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G. F. QUAYLE
COIL UPENDER

3,055,512

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3 Sheets-Sheet 2

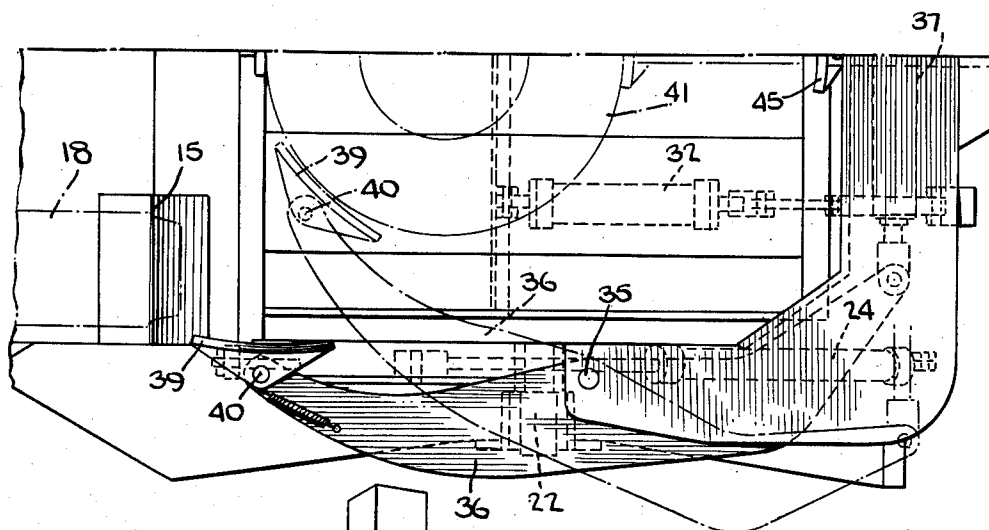


Fig. 2.

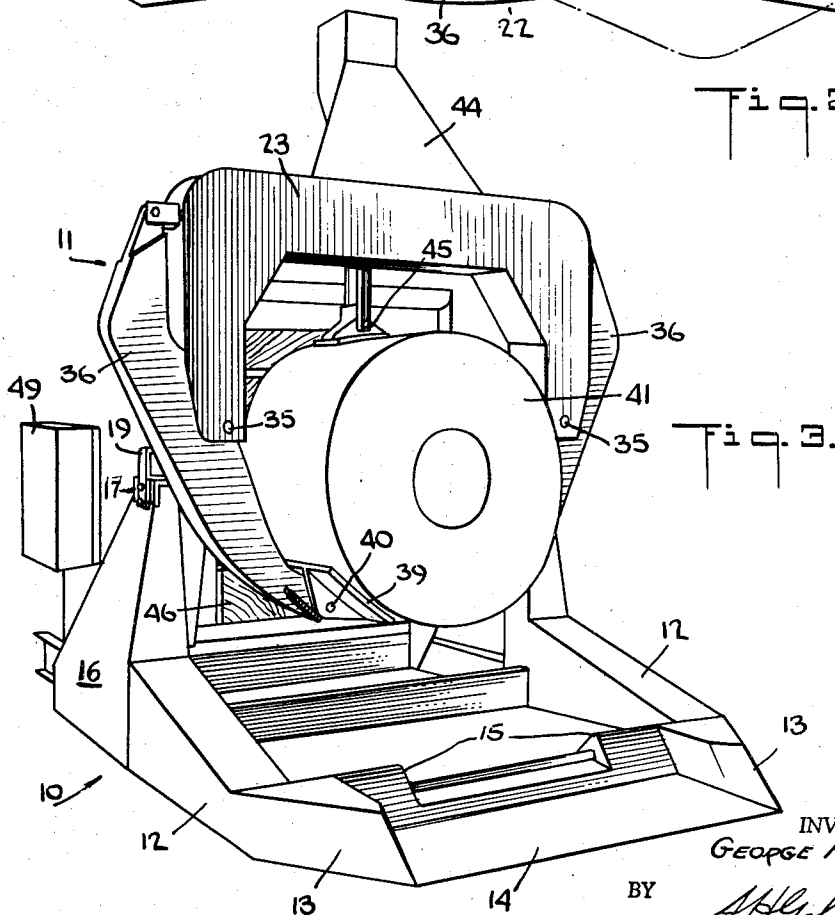


Fig. 3.

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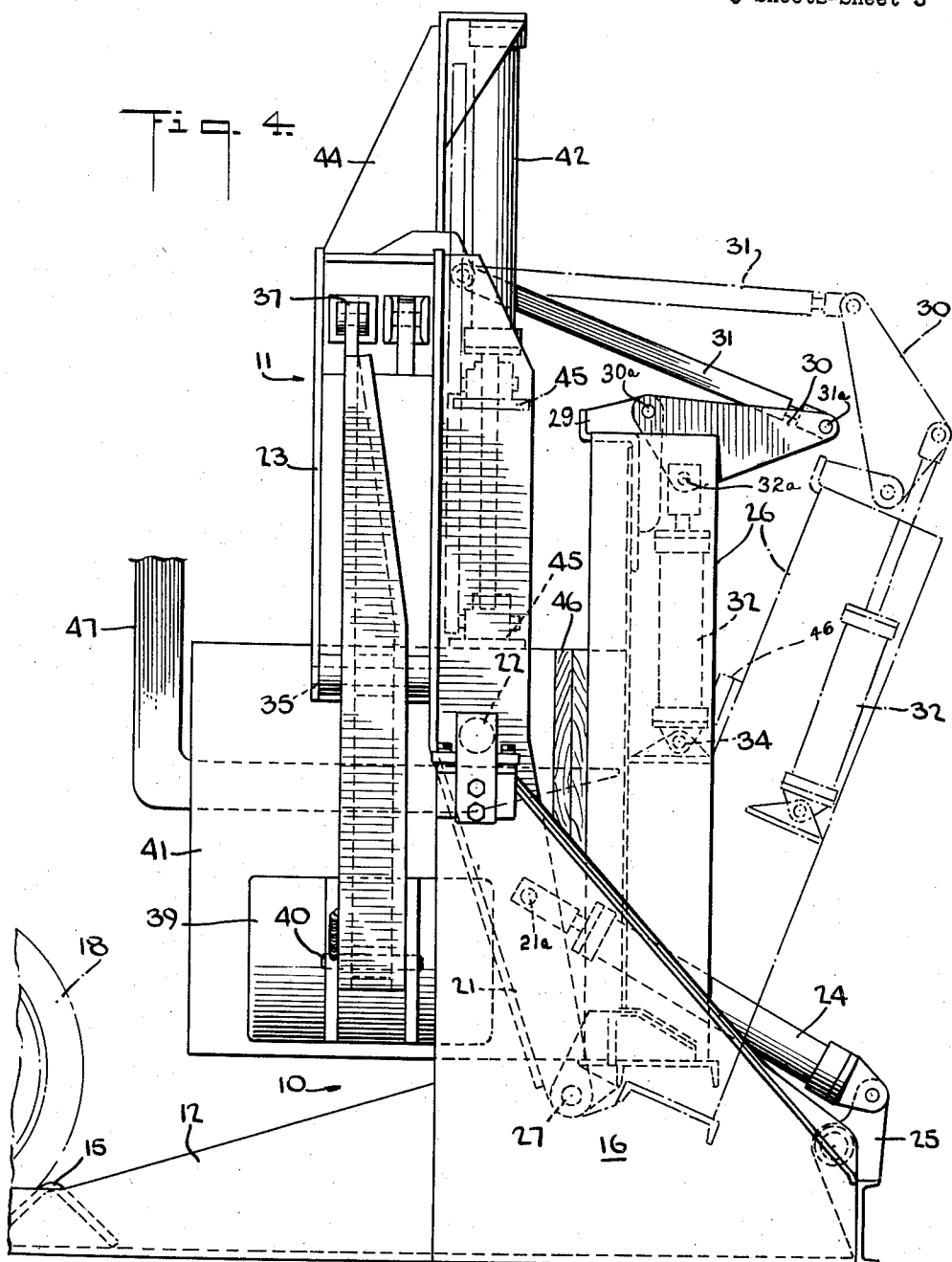
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COIL UPENDER

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6 Claims. (Cl. 214—1)

This invention relates to an upender used to facilitate the movement of a heavy coil of sheet metal such as tin plate, for example, from a position in which the coil rests on a skid with its flat surfaces horizontal, to a second position in which its flat surfaces are vertical so that the fork of an industrial truck may enter the central cylindrical opening of the coil.

Heretofore, there have been many industrial trucks and other devices proposed for engaging coils of tin plate, for example, and for moving them from a horizontal position with one of their flat sides downward, into a position with their axes horizontal. While some of these constructions have achieved a certain amount of commercial success, their employment in practice has nevertheless embodied certain inherent disadvantages. For example, since it is not uncommon for coils of the class described to weigh upwards of 20,000 pounds, the handling means for manipulating these coils frequently damage a certain amount of the strip or sheets forming the coils in the course of forcing gripping means between the coil and the floor, or removing the gripping means from between the coil and the floor, thereby causing the coil to roll along the floor. Then, too, industrial trucks constructed specifically for such operations involve highly complex apparatus which has no application in other materials handling operations. Accordingly, if other materials handling jobs are required to be performed in the vicinity, additional industrial trucks must be procured, often at considerable expense.

My invention relates particularly to an upender that is adapted to receive a coil with one of its flat sides downward as on a pallet or similar support, and then to manipulate it into a position where it may be accepted by the horizontal extended ram or fork of an industrial truck.

Essentially, it is a feature of my invention that the coil is received so as to be applied to my machine with its central opening vertical. Generally, this will be accomplished through delivery of the coil on a skid or pallet. By my invention means are provided for gripping and stabilizing the coil during its movement to an upended position. The coil may then be handled by inserting the ram or fork of an industrial truck into the central opening of the coil and easily removing it from the upender construction, means being provided for removing the stabilizing element and skid or pallet from the coil.

More in detail, my invention comprises a machine which will accept a coil weighing upwards of 20,000 pounds, for example, with its flat sides each in a horizontal plane, the coil being delivered to the machine on a skid or pallet. Hydraulically controlled gripper arms and stabilizing means are then adapted to move into position relatively to the coil to grip and stabilize it while the entire coil together with the gripper arms and stabilizing means as well as the pallet are rotated 90° to bring the coil into a position with its flat sides each in a vertical plane. Through withdrawal of the skid the coil is naturally in a position to be removed by a ram or fork of an industrial truck, the ram or fork being inserted into the cylindrical central opening of the coil.

I have thus outlined rather broadly the more important features of my invention in order that the detailed description thereof that follows may be better understood, and in order that my contribution to the art may be better appreciated. There are, of course, additional

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features of my invention that will be described herein-after and which will form the subject of the claims appended hereto. Those skilled in the art will appreciate that the conception on which my disclosure is based may readily be utilized as a basis for the designing of other structures for carrying out the several purposes of my invention. It is important, therefore, that the claims be regarded as including such equivalent constructions as do not depart from the spirit and scope of my invention, in order to prevent the appropriation of my invention by those skilled in the art.

An illustrative embodiment of the invention has been chosen for purposes of illustration and description, and is shown in the accompanying drawing forming a part of this specification.

In the drawing:

FIG. 1 is a side elevational view of an upender in accordance with the present invention and illustrates a coil supported thereon with its flat sides horizontal;

FIG. 2 is a fragmentary top plan view of the upender illustrated in FIG. 1 and showing a gripper arm in broken lines in engagement with the coil to be upended, the upender being symmetrical about the center line of this view;

FIG. 3 is a perspective view of the upender of the present invention illustrating the same supporting a coil in upended position; and

FIG. 4 is a side elevational view similar of FIG. 1 but illustrating the upender supporting the coil in upended position, and further showing the skid and supporting platform in broken lines tilting away from the coil.

Referring to the drawing, and particularly to FIGS. 1 and 3 thereof, the numeral 10 designates a base or frame structure upon which is pivotally mounted a load upending assembly 11. The frame structure 10 comprises a pair of elongate ground engaging legs 12 formed with tapered wing portions 13 at their extremities. An apron 14 is provided between the wing portions, and a pair of chock members 15 are disposed adjacent the apron. The wings and apron serve to guide the front wheels 18 of an industrial truck into position adjacent the chock members 15 in order to position the ram or fork of the truck for engagement with a load on the upender. The frame structure 10 is further provided with a pair of opposed upright portions 16 at the top of which brackets 17 support a pair of journal bearings 19.

The load upending assembly 11 comprises a carriage 20 formed with a pair of beams 21 rotatably supported in the journal bearings by trunnions 22. The carriage 20 further includes a yoke 23, the legs of which are integrally secured in over-riding relation to the end portions of the beams 21, to the right of the trunnions 22, as viewed in FIG. 1. In order to effect pivotal movement of the carriage about the axis of the trunnions 22, I prefer to employ a pair of hydraulic rams 24, the cylinder of each of which is pivotally supported by a bracket 25 mounted on the frame structure 10. The piston rods of these rams are pivotally connected to the beams 21 at a point 21a to the left of the trunnions 22, as viewed in FIG. 1, so that upon retraction of the piston rods the carriage 20 will pivot in a counterclockwise direction about the axis of the trunnions.

In order to receive a coil with its flat sides horizontal prior to manipulating it into a position where its central opening may accept the horizontal extended ram or fork of an industrial truck, I provide a table or load platform 26 connected at one of its ends to the free ends of the beams 21 by means of pivots 27 supported by brackets 28 fixed to the platform. At the opposite end of the load platform, I provide a pair of brackets 29 to which at 30a are pivotally mounted triangular bell-cranks 30. Each of the bell-cranks is also pivotally connected at

31a to an end of one of a pair of links 31, the opposite end of each of which is in turn pivotally connected to one of the beams 21 adjacent the yoke 23. I provide a second pair of hydraulic rams 32, the cylinders of which are connected to the load platform through pivots 34, and the piston rods of these rams are pivotally connected at 32a to the bell-cranks 30 at the third corner thereof for a purpose to be later discussed.

As I have already mentioned, the carriage 20 includes a yoke 23 integrally mounted on the beams 21. The free ends of the legs of this yoke 23 carry pivots 35 by which a pair of load engaging arms 36 are centrally mounted. One end of each of these arms is pivotally connected to the piston rod of one of a pair of hydraulic rams 37 fixedly mounted in opposed parallel relation to the web portion of the yoke 23, while the opposite ends of the arms are each provided with a pad 39 mounted thereon for limited pivotal movement about the pins 40. As will be seen in FIG. 2, protraction of the piston rods of the rams 37 will cause the load engaging arms 36 to rotate about the pivots 35 in a manner to move the pads 39 towards each other and into engagement with the surface of a coil illustrated at 41.

In order to assure firm engagement of the pads 39 with the coil 41, a stabilizing ram 42 is supported by a bracket 44 on the yoke 23 midway between the arms 36. A stabilizing pad 45 is fixed to the free end of the piston rod of this ram for protraction into engagement with the load at a point on its periphery substantially opposite the points of engagement of the pads 39. Thus, it will be understood that the load to be upended will be firmly engaged by the pads 39 and the stabilizer pad 45 as it rests on the load platform 26 as shown in FIGS. 1 and 2.

In operation, a coil of sheet metal 41 to be upended is delivered to the upender on a skid 46 by the usual fork lift truck (not shown), and is placed with the skid 46 on the platform 26 so that the core axis of the coil is vertical. The rams 37 and the stabilizing ram 42 are actuated to bring the pads 39 and the stabilizing pad 45 into firm engagement with the coil 41. The pistons of the rams 24 are then retracted and the entire load upending assembly 11 rotates in a counterclockwise direction, as viewed in FIG. 1, about the axis of the trunnions 22 into the position shown in FIGS. 3 and 4. In this position, it will be noted that the coil 41 is supported by the pad 39 at portions of its peripheral surface below its horizontal diameter.

Prior to removing the load from the upender, the stabilizing pad 45 is retracted and the rams 32 are actuated to protract the piston rods thereof and rotate the bell-cranks 30 about the pivots 31a at the ends of the links 31 into the position shown in broken lines in FIG. 4, thereby tilting the load platform 26 about its lowermost pivots 27 so as to draw the load platform and the skid 46 away from the coil 41 and into the position similarly shown in broken lines.

The ram or fork 47 (FIG. 4) of an industrial truck may now be freely inserted into the cylindrical central opening of the coil to lift the same out of engagement with the pads 39.

It will be understood by those skilled in the art that the various hydraulic rams may be controlled from a manual control station 49 supported on the frame structure at any conventional location, as in FIG. 3.

To complete the cycle of operation, the piston rods of the rams 32 are retracted thus rotating the bell-cranks 30 about the pivots 31a to return the load platform 20 and skid 46 to the vertical position illustrated in solid lines in FIG. 4. The rams 24 are then actuated to protract their piston rods to rotate the load platform about the axis of the trunnions 22 into the horizontal position shown in FIG. 1. The piston rods of the rams 37 are retracted to pivot the arms 36 about the pivots 35 to move the pads 39 away from each other. The

skid 46 is removed, and the upender is in condition to accept and upend another coil.

From the foregoing description, it will be seen that I have contributed an upender for facilitating the movement of a heavy coil of sheet metal from a position in which the coil rests on one of its flat sides into a position wherein its flat sides are vertical and its core axis horizontal, so that the central opening of the coil may be engaged by the extended ram or fork of an industrial truck. It will also be seen that the load engaging arms of my upender come into contact with the outer surface of the coil in a manner so as to prevent damage to the outer sheets forming the coil, and that the coil is securely and firmly supported throughout the entire cycle of manipulation from one position to another.

I believe that the construction and operation of my novel contribution will now be readily understood and that the advantages of my invention will be fully appreciated by those skilled in the art.

I now claim:

1. In a load upender of the class described, a carriage mounted for pivotal movement about a horizontal axis into and out of load upending position, means for pivoting said carriage into and out of load upending position, a load platform carried by said carriage and movable with said carriage from an initial horizontal load supporting position to a vertical load upending position, said platform when moving to said upending position causing an initially vertically positioned part of a side surface of a load supported thereon to rotate to a downwardly directed horizontal position, means for moving said platform out of engagement with the load when said carriage and platform are pivoted to vertical load upending position, load engaging means mounted on said carriage for movement into engagement with said part of the side surface of the load when that part is vertical for supporting the load while said carriage and said platform are pivoted into vertical load upending position, and means for moving said load engaging means into and out of load engaging position.

2. In a load upender of the class described, a stationary frame, a carriage mounted on said frame for pivotal movement about a horizontal axis into and out of load upending position, means for pivoting said carriage into and out of load upending position, a load platform pivotally carried by said carriage for initially supporting the load in one position, means for pivoting said platform relatively to said carriage about a horizontal axis to a position out of engagement with the load when the carriage is pivoted to load upending position, load engaging means including an arm pivotally mounted on said carriage and movable into engagement with the load for supporting the load in upended position, means for pivoting said arm into and out of load engaging position, and a stabilizer pad supported on said carriage and movable into and out of engagement with the load to stabilize the load on the arm while the carriage is pivoted into load upending position.

3. In a load upender of the class described, a stationary frame structure, a load upending assembly mounted for pivotal movement on said frame structure, and actuating means associated with said frame structure and said load upending assembly for pivoting said load upending assembly relatively to said frame structure from an initial load receiving position to a load upending position, said load upending assembly comprising a carriage, a load platform pivotally mounted on said carriage for initially supporting a skid carrying the load in one position, load engaging means including an arm pivotally mounted relatively to said load platform for movement into engagement with the load when the load is in said initial position to support the load while the load is moved from said initial position to an upended position, and actuating means carried by said load upending assembly for pivoting said load platform independently of said arm to move said platform

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and skid away from the load when said load is in upended position.

4. In a load upender of the class described, a carriage, means mounting said carriage for bodily rotation, a load receiving surface on said carriage adapted to have deposited thereon a skid or the like on which rests a coil of sheet metal with a flat surface of the coil against the skid, a curved surface of the coil then being vertical, coil engaging means movably mounted on said carriage for movement with said carriage and also for movement relatively thereto, means for moving said coil engaging means relatively to said carriage and into opposed relation to one side of said vertical curved surface of the coil in a position to support said coil against vertical sliding movement relatively to said skid when said skid is moved toward a vertical position, said coil engaging means leaving free the opposed side of said vertical curved surface, means for rotating said carriage on its mounting means from position in which said coil rests with its flat surface on the skid to a position in which the coil rests with said one side of its curved surface on said coil engaging means, and the free side of said curved surface then being the upper coil surface whereby to allow the coil to be lifted for removal by a part of a lift truck inserted into the central opening of the coil.

5. In a load upender of the class described, a carriage, means mounting said carriage for bodily rotation, a load receiving surface on said carriage adapted to have deposited thereon a skid or the like on which rests a coil of sheet metal with a flat surface of the coil against the skid, a curved surface of the coil being vertical, coil contacting arms movably mounted on said carriage for movement with said carriage and also for movement relatively thereto, means for moving said arms relatively to said carriage to bring said arms into opposed relation to one side of said vertical curved surface of the coil in a position to support said coil against vertical sliding movement relatively to said skid when said skid is moved toward a vertical position, said arms leaving free the opposed side of said vertical coil surface, means for rotating said carriage on its mounting means from position in which said coil rests with its flat surface on the skid to a position in which

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the coil rests with said one side of its curved surface on said arms, and the free side of said curved surface then being the upper coil surface whereby to allow the coil to be lifted for removal by a part of a lift truck inserted into the central opening of the coil.

6. In a load upender of the class described, a carriage, means mounting said carriage for bodily rotation, a load receiving surface on said carriage adapted to have deposited thereon a skid or the like on which rests a coil of sheet metal with a flat surface of the coil against the skid, a curved surface of the coil being vertical, coil contacting arms movably mounted on said carriage for movement with said carriage and also for movement relatively thereto, means for moving said arms relatively to said carriage to bring said arms into opposed relation to one side of said vertical curved surface of the coil in a position to support said coil against vertical sliding movement relatively to said skid when said skid is moved toward a vertical position, said arms leaving free the opposed side of said vertical coil surface, means for rotating said carriage on its mounting means from position in which said coil rests with its said flat surface on the skid to a position in which the coil rests with said one side of its curved surface on said arms, the free opposed side of the curved surface then being the upper surface of the coil, and means for moving the load receiving surface of said carriage away from the coil when said coil rests on said arms whereby to effect separation of the skid and coil prior to lifting and removal of the coil by a part of a lift truck inserted into the central opening of the coil.

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