June 8, 1954 J. A. MARCONI 2,680,644

APPARATUS FOR HANDLING COILED MATERIAL

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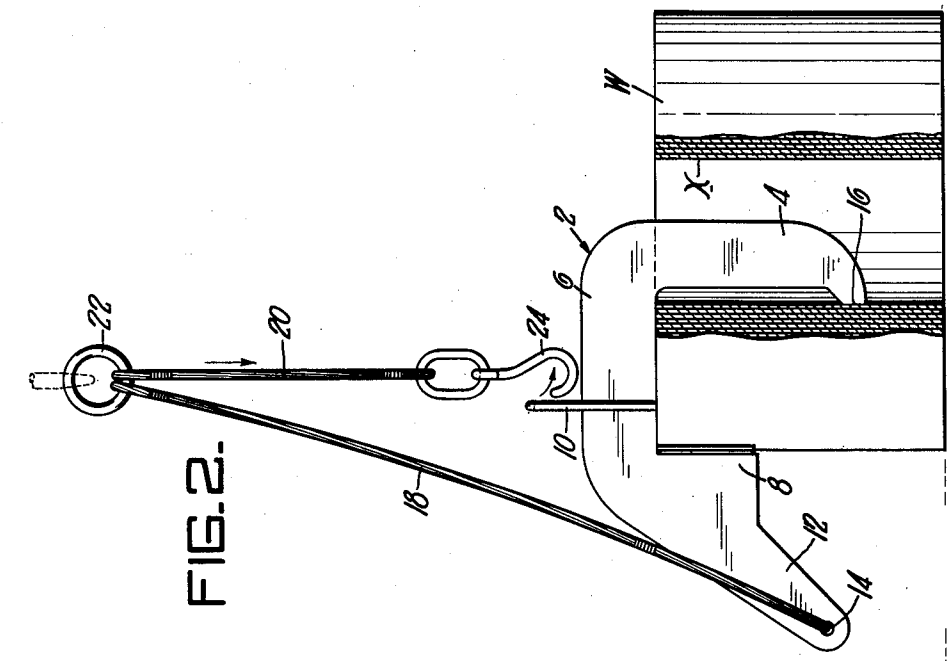


FIG. 2.

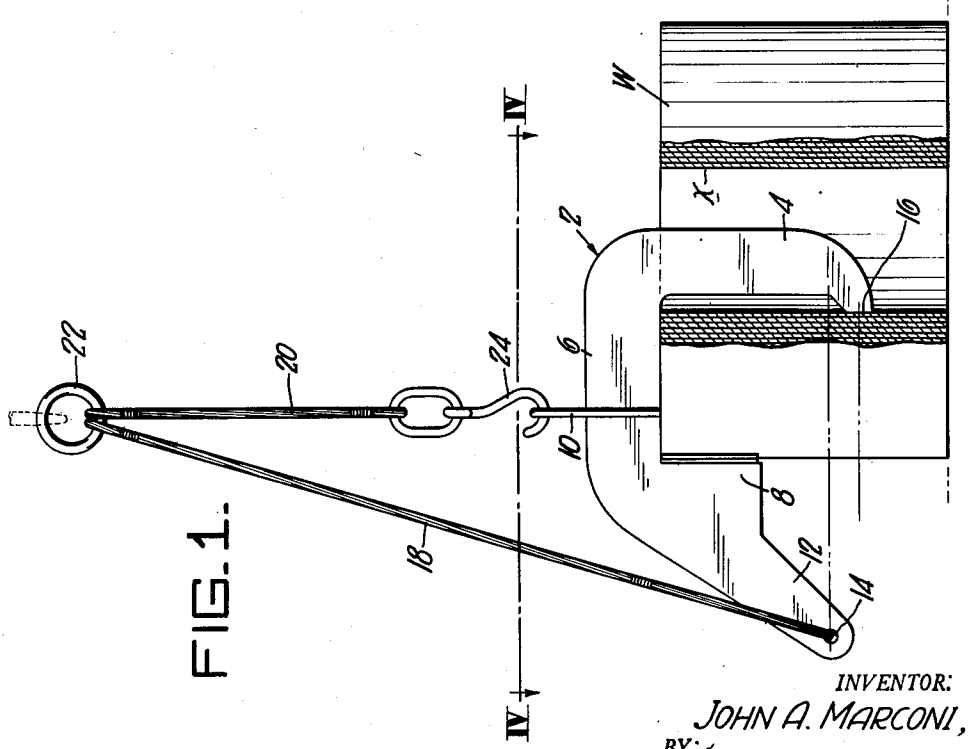


FIG. 1.

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FIG. 3.

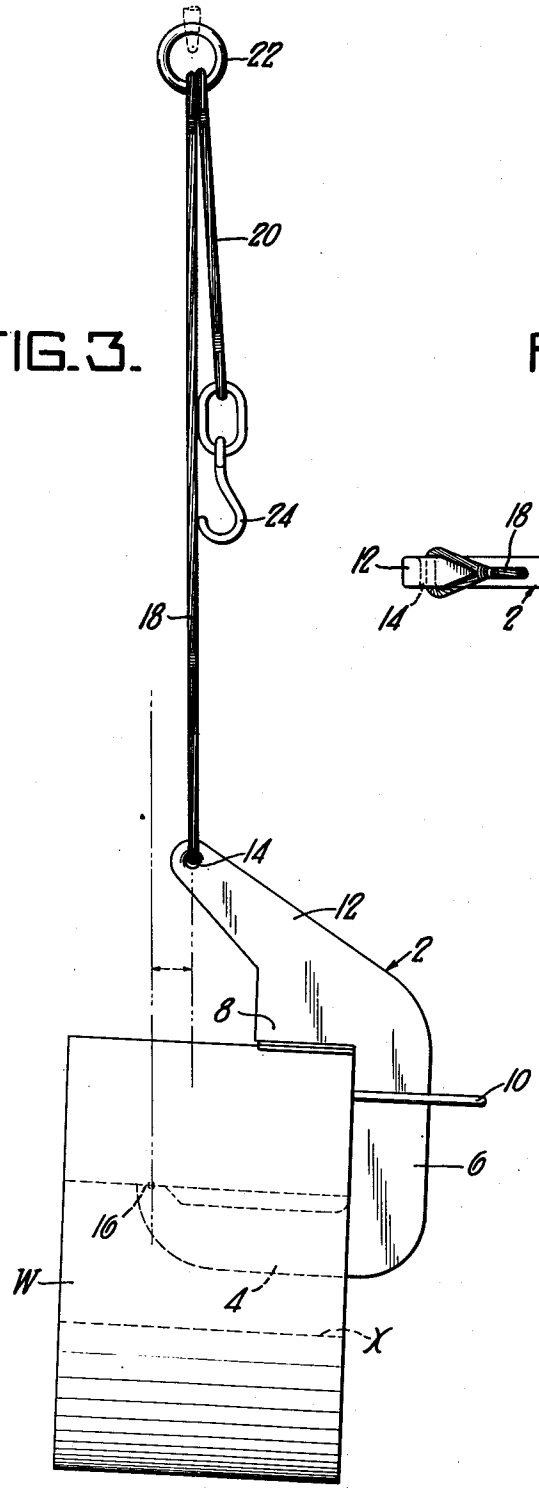
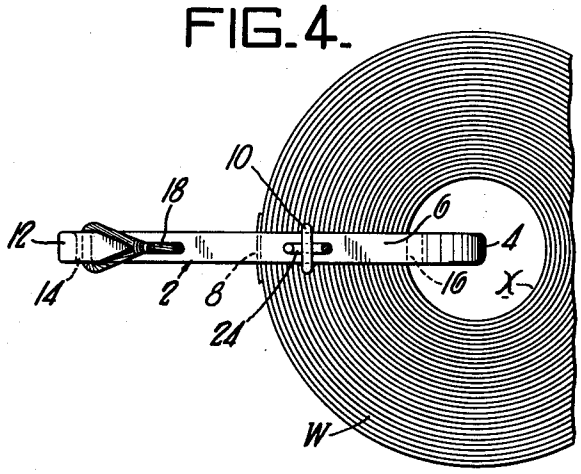


FIG. 4.



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UNITED STATES PATENT OFFICE

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APPARATUS FOR HANDLING COILED MATERIAL

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Application February 13, 1952, Serial No. 271,328

2 Claims. (Cl. 294—82)

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This invention relates generally to apparatus for handling coiled material and more particularly to a lift hook apparatus for manipulating heavy bundles of coiled material having axial openings; the objects in view are safety and speed in simultaneously lifting a bundle of coiled material and changing its position from vertical with the axial opening directed upwardly to horizontal with its axial opening directed horizontally. The invention finds practical application in the manipulation of heavy coils of strip steel during their removal from a stack annealing furnace, and in that application, I shall, in an exemplary way describe it.

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

Figure 1 is a side elevation showing the apparatus of the invention being lowered to operating position;

Figure 2 is a view similar to Figure 1 showing the apparatus in operating position and the slip hook being disengaged;

Figure 3 is a side elevation of the apparatus carrying a coil in tilted position after it has been hoisted; and

Figure 4 is a sectional plan view taken on the line IV—IV of Figure 1.

Referring more particularly to the drawings reference numeral 2 indicates the lift hook of my invention which is formed in the shape of a squared C. The hook 2 includes an arbor 4, a connecting web portion 6 projecting from one end of the arbor 4 at right angles thereto, and an abutment 8 extending normally from the outer end of the connecting web 6 with its inner surface substantially parallel to the arbor.

An eye member 10 is attached to the connecting web 6 and projects normally therefrom in the direction opposite to the arbor 4. Abutment 8 is provided with an arm 12 having a hole 14 in the free end thereof projecting angularly outwardly therefrom in a direction opposite to the eye member 10. The free end of the arbor 4 may be provided with a raised shoulder portion 16 which extends in the direction of the arm 12.

The hook 2 is supported by a long flexible sling 18 and a relatively short flexible sling 20 which are carried by a common hoist link 22 which is suspended from a crane hook (not shown). The long sling 18 is attached to the free end of the arm 12 through the hole 14. The short sling 18 carries an open slip hook 24 which is adapted to detachably engage the eye member 10, as shown in Figure 1.

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A typical operation for which the coil handling apparatus of my invention is particularly adapted is the removal of coils of steel strip from annealing furnaces, where they are stacked in vertical position, to the floor of the mill where they must be deposited in horizontal upright position so that they may be picked up and removed by a hi-lift tractor. In this operation the apparatus is lowered over the topmost coil W of the stack with the arm of the hook supported by the long sling 18 and the eye member 10 detachably engaged by the slip hook 24. As the hook is lowered the arbor 4 enters the axial opening X of the topmost coil W and the shoulder portion 16 contacts the inner surface of the axial opening. In lowered position the inner surface of the connecting web 6 fits over and abuts the top edge of the coil W while the inner surface of the abutment 8 fits against the upper portion of the outside wrap of the coil. After the hook 2 has reached this position the link 22 is lowered further to cause the slip hook 24 to disengage from the eye member 10. After the slip hook 24 has been disengaged link 22 is elevated to raise the arm 12 and simultaneously lift and tilt the coil W as shown in Figure 3. Tilting of the coil is brought about by the force applied by the shoulder 16 and the abutment 8.

After the coil W has been lifted clear of the stack the raised shoulder portion 16 causes it to lean inwardly on the hook 2 as shown in Figure 3. It is to be noted that although the raised shoulder portion 16 is not essential to the operation of my apparatus, the inward leaning of the coil caused by the shoulder, as shown in Figure 2, minimizes the possibility that it will slip from the hook while it is being carried away from the annealing furnace.

In order that the maximum amount of force may be applied at the free end of the arbor 4 when the arm 12 is raised, I have found it necessary to make the length of the arbor 4 equal to at least half of the length of the axial opening X of the coil to be handled. The length of the abutment 8 must be sufficient to prevent it slipping over the edge of the coil as the arm 12 is raised. For satisfactory operation I have found it necessary for the length of the abutment to be greater than half the length of the arbor. To bring about the maximum combined leverage against the outer wrap of the coil by abutment 8 and against the inner surface of the opening X, the point of attachment of the sling 18 on the arm 12 must be positioned inwardly of the free end of the arbor 4, as shown in Figure 3.

While one embodiment of my 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.

I claim:

1. Apparatus for moving a bundle of coiled material having an axial opening therein from a first position wherein said opening is directed vertically to a second position wherein said opening is directed substantially horizontally which comprises an arbor adapted to fit vertically into said opening when said bundle is in said first position, a connecting web attached to said arbor and projecting normally therefrom adapted to rest on top of said coil when said arbor is fitted into said opening, an eye member attached to said connecting web and projecting therefrom in a direction opposite to said arbor, an abutment connected to the outer end of said connecting web and extending normal therefrom in the same direction as and parallel with said arbor, the distance between the arbor and said abutment being substantially equal to the thickness of the body of said coil between the wall of said axial opening and the outer side surface of the coil, said arbor extending beyond the center of gravity of said coil when fitted therein, the length of said abutment being equal to at least half of but less than the entire length of said arbor, an arm connected to and extending angularly and outwardly from said abutment, said arm having a hole through the free end thereof, the projection of the vertical center line of said hole extending transversely of said arbor at a point inwardly of the free end thereof when said coil is in said second position, a relatively long flexible sling attached at one end to the free end of said arm through the hole therein, and a relatively short flexible sling detachably engaged with said eye member, the free ends of said slings being supported by common lifting means.

2. Apparatus for tilting a bundle of coiled material as defined by claim 1 characterized by said arbor having a raised shoulder portion on the free end thereof extending in the direction toward said arm and adapted to contact the inner surface of said axial opening to tilt the coil inwardly toward said connecting web when the coil is carried by said apparatus in said second position.

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