Nov. 22, 1949 W. W. BEAUMONT ET AL 2,489,004

SHEET PILER

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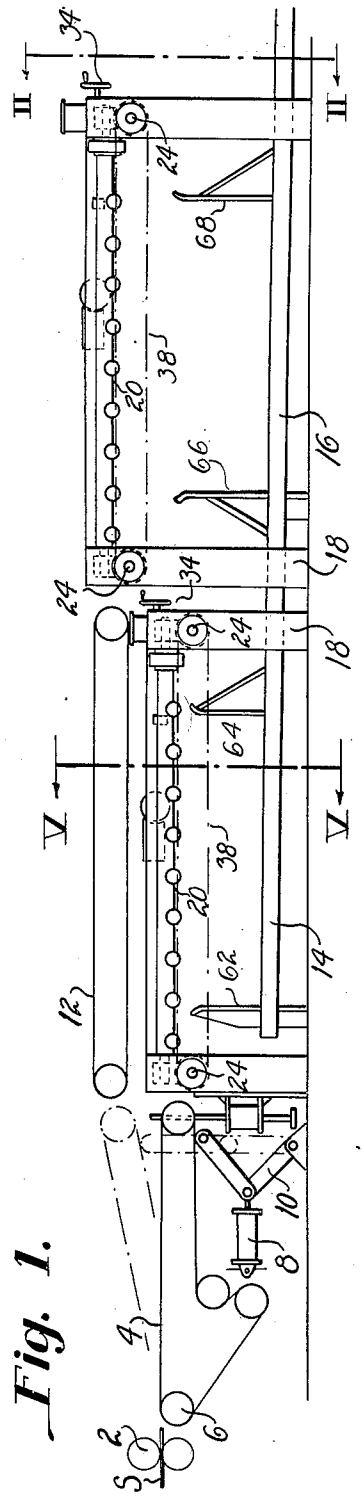

Fig. 1.

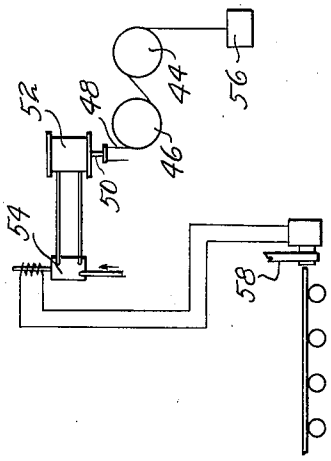

Fig. 3.

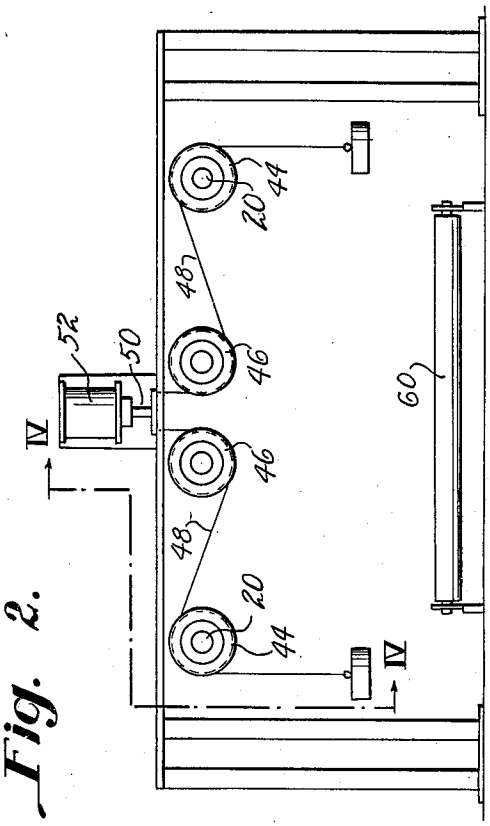

Fig. 2.

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Fig. 4.

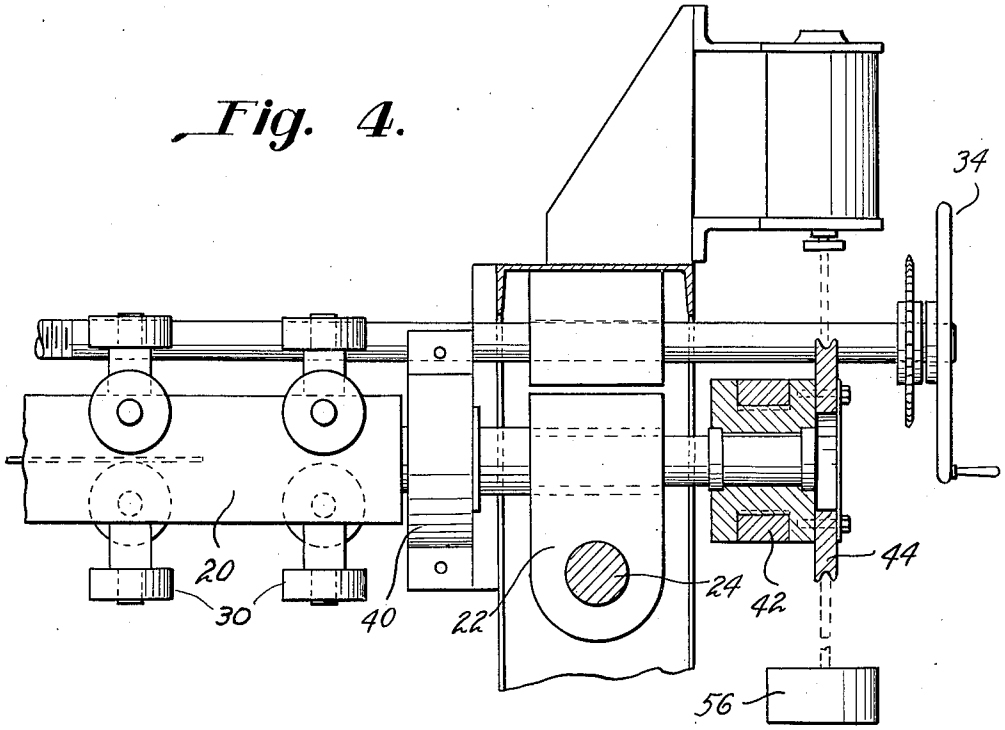
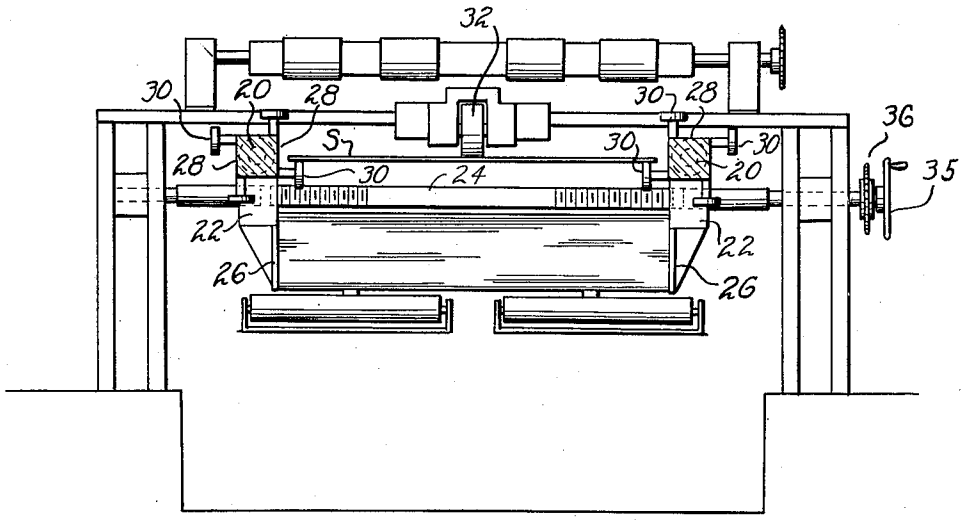


Fig. 5.



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SHEET PILER

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Application September 30, 1947, Serial No. 777,096

3 Claims. (Cl. 214—6)

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This invention relates to a sheet piler and more particularly to such a piler for assorting and piling rectangular shaped flat metallic sheets in stacked relationship after processing in a rolling mill, shearing line or the like.

The conventional manner of piling sheets consists of passing the sheets through a pair of exit pinch rolls which are elevated some distance above the piler level, and projecting the sheets onto a piling conveyor where they are stacked one above the other on two or more skids which facilitate handling. The piler consists of a section of gravity roller conveyor which is provided with an adjustable steel plate side guide of suitable height and a retractable end stop which may be adjusted to accommodate various lengths of sheets. The opposite end of the piler is made from a fixed flat steel plate which is generally attached to or forms a part of the pinch roll assembly. The fourth side of the rectangular shaped container thus formed is entirely open to provide access to the pile and to permit aligning the side of the pack vertically by manually or mechanically tamping the side edge of each sheet as it slides into position and forcing the sheet sideways until it contacts the side guide along its entire edge. At present no effort is made to mechanically separate the reject sheets from the prime sheets as they are piled, this assorting operation being performed manually in subsequent processes.

Operation of the conventional sheet piler requires each sheet to slide over the top surface of the preceding sheet with its forward motion being halted by the end stop. This method has numerous disadvantages which include scratching of the top surfaces of individual sheets as a result of shear burr on the forward edges, damage caused by impact with the end stop, and cobbling when the sheet being piled is not of sufficient stiffness to overcome the sliding friction involved.

An object of the present invention is to provide a sheet piler which will mechanically segregate reject and prime sheets into separate piles.

Another object is to provide a piler which will eliminate scratches on the sheet surface and reduce damage to the sheet ends.

Still another object is to provide a piler which will prevent cobbling of the sheets due to sliding friction.

These and other objects will be more apparent after referring to the following specification and attached drawings in which:

Figure 1 is a side elevation of the piler;

Figure 2 is an end elevation on line II—II of Figure 1;

Figure 3 is a schematic diagram of the rotating mechanism;

Figure 4 is a sectional view taken on line IV—IV of Figure 2; and

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Figure 5 is a sectional view taken on line V—V of Figure 1.

Referring more particularly to the drawings the reference numeral 2 indicates a pair of exit pinch rolls located at the delivery side of a rolling mill, shearing line or other processing equipment. The sheets S to be piled are delivered by the pinch rolls 2 to a belt conveyor 4, which is raised and lowered about a roll 6 by means of a manually controlled air cylinder 8 and linkage 10 so that the sheets emerging from the pinch rolls 2 may be directed on to the prime material belt conveyor 12 or directly into a reject piler 14. The prime piler 16 is located beyond the reject piler 14 and is substantially identical therewith, except that the top of the prime piler is at a higher elevation than the top of the reject piler. Because of the similarity of the two pilers the same reference numerals will be used to describe the various parts of the pilers, it being understood that the operation of the two pilers is identical.

Each piler comprises a supporting framework 18 in which two longitudinal carrier shafts 20 are journalled in anti-friction bearings in the guide assemblies 22 which in turn are mounted on transverse threaded shafts 24. The lower portion of each guide assembly 22 is provided with a vertical steel plate 26 which acts as a side guide for vertically aligning the sheets being piled. The shafts 20, except at their extremities, are multi-sided. As shown, each shaft has four sides 28. Supported on each side 28 are a plurality of longitudinally spaced rotatable discs or rollers 30 which are provided with anti-friction bearings. A sheet S being fed to the piler is supported on those rollers which are supported on the sides 28 facing each other as clearly shown in Figure 5. A magnetic roll 32 which is rotated by an electric motor, not shown, is provided between the shafts 20 to aid the forward movement of the sheets being piled and also to prevent wide sheets from bowing in the middle. The roll 32 is adjustable longitudinally of the piler by means of a screw and handwheel mechanism 34. The shafts 20 and associated mechanism are movable to and from each other to provide for piling of sheets of various widths. This is done by means of a handwheel 35 attached to one end of one of the shafts 24. Since it is ordinarily desirable to have the center line of the piler constant regardless of the width of the sheet, a sprocket 36 is mounted on each shaft 24 and the sprockets are connected by means of a chain 38. When the wheel 35 is turned, the guide assemblies 22 are moved equal amounts toward and away from each other by means of their threaded connection with the shafts 24. A friction brake 40 is provided for each shaft 20 to provide a constant drag thereon so that overtravel of the shaft will be prevented when the shaft is moved

in the manner hereinafter described. Mounted on the end of each shaft **20** is a conventional indexing clutch mechanism **42** which permits rotation of the shaft in one direction. A pulley **44** is bolted to the clutch **42**. Adjacent the pulley **44** is a second pulley **46**. A chain **48** passes around the pulleys **44** and **46** and has one end thereof connected to the piston rod **50** of a hydraulic motor **52** which is operated by means of a solenoid operated 4-way valve **54**. The free end of the chain **48** is provided with a counterweight **56** to hold it in engagement with the pulleys. Operation of the valve **54** is controlled by means of a switch **58** which is located adjacent the rollers **30**. The sheets being piled are stacked on skids placed on a gravity roller conveyor **60**. The reject piler is provided with a permanent back stop **62** and a collapsible front end stop **64**. The back and front stops **66** and **68** on the prime piler are both collapsible. The operation of the device is as follows:

The sheets to be piled pass through the pinch rolls and are directed into the reject or prime piler as determined by a visual inspection prior to entering the pinch rolls. If the sheet is prime, the conveyor **4** is raised to the broken line position shown in Figure 1 and the sheet passes over conveyor **12** to the prime piler **16**. If the sheet is a reject, the operator moves the conveyor **4** to the full line position shown in Figure 1 so that the sheet passes to the reject piler **14**. Sufficient momentum to the sheets is provided by either the conveyor **4** or **12** to cause each sheet to move completely into the piler over the rollers **30**, this position of the sheet being shown in Figure 5. It will be noted that when the rollers **30** so receive the sheet, the axes of the rollers are in horizontal position. The sheet S travels along the rollers **30** until it contacts a stop switch **58**. The impact of the sheet against the switch causes the contacts of the switch to close, thus completing the electrical circuit to the solenoid operated valve **54**. This causes the valve to open and admit compressed air to the bottom of the cylinder of hydraulic motor **52**. The resultant upward movement of the piston rod **50** causes rotation of the pulleys **44** and **46**. The upward stroke of the motor **52** is designed to turn the shaft **20** through an angle of 90°, thus dropping the sheet supported on the rollers **30** vertically downward onto the pile of sheets. The friction brake **40** prevents the carrier shaft **20** from overtravelling beyond 90°. At the same time the succeeding row of rollers **30** comes into position to receive the following sheet. When the sheet drops from the supporting rollers onto the pile, the contacts of switch **58** are broken, thus de-energizing valve **54** and causing compressed air to enter the top side of the cylinder of motor **52** to return the piston to its original position. This causes the pulleys **44** and **46** to rotate to their original position, but shafts **20** do not move because of the indexing clutch mechanism **42**. As is conventional, the pilers may be provided with an air or hydraulically operated elevating clutch mechanism to raise and lower the rollers **60** so as to limit the distance of free fall of individual sheets as they are discharged from the carrier rollers **30**.

While one embodiment of our invention has been shown and described, it will be apparent that other adaptations and modifications may be made without departing from the scope of the following claims.

We claim:

1. A sheet piler comprising a pair of spaced apart substantially parallel shafts having four-sided portions thereon, a plurality of rollers supported on each side of each shaft and spaced apart longitudinally thereon, the sheets being fed to said piler being supported on the rollers on the sides of said shafts which face each other, means for moving said shafts to and from each other, a friction brake bearing on each of said shafts, an indexing clutch supported on each of said shafts, a pulley mounted on each shaft adjacent said clutch, a second pulley adjacent the first-named pulley, a fluid motor adjacent the second pulley, a chain fastened to the piston rod of the fluid motor and passing around the first and second pulleys, a counterweight at the free end of said chain, a solenoid valve for operating said motor, and a switch adjacent said rollers adapted to be contacted by the sheet when it has reached a predetermined position to operate said valve to rotate said shafts and drop said sheet.

2. A sheet piler comprising a pair of spaced apart substantially parallel shafts having four-sided portions thereon, a plurality of rollers supported on each side of each shaft and spaced apart longitudinally thereon, the sheets being fed to said piler being supported on the rollers on the sides of said shafts which face each other, means for moving said shafts to and from each other, a magnetic roll located between said shafts for contacting the top of said sheets as they are fed to said piler, a friction brake bearing on each of said shafts, an indexing clutch supported on each of said shafts, a pulley mounted on each shaft adjacent said clutch, a second pulley adjacent the first-named pulley, a fluid motor adjacent the second pulley, a chain fastened to the piston rod of the fluid motor and passing around the first and second pulleys, a counterweight at the free end of said chain, a solenoid valve for operating said motor, and a switch adjacent said rollers adapted to be contacted by the sheet when it has reached a predetermined position to operate said valve to rotate said shafts and drop said sheet.

3. A sheet piler comprising a pair of spaced apart substantially parallel shafts, a plurality of longitudinal rows of rollers supported on and spaced about each shaft, the sheets being fed to said piler being supported on one row of rollers on each shaft, a brake bearing on each of said shafts, an indexing clutch supported on each of said shafts, a pulley mounted on each shaft adjacent said clutch, a second pulley adjacent the first-named pulley, a fluid motor adjacent the second pulley, a member fastened to the piston rod of the fluid motor and passing around the first and second pulleys, a counterweight at the free end of said member, a solenoid valve for operating said motor, and a switch adjacent said rollers adapted to be contacted by the sheet when it has reached a predetermined position to operate said valve to rotate said shafts and drop said sheet.

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