Dec. 7, 1937. H. R. GOTTHARDT 2,101,738

COIL HANDLING APPARATUS

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Fig. 1.

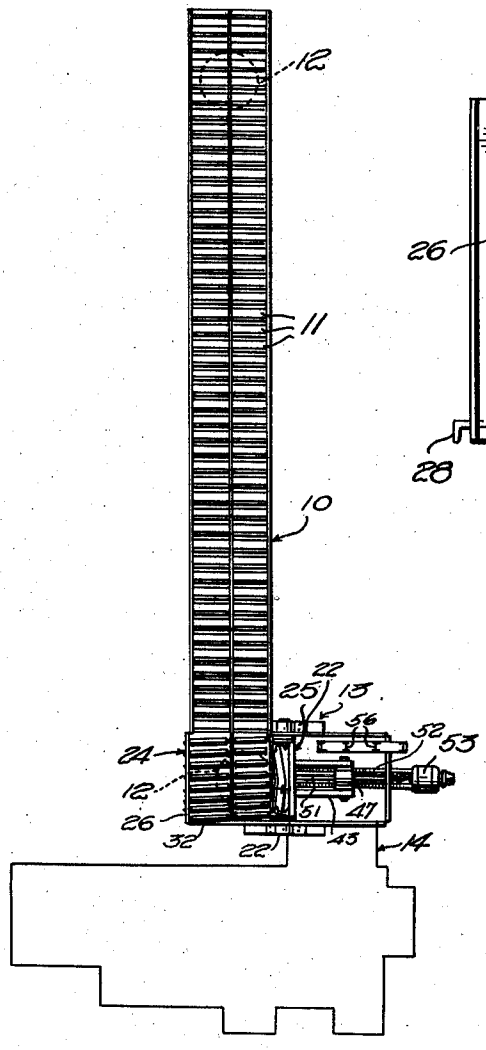


Fig. 6.

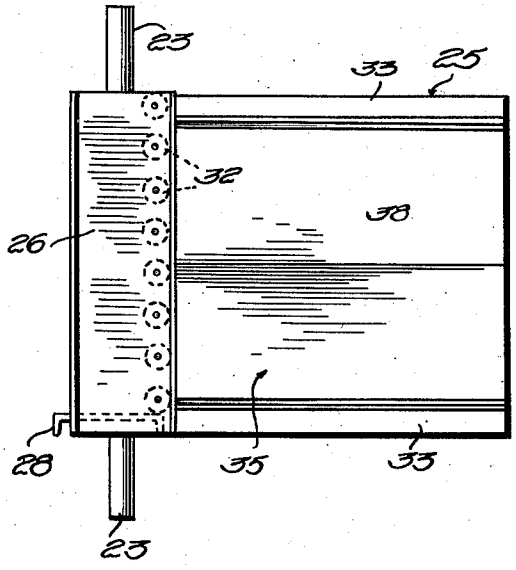
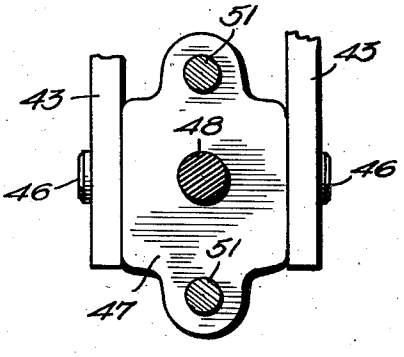


Fig. 7.



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Fig. 2.

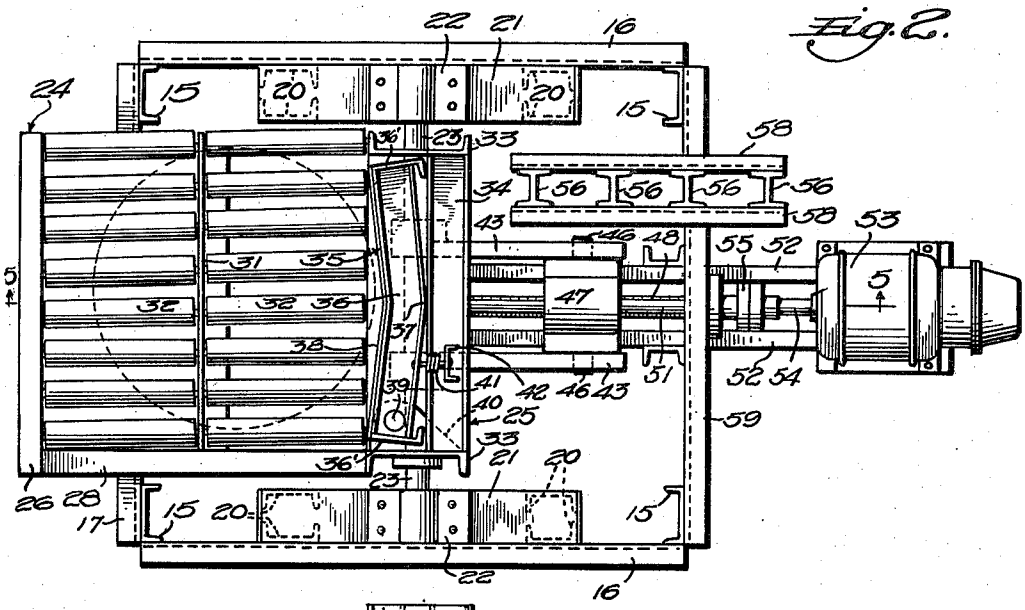
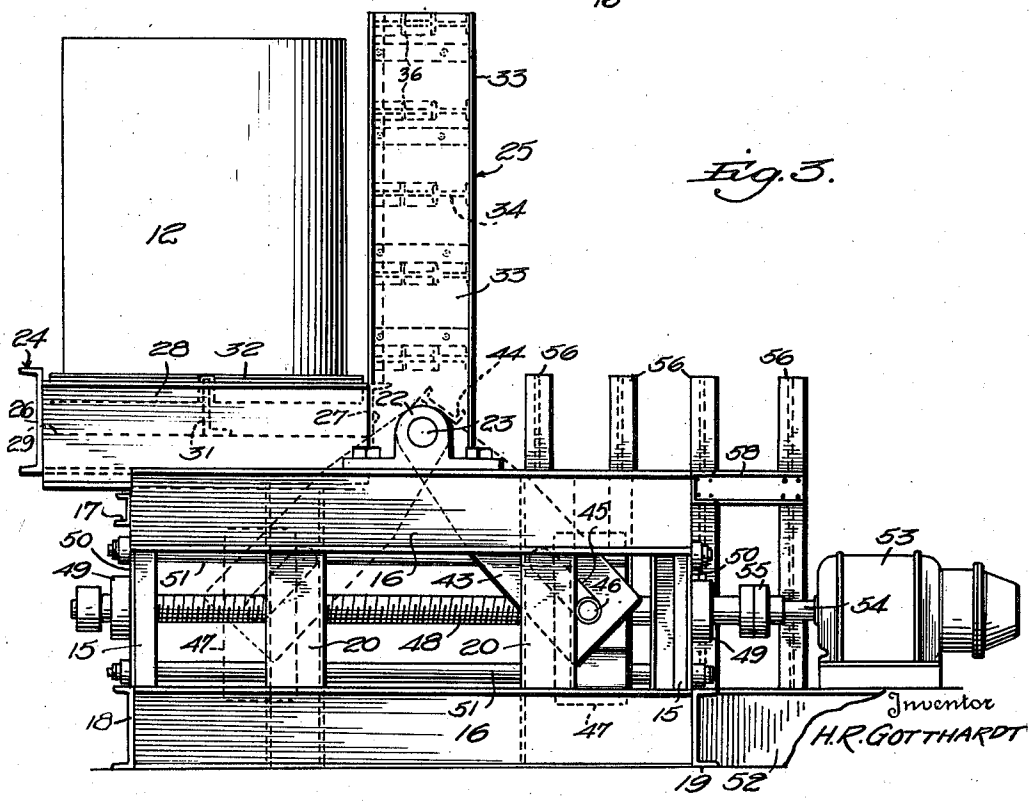


Fig. 3.



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COIL HANDLING APPARATUS

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Fig. 4.

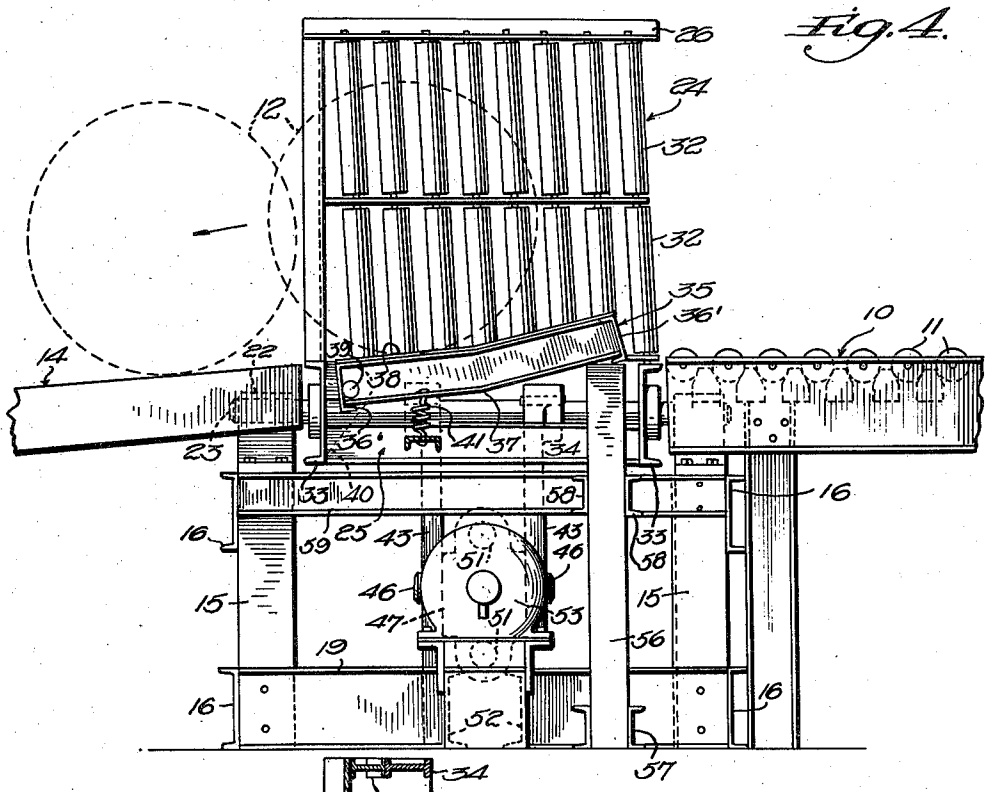
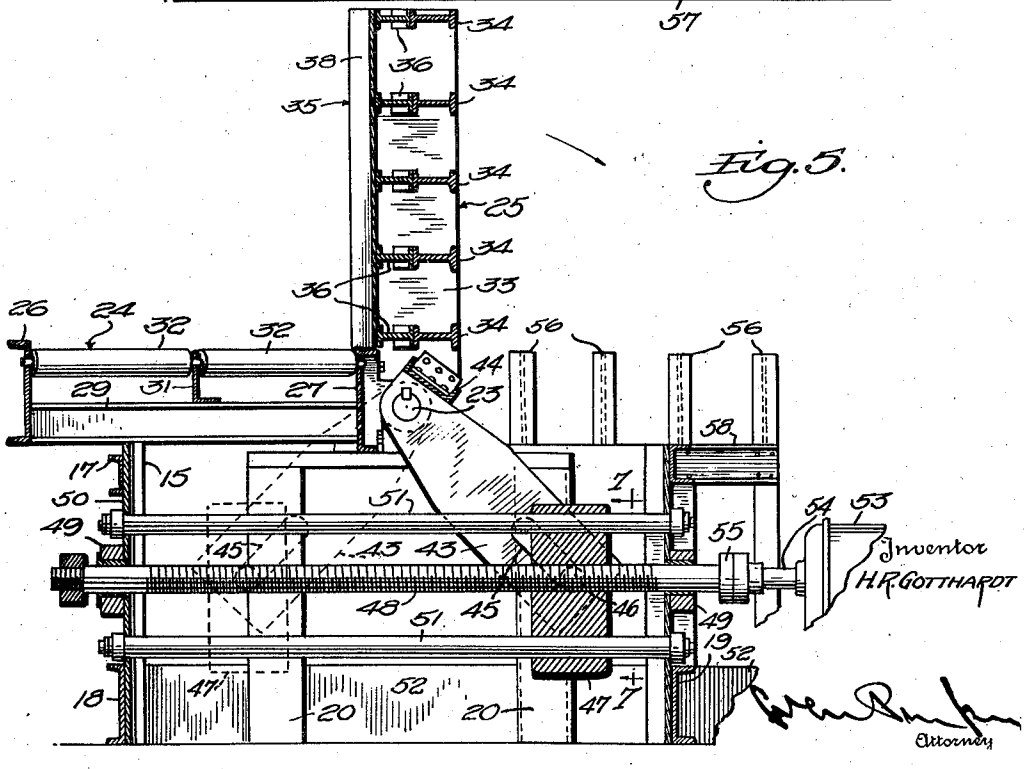


Fig. 5.



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2,101,738

COIL HANDLING APPARATUS

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Application October 1, 1936, Serial No. 103,587

20 Claims. (Cl. 214—130)

This invention relates to coil handling apparatus, and more particularly to an apparatus for feeding coiled strip steel and the like to uncoilers or other mechanisms.

In the manufacture of sheet metal, it has increasingly become the practice for several years to make the metal in strip form and to coil the metal while hot. This method of manufacturing sheet metal has several advantages over the prior method of making the metal in sheet form. The coiled metal obviously must be uncoiled prior to being manufactured into various articles, and for this purpose the coils are placed in position in apparatus particularly designed for uncoiling the strip material. Obviously, the coils are very heavy and difficult to handle as, for example, when it is desired to feed them to an uncoiling apparatus.

An important object of the present invention is to provide a novel sheet handling apparatus for feeding coiled strip metal to an uncoiling apparatus in the proper position to be received by the latter.

A further object is to provide an apparatus of the character referred to which is adapted to receive the coils in a vertical position, and to turn the coils and automatically discharge them in a horizontal position.

A further object is to provide an apparatus of this character wherein the turning means comprises a pair of elements arranged at right angles to each other, and one of which is horizontally arranged to receive the incoming coil, and wherein the normally horizontal element automatically moves the incoming coil toward the normally vertical element to lie thereagainst during the turning operation.

A further object is to provide a coil turning apparatus of the character referred to wherein the pair of elements of the coil turning device are adapted to be rotated through approximately 90 degrees to turn the normally vertical element to a horizontal position, and to provide means engageable with the latter element to tilt it as it approaches horizontal position, to discharge the coil 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 plan view of the apparatus shown in conjunction with a supply conveyor and an uncoiling apparatus, the latter being diagrammatically represented,

Figure 2 is an enlarged plan view of the apparatus,

Figure 3 is a side elevation of the same,

Figure 4 is an end elevation of the same, portions of the supply and take-off conveyors being illustrated,

Figure 5 is a central vertical sectional view on line 5—5 of Figure 2,

Figure 6 is a plan view of the coil turning device per se, showing such device in its discharging position, and,

Figure 7 is a detail sectional view on line 7—7 of Figure 5.

Referring to Figure 1, the numeral 10 designates a supply conveyor, which is ordinarily employed for storing the coils of strip metal prior to the uncoiling thereof. Such conveyor includes freely rotatable rollers 11 of the ordinary gravity type upon which the coils are supported in vertical position, one of the coils being shown in dotted lines on the conveyor 10 in Figure 1 and indicated by the numeral 12. The coils are fed to the apparatus forming the subject matter of the present invention and indicated as a whole in Figure 1 by the numeral 13. As will be described in detail, the coil handling apparatus receives successive coils from the conveyor 10 in vertical position, turns them to a horizontal position and then discharges them to an uncoiling apparatus generally indicated by the numeral 14. In Figure 1 of the drawings, one of the coils 12 is shown in dotted lines in position on the apparatus 13, ready to be turned to a horizontal position.

The apparatus forming the subject matter of the present invention comprises a supporting framework made up of a plurality of corner posts 15 connected by suitable horizontal upper and lower structural members 16, preferably formed of channel iron section, at opposite sides of the apparatus. The posts 15 at one end of the apparatus are connected by horizontal upper and lower structural members 17 and 18, the bottoms of the posts 15 at the opposite end of the apparatus being connected by similar structural members 19.

Spaced columns, preferably made up of vertical channel members 20, are arranged against the inner faces of the structural members 16 on opposite sides of the centers of the lengths thereof. Each pair of these columns supports an upper connecting member 21 carrying a bearing 22 in which is supported a shaft 23. This shaft supports a sheet turning device having a pair of units indicated as a whole respectively by the

numerals 24 and 25 arranged at right angles to each other. These units are normally arranged in the position shown in Figures 2, 3 and 5 and are adapted to be turned through an arc of approximately 90 degrees in a manner and for a purpose to be described.

The unit 24 comprises an outer channel frame member 26, an inner similar member 27 (see Figure 5) and a transverse connecting member 28 extending between the members 26 and 27 at one end thereof. The members 26 and 27 are further connected by a plurality of structural members, such as I beams 29, and such structural members support a central rail 31, as shown in Figure 5. Sets of rollers 32 are arranged between the rail 31 and the members 26 and 27, the adjacent ends of the rollers being supported by the rail 31 and the opposite ends of the rollers being supported by the frame members 26 and 27. The rollers 32 are inclined as shown in Figure 2, for a purpose to be described. Of the various structural members comprising the unit 24, only the frame member 26 has its upper edge projecting above the upper limits of the rollers 32, and this is for the purpose of providing a rail at the outer extremity of the unit 24.

The unit 25 is normally vertically arranged and comprises opposite parallel normally vertically arranged channel members 33 rigidly fixed at their lower ends to the frame member 27. Accordingly it will be apparent that the units 24 and 25 are rigid with respect to each other. The side members 33 are connected by a plurality of structural members 34, such as I beams. The normally lower ends of the side members 33 are supported by the shaft 23, and accordingly it will be apparent that this shaft supports the units 24 and 25 for swinging movement about the horizontal axis of the shaft 23.

The structural members 34, as shown in Figures 2 and 5, are substantially narrower than the side members 33, thus providing a space for the reception of a coil receiver indicated as a whole by the numeral 35. This receiver comprises a plurality of structural members, such as I beams 36, which are angled intermediate their ends to provide each with a point of contact 37 engageable with one of the structural members 34, as shown in Figure 2. The ends of the members 36 are connected by end frame members 36'. A supporting plate 38 is secured against the edge portions of the members 36 which face toward the unit 24, the plate 38 being angled intermediate its edges to fit against the corresponding angled edges of the members 36, as will be apparent.

A shaft 39 extends through all of the structural members 36 and is carried by bearing members 40 secured to one of the side members 33, as shown in Figures 2 and 4. Accordingly it will be apparent that the receiver 35 is adapted to swing with respect to the unit 25. The receiver 35 normally occupies the position shown in Figure 2 with the points of contact 37 engaging the respective members 34, and springs 41 tend to maintain the receiver in such position. These springs are of the tension type and are connected at their ends respectively to certain of the members 36 and at their other ends to channel members 42 which may extend between any desired pairs of the structural members 34.

Means are provided for swinging the coil turning device from the loading position shown in Figures 2, 3 and 5 to the unloading position shown in Figure 4, it being noted that in the latter position the unit 24 has assumed a vertical position. A pair of relatively heavy arms 43 have their inner ends connected to the shaft 23. These arms are rigidly connected to a transverse channel or similar member 44, the ends of which are rigidly secured to the side members 33. The transmission of a force to the free ends of the arms 43, therefore, swings the units 24 and 25 about the axis of the shaft 23.

The arms 43 are provided in their free ends with corresponding slots 45 receiving outstanding trunnions 46 carried by a crosshead 47. This crosshead is threaded on a shaft 48 journalled at its ends in bearings 49 carried by plates 50 suitably supported with respect to the main frame of the apparatus, as will be apparent. The shaft 48 is driven in a manner to be described. Above and below the shaft 48 the crosshead 47 is slidable on guide rods 51, anchored at their ends to the plates 50.

A pair of parallel channels 52 extend through the bottom of the main frame of the apparatus, the lower frame members 19 (Figure 4) being formed of a pair of sections having their inner ends terminating at and secured to the respective channels 52. These channels extend beyond the main frame of the apparatus, as shown in Figure 2, and support a motor 53 preferably provided with a suitable solenoid brake of conventional type to promptly arrest operation of the motor when desired. This motor has a shaft 54 coupled as at 55 to the adjacent end of the threaded shaft 48. It will be apparent that rotation of the motor in a given direction operates, through the crosshead 47, to swing the arms 43 to turn the units 24 and 25 in a clockwise direction as viewed in Figures 3 and 5, and that rotation of the shaft 48 in the opposite direction swings the units 24 and 25 in a counterclockwise direction.

As previously stated, the receiver 35 is adapted to swing about the axis of the shaft 39, and means is provided for automatically effecting such swinging action as the parts approach the coil discharging position shown in Figure 4. Referring to Figures 2 to 5 inclusive, the numeral 56 designates a plurality of vertical posts secured at their lower ends between channel members 57 and at their upper ends between similar members 58. A structural member 59 connects the upper ends of the adjacent pair of corner posts 15, the member 59 being formed in two sections having their inner ends secured to the channels 58. It will be apparent that the members 56 project a substantial distance above the top of the main frame of the apparatus.

The operation of the apparatus is as follows:

The conveyor 10 is employed for storing coils of strip metal until it is desired to uncoil them, the coils being supported on end on the rollers 11. Any suitable type of conveying means may be employed, and if desired, suitable braking means may be provided on the rollers 11 for preventing accidental movement of the coils along the conveyor rollers. Whenever it is desired to uncoil one of the coils of the conveyor 10, such coil is moved from the conveyor to the unit 24.

As previously stated, the rollers 32 of the unit 24 are inclined in the manner shown in Figures 1 and 2, and when a coil moves across the unit 24 the angularity of the rollers 32 causes the coil to move angularly to assume substantially the position shown in Figures 1 and 2, adjacent or in contact with the receiver plate 38. When the coil reaches such position, the motor 53 is ener-

gized to rotate the screw shaft **48** in one direction to cause the crosshead **47** to travel toward the left of the solid line position shown in Figure 5. The operation of the trunnion **46** in the slots **45** swings the arms **43** in a clockwise direction as viewed in Figures 3 and 5, and such motion is transmitted through the transverse member **44** to similarly swing the units **24** and **25** in a clockwise direction about the axis of the shaft **23**.

As the turning movement of the units **24** and **25** progresses, the coil on the rollers **32** will be tilted into engagement with the plate **38**. This plate by virtue of the action of the springs **41**, normally retains with respect to the unit **25** the position shown in Figure 2. As the unit **25** approaches horizontal position, therefore, the plate **38** slopes downwardly in both directions toward its center, thus preventing the coil from rolling from the plate **38**.

As the swinging action referred to progressively continues, one of the frame members **35** of the coil receiver contacts with the inner post **56**, whereupon continued turning movement of the parts causes the receiver **35** to be tilted to the position shown in Figure 4, when the parts reach their limit of movement. At such time, the receiver end member **36'** referred to will be supported on the upper ends of all of the ports **56**, under which conditions the receiver plate **38** will have all portions thereof inclined downwardly toward the left, as viewed in Figure 4. The coil **12** will have been turned to a horizontal position on the receiver, and such coil will move by gravity toward the left as viewed in Figure 4 to enter the uncoiler to be supported therein in proper position to permit the uncoiling operation to take place. In connection with the swinging movement of the coil turning device, it will be noted that the posts **56** are so positioned as to clear the structural members **34** and **36** when the device is turned to the discharging position, the upper ends of the posts **56** contacting with the end members **36'** as previously stated.

As soon as the coil is discharged, the motor **53** may be reversed to restore the parts to normal position. In the unloading position referred to, the crosshead **47** will occupy the dotted line position shown in Figure 3, and upon reverse rotation of the screw shaft **48**, the units **24** and **25** will start to rotate in a counter-clockwise direction. During the first part of such movement, the receiver will gradually move upwardly with respect to the posts **56** to be progressively released thereby, the springs **41** progressively returning the receiver to its normal position with respect to the unit **25**. The movement of the receiver with respect to the unit **25** is arrested when the points of contact **37** (Figure 2) engage the structural members **34**, as will be apparent. Continued movement of the parts in the manner referred to restores the units **24** and **25** to the normal position shown in Figures 2, 3 and 5, whereupon the apparatus is ready, when desired, to receive another coil from the conveyor **10**.

From the foregoing, it will be apparent that the present apparatus greatly facilitates the handling of the heavy coils, to turn them from the normal vertical position in which they are stored, to a horizontal position, and then to automatically discharge the coils from the apparatus to feed them to the uncoiling apparatus **14**. No manual labor is required in the performance of the operations of turning the coil and feeding it to the uncoiler and the complete operation may be very quickly carried out.

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. Apparatus of the character described comprising a support for an article, means for swinging said support to turn the article to a different position, said support having a relatively movable portion receiving the article when said support swings to a predetermined extent, and means for actuating said relatively movable portion when the article is supported thereon to discharge the article therefrom.

2. Apparatus of the character described comprising a support having a normally substantially horizontal portion to receive an article thereon and having a normally substantially vertical portion, means for swinging said support to turn the article and transfer it to said normally vertical portion, and means operative when said support has swung to a predetermined extent for tilting the second named portion thereof to discharge the article therefrom.

3. Apparatus of the character described comprising a support having a normally substantially horizontal portion adapted to receive an article thereon and a normally substantially vertical portion, means for supporting said support for swinging movement about a horizontal axis to swing the first named portion thereof to a substantially vertical position and said second named portion thereof to a substantially horizontal position, and means operative as the second named portion of said support approaches horizontal positon for tilting it to discharge the article therefrom.

4. A sheet coil handling apparatus comprising a support having a normally substantially horizontal portion adapted to receive an article thereon and further including a normally substantially vertical portion arranged adjacent the article on said first named portion, means for supporting said support for swinging movement on a horizontal axis parallel to the junction of said portions of said support to turn the article to a position resting on said second named portion, means for mounting said second named portion for swinging movement independently of said support, and means operative as said second named portion approaches horizontal position for swinging it independently of said support to discharge the article from said second named portion.

5. A sheet coil handling apparatus comprising an article turning device including a normally substantially horizontal unit provided with conveyor rollers and a second unit including a normally substantially vertical plate, means for swinging said device about a horizontal axis to cause said first and second units to assume respectively substantially vertical and horizontal positions, and means operative as said second unit approaches a horizontal position for tilting said plate independently thereof to discharge the article from said plate.

6. Apparatus constructed in accordance with claim 5 wherein said plate is angled along a line extending substantially vertically of said plate when the latter is in normal position to provide a trough to receive said article as said device is tilted toward horizontal position.

7. Apparatus constructed in accordance with claim 5 wherein the conveyor rollers of said first named unit are angularly arranged to convey the coil angularly to a position in proximity to said plate.

8. A sheet coil handling apparatus comprising an article turning device including a normally substantially horizontal unit adapted to receive an article thereon and further including a normally substantially vertical unit, a substantially horizontal shaft supporting said unit for turning movement through an arc of approximately 90°, an arm fixed with respect to said unit, a rotatable threaded shaft, a crosshead mounted on said shaft and engaging said arm to swing said unit, and means operative as said normally vertical unit approaches horizontal position for tilting said second named unit to discharge the article therefrom.

9. A sheet coil handling apparatus comprising a coil turning device including a normally substantially horizontal unit adapted to receive an article thereon and further including a normally substantially vertical unit, a substantially horizontal shaft supporting said unit for turning movement through an arc of approximately 90°, an arm fixed with respect to said unit, a rotatable threaded shaft, a crosshead mounted on said shaft and engaging said arm to swing said unit, said second named unit having an article receiving plate relatively movable with respect to such unit, and means operative as said second named unit approaches said horizontal position for tilting said plate to discharge the article therefrom.

10. A sheet coil handling apparatus comprising an article turning device including a normally substantially horizontal unit and a normally substantially vertical unit mounted to swing on a horizontal axis to transfer the article from the first named unit to a position on said second named unit, said first named unit having conveying means for supporting an article entering such unit, said conveying means being constructed and arranged for moving the article angularly and laterally into proximity to the second named unit.

11. A sheet coil handling apparatus comprising an article turning device including a normally substantially horizontal unit and a normally substantially vertical unit mounted to swing on a horizontal axis to transfer the article from the first named unit to a position on said second named unit, said first named unit having a plurality of article supporting rollers angularly arranged with respect to lines at right angles to said second named unit whereby an article moving over said rollers is moved angularly into proximity to said second named unit.

12. A sheet coil handling apparatus comprising a conveyor, an article turning device having a normally substantially horizontal unit and a normally substantially vertical unit, conveyor rollers forming a part of said first named unit and arranged in alignment with said conveyor to receive an article therefrom, said rollers being arranged at an angle to the direction of movement of the article on said conveyor to thereby move the article angularly into proximity to said second named unit, and means for turning said device to transfer an article from said first named unit to said second named unit.

13. Apparatus constructed in accordance with claim 12 provided with means operative upon turning movement of said second named unit to a predetermined extent for discharging the article therefrom.

14. Apparatus constructed in accordance with claim 12 provided with an article supporting plate forming a part of said second named unit, and means operative upon turning movement of said second named unit to a predetermined extent for tilting said plate to discharge the article therefrom by gravity.

15. In a mechanism for turning an article through an angle of approximately 90°, turning means having a normally substantially horizontal article receiving unit and a normally substantially vertical article discharging unit, said units being arranged at approximately right angles to each other and rotatable as a unit to cause said first and second named units to assume substantially vertical and horizontal positions respectively, at least a portion of said second named unit being rotatable independently of said first named unit about an axis in a plane perpendicular to said horizontal axis, and means operative when said second named unit is in substantially a horizontal position for tilting said rotatable portion about the axis thereof to discharge the article therefrom.

16. In a mechanism for turning an article through an angle of approximately 90°, turning means having a normally substantially horizontal article receiving unit and a normally substantially vertical article discharging unit, said units being arranged at approximately right angles to each other and rotatable as a unit to cause said first and second named units to assume vertical and horizontal positions, at least a portion of said second named unit being rotatable independently of said first named unit about an axis in a plane perpendicular to said horizontal axis, resilient means normally holding said rotatable portion from movement about said second named axis, and means operative when said second named unit is in substantially a horizontal position for tilting said rotatable portion about its axis to discharge the article therefrom.

17. In a mechanism for turning an article through an angle of approximately 90°, turning means having a normally substantially horizontal article receiving unit and a normally substantially vertical article discharging unit, said units being arranged at approximately right angles to each other and rotatable as a unit to cause said first and second named units to assume vertical and horizontal positions, at least a portion of said second named unit being rotatable independently of said first named unit about an axis in a plane perpendicular to said horizontal axis, resilient means normally holding said rotatable portion from movement about said second named axis, and means operative when said second named unit is in substantially a horizontal position for tilting said rotatable portion about its axis to discharge the article therefrom, said resilient means being operative to return said rotatable portion to its normal position when the mechanism is returned to its original position.

18. Apparatus of the character described comprising a support having a unit normally substantially horizontally positioned to receive an article, and a normally substantially vertical unit, means for swinging said support to transfer the article from said first named unit to said second named unit, said second named unit having an article supporting portion movable independently of said support, and means for moving said portion for discharging the article therefrom.

19. Apparatus of the character described comprising a support having a unit normally sub-

stantially horizontally positioned to receive an article, and a normally substantially vertical unit, means for swinging said support to transfer the article from said first named unit to said second named unit, said second named unit having an article supporting portion movable independently of said support, resilient means normally holding said movable portion from movement relative to said second named unit, and means for moving said portion against the tension of said spring for discharging the article therefrom.

20. Apparatus of the character described comprising a support having a unit normally substantially horizontally positioned to receive an article, and a normally substantially vertical unit, means for swinging said support to transfer the article from said first named unit to said second named unit, said second named unit having an article supporting portion movable independently of said support, means for moving said portion for discharging the article therefrom, and resilient means for tending to return said movable portion to its normal position relative to said second named unit after the article has been discharged therefrom.

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