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REELING APPARATUS

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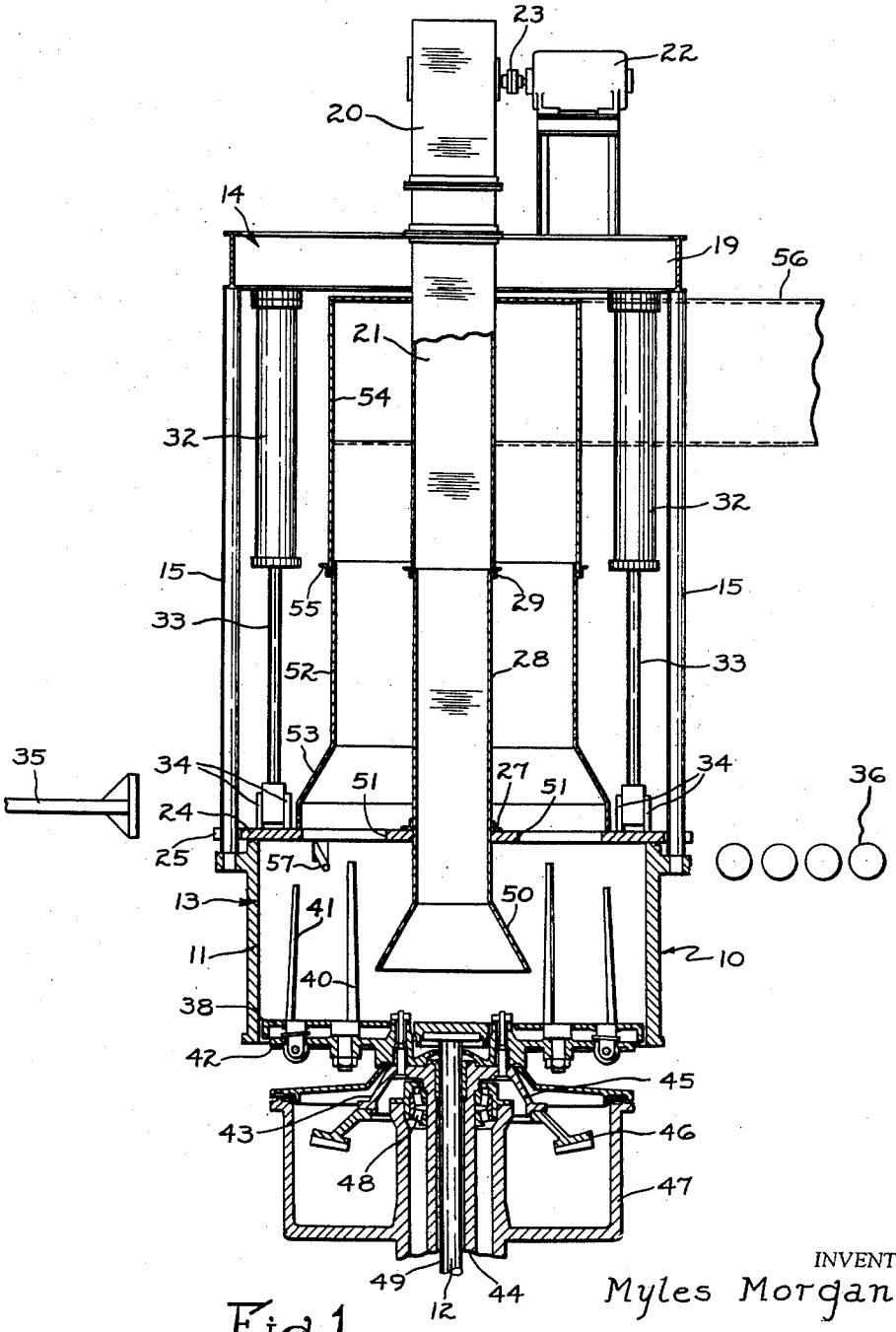


Fig. 1

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REELING APPARATUS

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5 Claims. (Cl. 266—5)

This invention relates to reeling apparatus and more particularly to a pouring reel apparatus for coiling steel rod as it leaves the last stand of a rolling mill.

In the production of steel rod, it is the usual practice to form the rod into coils after it leaves the rolling mill in order that it may be handled more easily. It is necessary, however, to lower the temperature of the rod to a point below the critical temperature of the steel in a short time after it leaves the rolling mill. Otherwise, scale forms rapidly on the surface of the rod and it may not be possible to hold the metallurgical properties to desired specifications. Although the rod is passed through water boxes between the mill and the reel, the time which it resides in the boxes for cooling is very short. As a matter of fact, with the increases in rolling speed that have been taking place in the last few years, this method of cooling becomes less and less effective. If one waits until the coil is removed from the reel before beginning cooling, the rod has had the entire reeling time to deteriorate. It was suggested in the patent to Myles Morgan No. 2,621,914 that the cooling take place in the reel itself and this patent shows a laying reel which provides for such cooling. The present invention involves an improved reel of this type, particularly adapted for use in coiling rod by the pouring method.

It is therefore an outstanding object of the present invention to provide a reeling apparatus in which hot rod may be cooled during reeling.

It is another object of the invention to provide a pouring reel having apparatus for cooling rod during the coiling operation, which apparatus does not interfere with the normal operation of the reel.

To the accomplishment of the foregoing and related ends, the invention then comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawings setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principles of the invention may be employed.

In the said annexed drawing, the single figure is a vertical sectional view of the invention.

The reeling apparatus, designated generally by the reference numeral 10, comprises a pouring reel 11 driven by a shaft 12. The reel is provided with a housing 13 on which is mounted a superstructure 14 which consists of vertical supporting members 15, and a horizontal table portion 19. On the central part of the table portion is mounted a draft means such as a fan 20 of the usual type; this fan is arranged to discharge downwardly into a vertical conduit 21 which is dependent from the fan and table portion. The conduit is of circular cross-sectional shape and extends downwardly to a point slightly below the mid-point between the table portion of the superstructure and the top edge of the housing 13. A motor 22 is suitably mounted on the table portion and connected through a coupling 23 to the fan 20.

A cover 24 overlies the housing 13 of the reel and fits

it in a substantially air-tight manner. This cover is provided with notches 25 which embrace the vertical members 15 and are guided thereby. A large circular aperture 27 extends through the central portion of the cover and from this aperture extends a vertical conduit 28 which telescopes into the conduit 21, there being a substantially air-tight sealing means 29 provided between the upper end of the conduit 28 and the surface of the conduit 21.

Between the table portion 19 of the superstructure and the cover 24 extends a motive means such as hydraulic actuating cylinders 32 and their associated piston rods 33. The end of each cylinder which is away from the piston rod is fastened to the under surface of the table portion of the superstructure, while the outer end of the piston rod is pivotally mounted between abutments 34 extending upwardly from the upper surface of the cover 24. Suitable means is provided for setting the cylinders in motion under the control of an operator, but this means is not shown, nor is it part of the present invention.

It is to be noted that a pusher rod 35 extends adjacent the level of the upper edge of the housing 13, but its operating mechanism is not shown. In addition, a conveyor 36 resides on the side of the reel opposite the pusher rod and has its upper surface in the plane of the top of the housing. A suitable foundation, not shown, is provided for the apparatus.

The reel 11 comprises a horizontal coil plate 38 through which pass a circular row of inner pins 40 and a circular row of outer pins 41. The pins are fastened to a driven plate 42 which underlies the coil plate and serves to support and drive it. The housing 13 surrounds all of these elements. The driven plate 42 is mounted on and concentric with a hub member 43 which has a tubular portion 44 which extends downwardly and a skirt portion 45 which extends downwardly and outwardly. The lower edge of the skirt has a bevel pinion gear 46 fastened thereto. The pinion gear engages another bevel gear, not shown, which is keyed to a horizontal drive shaft. The shaft is, of course, connected in turn to a source of power by which the reel is driven. A housing 47 surrounds the gear and serves to support the elements of the reel. The hub member 43 is supported on the housing 47, there being a combined thrust and radial bearing 48 therebetween. Through the tubular portion 44 of the hub member extends a shaft 49 which is fastened at its upper end to the coil plate and at its lower end to an actuating mechanism, not shown, which, on occasion, causes the shaft to move upwardly, carrying the coil plate with it.

The conduit 28 extends downwardly through the aperture 27 in the cover 24 and terminates in a conical flared portion 50. The lower edge of the flared portion resides some distance above the upper surface of the coil plate 38. The cover 24 is provided with apertures 51 which are arranged around the center of the cover and are of considerable size. A flared skirt 53 of a conduit 52 of circular cross section is attached by welding or the like to the upper surface of the cover outside the circle of apertures 51. All of the apertures 51 reside between the conduit 28 and the conduit 52. The diameter of the latter conduit is considerably larger than that of the former. The conduit 52 extends upwardly to about the same height as the conduit 28 and is telescopingly joined to a similar conduit 54 which depends from the superstructure 14. An air-tight seal 55 is provided between the two conduits 52 and 54. At its upper portion, the conduit 54 merges with an air disposal means such as a horizontal conduit 56 which extends away from the apparatus for the disposal of the heated air. A rod admission opening 57 is formed in the wall of the reel 11 in the well-known manner.

The operation of the invention will now be understood in view of the above description. The reel will operate in the usual manner, with the driven plate 42 being driven through the bevel gear 46 and the hub member 43 and, in turn, driving the coil plate 38 and the pins 40 and 41. The rod which is to be coiled enters the reel through the opening 57 after leaving the last stand of the rod mill and passing through rod pipes and cooling box and passes into the annular space between the inner pins 40 and the outer pins 41. The coil of rod begins to accumulate. Cooling air originating in the fan 20 passes downwardly through the conduit 21 and the conduit 28 through the aperture 27 in the cover 24 and into the housing 13. The air flows downwardly and outwardly under the guidance of the flared portion 50 and passes through the coil which is accumulating, thus cooling the rod. The air then passes upwardly and leaves the reel through the apertures 51 and passes through the conduits 52, 54 and 56 to a point of disposal, which, presumably, will be outside the plant. When the coil has been completed, the operator will actuate the shaft 49, thus raising the coil plate 38 and the coil to the level of the conveyor 36. At the same time that the shaft 49 is actuated, the hydraulic actuating cylinders 32 and their associated piston rods will be set in motion to raise the cover 24. The upward motion of the cover carries with it the conduits 28 and 52 which will telescope over the surfaces of the conduits 21 and 54, respectively. When the coil has been pushed onto the conveyor 36 and the pusher rod 35 has been retracted, the cover and the conduits 28 and 52 are lowered into their original positions and the apparatus is ready for the introduction of another rod length.

Other modes of applying the principles of the invention may be employed, change being made as regards the details described, provided the features stated in the following claims, or the equivalent of such, be employed.

I therefore particularly point out and distinctly claim as my invention:

1. A reeling apparatus comprising a pouring reel having a vertical axis of rotation, a tight-fitting horizontal cover for said reel, first vertical conduit extending through the said cover in a manner generally coaxial with the said axis of rotation of the reel, a second vertical conduit attached to the cover and communicating with the interior of the reel for removing air therefrom, the first conduit being contained within the second, a source of cooling air at the end of the conduit which is away from the cover, and an actuating means for removing the cover and conduits completely from the reel to permit the removal of coiled product therefrom.

2. A reeling apparatus comprising a pouring reel having a substantially vertical axis of rotation, a superstructure having a source of cooling air mounted thereon, a first conduit depending from the said superstructure and connected at its upper end to the said source, a tight-fitting cover for the reel having a second vertical conduit extending through and upwardly therefrom, the two conduits telescoping at all times and having an air tight seal therebetween, a third vertical conduit extending upwardly from the cover concentrically with the second conduit and communicating with the interior of the reel for the removal of air therefrom, a fourth conduit dependent from the superstructure and having an air disposal means connected to its upper end while the lower end is in telescoping relationship with the upper part of the third conduit, and means for raising the cover and its associated conduit upwardly and completely away from the reel.

3. A reeling apparatus comprising a pouring reel having a substantially vertical axis of rotation, a superstructure having a source of cooling air mounted thereon, a conduit depending from the said superstructure and connected at its upper end to the said source, a tight-fitting cover for the reel having a vertical conduit extending through and downwardly to a position adjacent the bottom of the reel, the two conduits telescoping at all times and having a substantially air tight seal therebetween, means for raising the cover and its associated conduit completely away from the reel, and a passage connected to the upper portion of the reel for removing air from the reel.

4. A reeling apparatus comprising a pouring reel having a substantially vertical axis of rotation, a superstructure having a source of cooling air mounted thereon, a first conduit depending from the said superstructure and connected at its upper end to the said source, a tight-fitting cover for the reel having a second vertical conduit extending through and upwardly therefrom, the two conduits telescoping at all times and having an air-tight seal therebetween, a third vertical conduit extending upwardly from the cover concentrically with the second conduit, apertures formed in the cover in the portion thereof lying between the second and third conduits, the said apertures permitting communication from the interior of the reel to the space between the second and third conduits for the removal of air from the said interior, a fourth conduit dependent from the superstructure and having an air disposal means connected to its upper end while the lower end is in telescoping relationship with the upper part of the third conduit, and means for raising the cover and its associated conduit upwardly and completely away from the reel.

5. A reeling apparatus comprising a pouring reel having a substantially vertical axis of rotation, a superstructure having a source of cooling air mounted thereon, a first conduit depending from the said superstructure and connected at its upper end to the said source, a tight-fitting cover for the reel having a second vertical conduit extending through and upwardly therefrom in alignment with the said first conduit, the two conduits telescoping at all times and having an air-tight seal therebetween, a third vertical conduit extending upwardly from the cover concentrically with the second conduit and communicating with the interior of the reel for the removal of air therefrom, a fourth conduit in alignment with the said third conduit dependent from the superstructure and having an air disposal means connected to its upper end while the lower end is in telescoping relationship with the upper part of the third conduit, and hydraulic cylinders connected between the cover and the superstructure for raising the cover and its associated conduit upwardly and completely away from the reel.

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