 1.

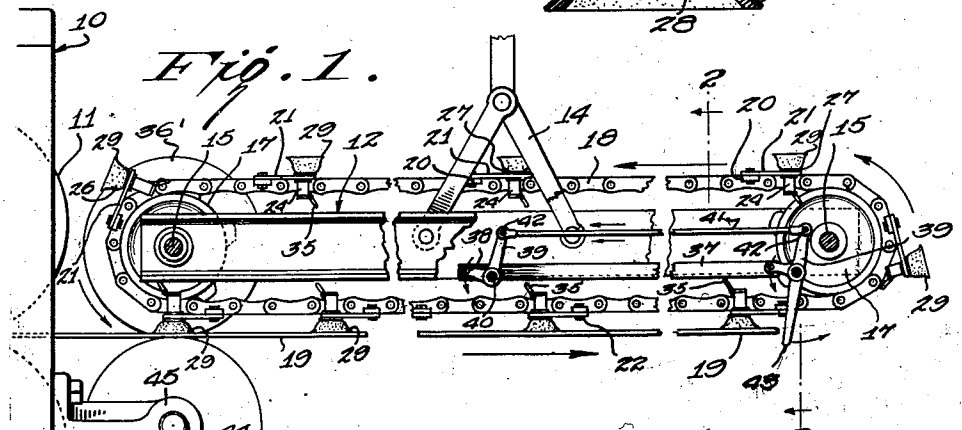
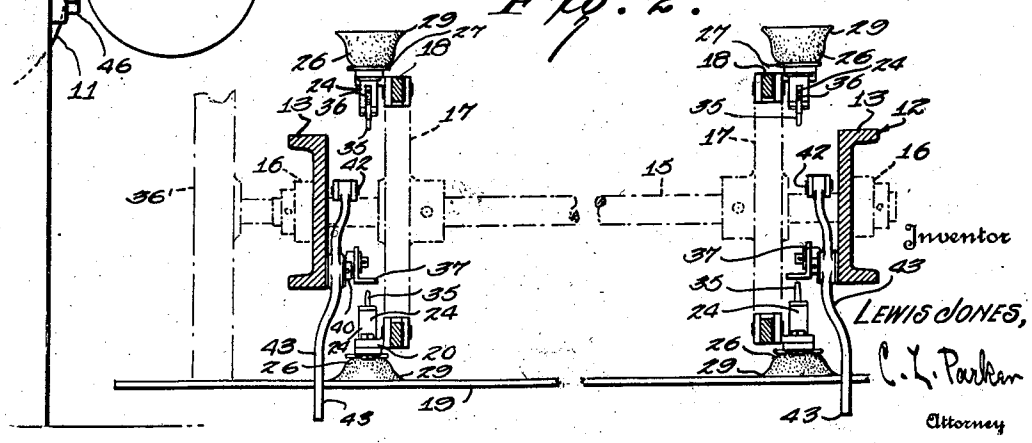


Fig. 2.



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UNITED STATES PATENT OFFICE.

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SHEET PILER.

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This invention relates to sheet pilers, and more particularly to an apparatus adapted to pile successive sheets of metal and the like after they are discharged from leveling devices, and other machines employed in the sheet metal industry.

As is well known, it is impossible to permit successive sheets from a leveling machine or the like to fall freely to the floor inasmuch as they fall endwise and considerable damage is done to the sheets. The piling of the sheets therefore is ordinarily accomplished manually.

It is an important object of the present invention to provide automatic means adapted to be placed at the outlet side of a leveling device or similar machine to engage the sheets and support them until they have been completely discharged from the machine, and then to drop them by gravity whereby they will fall to the floor in a substantially horizontal position without causing damage to be done to the sheets.

A further object is to provide an apparatus of the character referred to having means adapted to engage successive portions of a sheet as it is discharged from a leveling machine or the like and to travel with the sheet, and to support it until it is completely discharged from the machine, whereupon the sheet engaging means is adapted to release the sheet to permit it to drop to the floor in the manner referred to.

A further object is to provide an apparatus of the above mentioned character wherein movement is imparted to the sheet engaging means wholly by movement of the sheet from the leveling device or other machine without employing an independent power source for moving the sheet engaging members.

A further object is to provide means for automatically releasing successive sheets from the engaging means as the sheets reach a predetermined position.

A further object is to provide pairs of spaced sprockets having endless chains passing thereabout and provided with sheet engaging members adapted to engage successive sheets as they are discharged from a leveling machine or the like, the lower run of the chain being arranged in a horizontal plane at such an elevation that the sheet engaging members carried by the chain are adapted to engage the sheet and hold it in its plane of movement as it moves from the leveling machine until it is completely discharged therefrom, whereupon the sheet is released to fall to the floor in the manner previously referred to.

A further object is to provide an apparatus of the character just referred to wherein the sheet engaging members are in the form of rubber or similar vacuum cups which are adapted to be pressed against the upper surface of each successive sheet moving from the leveling device or other machine, and to admit atmospheric pressure into the vacuum cups after each successive sheet is completely discharged from the leveling machine.

A further object is to provide a machine of the character mentioned provided with a supporting roller adapted to engage the lower face of each successive sheet to support it at the point where the vacuum cups initially engage the upper faces of the sheets whereby sufficient pressure may be brought to bear upon the vacuum cups to exhaust air therefrom.

Other objects and advantages of the invention will become apparent during the course of the following description.

In the drawings I have shown one embodiment of the invention. In this showing:

Figure 1 is a side elevation of the apparatus showing it in position adjacent a leveling device,

Figure 2 is a section on line 2—2 of Figure 1,

Figure 3 is a fragmentary plan view of one of the chains and associated elements, and,

Figure 4 is a detail section on line 4—4 of Figure 3.

Referring to the drawings the numeral 10 designates an ordinary leveling machine commonly employed in sheet metal mills for smoothing out sheets of metal after they have been separated from the pack. The leveling machine includes a plurality of leveling rolls 11 of the usual construction.

Referring to Figure 1, the numeral 12 designates a supporting frame as a whole preferably including a pair of parallel channel irons 13. The supporting frame is adapted to be suspended from any suitable overhead means by a suspension member 14, although it will be apparent that the device may be constructed as a permanent accessory for use in connection with any suitable machine.

Shafts 15 extend through the ends of the supporting frame and are journalled in suitable bearings 16 carried thereby. Each of these shafts is provided with a pair of spaced sprockets 17 as clearly shown in Figures 1 and 2.

Sprocket chains 18 pass around the sprockets, and these chains are provided with means adapted to engage successive metal sheets 19 as the latter are discharged from the leveling machine. As shown, each of the chains is provided at spaced intervals with a link having a laterally extending bracket 20 to which is connected a longitudinally extending arm 21, these elements being secured together in any suitable manner as by bolts 22. Referring to Figure 4, it will be noted that each arm 21 is provided in its end portion with an opening 23 in which is arranged a sleeve 24. This sleeve is provided with an annular flange 25 engaging one side of the arm 21. A vacuum cup 26 is arranged at the opposite side of each arm and is spaced therefrom by a washer 27. The sleeve 24 extends through the vacuum cup and is threaded at its end to receive a nut 28 whereby the vacuum cup may be secured to the arm and sleeve. The nut also is adapted to clamp the adjacent portions of the vacuum cup against the washer 27 to form a leak-proof joint between the sleeve and cup. Each vacuum cup is flared outwardly adjacent its edge as at 29 to permit it more readily to seat against the metal sheets in a manner to be described.

Each sleeve 24 is provided with a relatively large bore 30 which communicates with the associated vacuum cup, while the opposite end of the bore communicates with a restricted opening 31, the outer end of which is formed as a valve seat. A valve 32 is arranged adjacent the end of the sleeve 24 and is pivoted thereto as at 33. A valve washer or the like 34 is carried by the valve and is adapted to engage the seat formed at the end of the passage 31. Each of the valves 32 is provided with an angularly projecting operating member 35 preferably formed integral therewith, and a spring 36 is adapted to maintain the valve in closed position by engaging the operating member 35. Wheels 36′ are mounted on the ends of the inner shaft 15 and are adapted to engage the sheets as they are discharged from the leveling machine, to effect rotation of the shaft 15 and to drive the chains 18.

Referring to Figures 1 and 2, the numeral 37 designates a pair of operating bars arranged adjacent each of the frame members 13. The operating bars are preferably formed of angle iron and are pivotally connected as at 38 with bell crank levers 39. These levers are pivotally connected to the frame members as indicated at 40, and the opposite ends of each pair of bell crank levers are connected by tie rods 41 pivotally connected thereto as at 42. The bell crank levers adjacent the outer end of the apparatus are provided with depending trip arms 43 which are arranged in the path of travel of the sheets 19 and are adapted to be engaged by the forward edges thereof, in a manner to be described.

A supporting roller 44 is mounted adjacent the leveling apparatus and is journalled in bearings 45 bolted to the leveling apparatus as at 46. It will be noted that the axis of the roller 44 is mounted in vertical alinement with the axis of the inner shaft 15.

The operation of the apparatus is as follows:

As the successive sheets 19 are discharged from the leveling machine or other apparatus in connection with which the present device is employed, the sheets pass between the roller 44 and wheels 36′. It will be apparent that as each successive bracket 20 reaches a point directly beneath the axis of the inner shaft 15, the associated arm 21 will assume a perfectly horizontal position whereby the vacuum cup connected therewith will seat flatly against the upper face of the sheet 19 passing therebeneath. The member 14 is preferably pivotally connected to the element from which it is suspended, and is arranged centrally of the apparatus. The inner end of the apparatus is slightly heavier than the outer end whereby it tends to swing downwardly and is supported upon the roller 44 by means of the wheels 36′. The outer extremities of the vacuum cups preferably extend slightly beyond the periphery of the wheel 36′ whereby sufficient pressure will be exerted upon the vacuum cups to exhaust air therefrom as they pass over the top of the roller 44. This exhausting of the air takes place at a time when the valve of the associated cup is closed and accordingly the vacuum cup acts as supporting means for the sheets. The sheet thus continues to move in a perfectly horizontal position, being supported by a plurality of the vacuum cups carried by both chains 18. It will be understood that the leveling rollers 11 are driven in the usual manner thus positively moving the successive sheets from the leveling machine, and this movement is utilized as the source of power which causes the chains 18 to travel and the successive vacuum cups to engage the sheets. As previously stated, the wheels 36′ normally rest upon the roller 44, and the inner end of the apparatus is elevated slightly as each successive sheet is fed outwardly from the leveling machine, between the roller 44 and wheels 36′. The weight of the inner end of the apparatus is sufficient to cause firm engagement between the wheels 36′ and the sheets 19, whereby movement of the latter is adapted to impart rotation to the wheels

36' and thus drive the inner shaft 15 and the chains. This movement continues as successive sheets are fed from the machine, and as each sheet reaches a point adjacent the outer limit of its movement, the forward edge thereof contacts with the trip arms 43 thus swinging the associated bell crank levers, and this movement is transmitted to the other bell crank levers through the rods 41. This movement of the bell crank levers causes the operating bars 37 to be moved downwardly whereby they contact with the operating members 35 of the valves to swing the latter to open position. This action admits atmospheric air into the interiors of the sleeves 30 and vacuum cups 26, thus releasing the sheets whereupon they drop in a pile on the floor beneath the apparatus. The successive sheets obviously are released in the same manner by swinging the trip lever to release air from the vacuum cups. As soon as the operating members 35 are released from the bars 37, the valves which control the cups immediately swing to closed position by the action of the springs 36, whereupon the cups are ready again to engage the upper faces of the sheets passing from the leveling machine. It will be apparent that movement of the lower run of the chain corresponds in speed to that of the successively discharged sheets whereby any frictional action between the sheets and the vacuum cups is eliminated and accordingly it will be apparent that the vacuum cups are not subjected to excessive wear. As these devices become worn after having been used over a long period of time they readily may be replaced by removing the nut 28. The lower ends of the vacuum cups are preferably flared outwardly as at 29 to permit them more readily to be moved into engagement with the sheets and to exhaust the air therefrom. The exhausting of the air is facilitated by the opening of the valves 32 when pressure is brought to bear on the vacuum cups.

While the apparatus has been described particularly in connection with leveling devices, it will be apparent that it may be utilized in connection with any other machine used in the sheet metal art which employs power means for discharging the sheets therefrom, whereby movement of the sheets themselves may be utilized for operating the sheet piler.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. The combination with a sheet working machine having power driven means for discharging sheets therefrom, of freely movable means adapted to engage and support the sheets and to be actuated solely by movement thereof as they are discharged from the sheet working machine.

2. The combination with a sheet working machine having power driven means for discharging sheets therefrom, of freely movable means adapted to engage successive sheets and to be actuated by movement thereof as they are discharged from the sheet working machine, and means for releasing the sheets from said movable means after they have been completely discharged from the sheet working machine.

3. The combination with a sheet working machine having power driven means for discharging sheets therefrom, of an endless chain adapted to derive its movement solely from sheets being discharged from the sheet working machine, and means carried by said chain for engaging and supporting the sheets as they are discharged from the sheet working machine.

4. The combination with a sheet working machine having power driven means for discharging sheets therefrom, of an endless chain adapted to derive its movement from sheets being discharged from the sheet working machine, means carried by said chain for engaging and supporting the sheets as they are discharged from the sheet working machine, and means for releasing the sheets from said last named means as they are completely discharged from the sheet working machine.

5. The combination with a sheet working machine having power driven means for discharging sheets therefrom, of an endless chain adapted to derive its movement solely from sheets being discharged from the sheet working machine, and a plurality of spaced members carried by said chain and adapted to be successively brought into engagement with the sheets to support them as they are discharged from the sheet working machine.

6. The combination with a sheet working machine having power driven means for discharging sheets therefrom, of an endless chain adapted to derive its movement from sheets being discharge from the sheet working machine, a plurality of spaced members carried by said chain and adapted to be successively brought into engagement with the sheets to support them as they are discharged from the sheet working machine, and means for simultaneously releasing all of said members in engagement with one of the sheets after the latter has been completely discharged from the sheet working machine.

7. Apparatus constructed in accordance with claim 6 wherein said releasing means

comprises automatic means actuated by successive sheets as they reach a point completely removed from the sheet working machine.

8. Apparatus constructed in accordance with claim 6 wherein said releasing means comprises a trip lever arranged in the path of travel of the sheets, and connections between said trip lever and said sheet engaging members.

9. The combination with a sheet working machine having power driven means for discharging sheets therefrom, of an endless chain adapted to derive its movement solely from sheets being discharged from the machine, and a plurality of vacuum cups carried at spaced intervals by said chain and adapted to be successively brought into engagement with sheets discharged from the sheet working machine to act as supporting means for the sheets.

10. The combination with a sheet working machine having power driven means for discharging sheets therefrom, of an endless chain adapted to derive its movement from sheets being discharged from the machine, a plurality of vacuum cups carried at spaced intervals by said chain and adapted to be successively brought into engagement with sheets being discharged from the sheet working machine to act as supporting means for the sheets, valves associated with said vacuum cups, and means for simultaneously opening all of the vacuum cups in engagement with one of said sheets as the latter reaches a position wholly discharged from the sheet working machine.

11. The combination with a sheet working machine having power driven means for discharging sheets therefrom, of an endless chain adapted to derive its movement from sheets being discharged from the machine, a plurality of vacuum cups carried at spaced intervals by said chain and adapted to be successively brought into engagement with sheets being discharged from the sheet working machine to act as supporting means for the sheets, valves associated with said vacuum cups, handles carried by said valves, and means for simultaneously operating the handles of the valve associated with all the vacuum cups in engagement with one of said sheets as the latter reaches a position wholly discharged from the sheet working machine.

12. Apparatus constructed in accordance with claim 11 wherein said valve handle operating means comprises an actuating member, and means connected to said actuating member and arranged in the path of travel of the sheets to be operated thereby.

13. The combination with a sheet working machine having power driven means for discharging sheets therefrom, of a pair of parallel endless chains adapted to derive their movement from sheets being discharged from the machine, a plurality of vacuum cups carried at spaced intervals by said chains and adapted to be brought into engagement with sheets being discharged from the sheet working machine to act as supporting means for the sheets, valves associated with said vacuum cups, handles carried by said valves and arranged at an acute angle to the path of travel of the sheets, an actuating bar arranged over the path of travel of the valves carried by each of said chains, and means controlled by the movement of the sheets for depressing said bars to open certain of the valves as successive sheets reach a predetermined position wholly discharged from the sheet working machine.

14. The combination with a sheet working machine having power driven means for discharging sheets therefrom, of an endless chain, a pair of sprockets about which said chain passes, shafts connected to said sprockets, one of said shafts being arranged adjacent the sheet working machine, a wheel carried by said last mentioned shaft and adapted to contact with the sheets as they are being discharged from the machine to be rotated thereby, a plurality of spaced members carried by said chain and adapted to be successively brought into engagement with the sheets to support them as they are discharged from the sheet working machine, and means for simultaneously releasing certain of said members from successive sheets.

15. The combination set forth in claim 14 wherein a roller is arranged beneath the plane of movement of the sheets and substantially in vertical alinement with the axis of said wheel.

16. Apparatus of the character described comprising a pair of sprockets, an endless chain passing around said sprockets, a plurality of spaced members carried by said chain and adapted to be successively brought into engagement with sheets being discharged from a sheet working machine, and means for simultaneously releasing certain of said members as successive sheets reach a point wholly discharged from the sheet working machine.

17. Apparatus of the character described comprising a supporting frame, a pair of shafts journalled in said frame, a pair of sprockets carried by each of said shafts, endless chains passing around said sprockets, the lower runs of said chains being arranged above and parallel to the plane of movement of sheets being discharged from a sheet working machine, a plurality of vacuum cups carried at spaced intervals by said chains and adapted to successively engage the upper faces of sheets being discharged from the machine, and automatic means controlled by the movement of the sheets for simultaneously releasing said vacuum cups from successive sheets.

18. Apparatus constructed in accordance with claim 17 wherein said chains are provided with fixed arms carried by certain of the links of the chain and extending longitudinally with respect thereto, said vacuum cups being carried by said arms.

19. Apparatus constructed in accordance with claim 17 provided with a wheel carried by one of said shafts and adapted to contact with successive sheets being discharged from the machine to be rotated by the sheets.

20. A conveyor for sheet material comprising a pair of parallel shafts, a sprocket carried by each of said shafts, an endless chain passing around said sprockets, the lower run of said chain being arranged horizontally and parallel to the plane of sheets moved theretoward, a plurality of spaced arms secured at one end to said chain and extending opposite to the direction of movement of the chain, a vacuum cup carried by the opposite end of each of said arms, each of said vacuum cups being adapted to be brought into engagement with the upper face of the sheet as the vacuum cup reaches the lower run of the chain, and a supporting roller arranged beneath one of said sprockets and adapted to support the sheet substantially at the point at which each successive vacuum cup is brought into engagement with the sheet.

In testimony whereof I affix my signature.

LEWIS JONES.