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CHARGING DEVICE FOR PICKLING MACHINES

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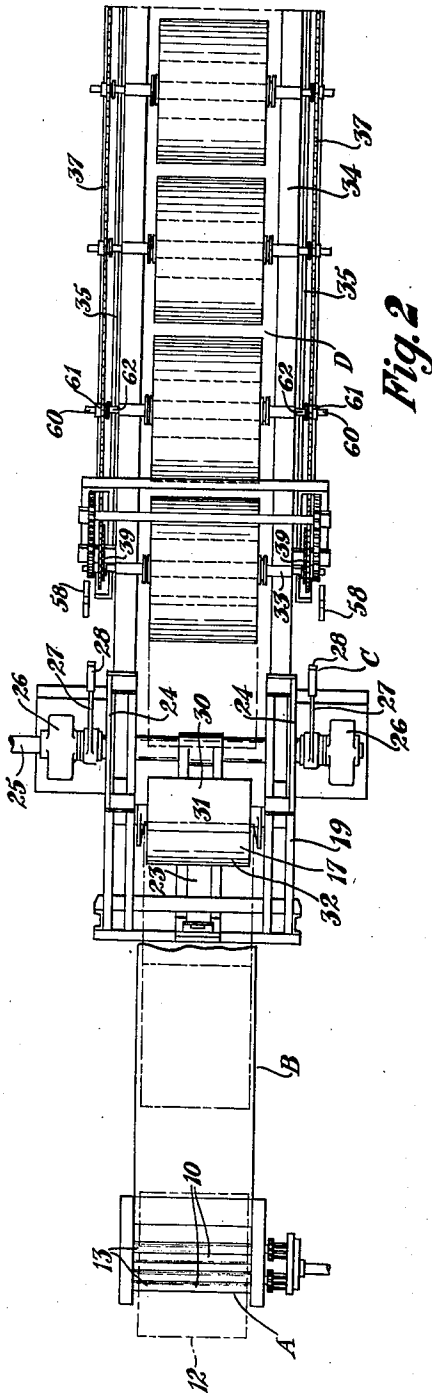


Fig. 2

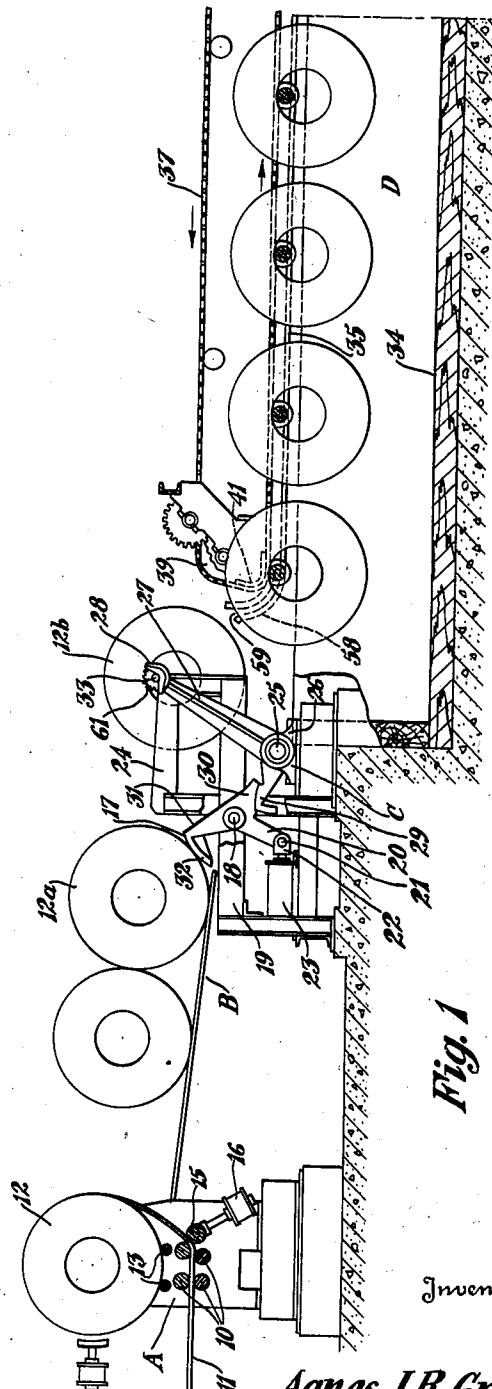


Fig. 1

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CHARGING DEVICE FOR PICKLING
MACHINES

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147,515. Divided and this application August
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7 Claims. (Cl. 214-17)

The invention relates to apparatus for pickling coils of metal strip and the like, and the present application is a division of my Patent No. 2,091,921.

Under present practice considerable difficulty is experienced in the pickling of hot rolled strips of sheet steel which under modern methods are produced in great length and width. In some of the larger mills these hot rolled sheet strips are uncoiled after coming from the hot rolling mill and passed through a continuous pickling apparatus. Such pickling machines, however, are prohibitive, both because of the cost of installing and the great amount of space required, for use in the average smaller cold rolling plant, in which one of the chief difficulties encountered is the pickling of hot rolled coils of strip as received from the manufacturer of the hot rolled strip.

It is usually necessary for the average cold rolling plant to keep on hand a large stock of hot rolled strip of various gauges and widths so that they may quickly fill orders for any gauge or size of cold rolled strip required. Pickled hot rolled strip is not usually purchased by the cold rolling plant, not only because of the increased cost of the same but because the pickled coils will quickly rust if held in storage for any appreciable time before cold rolling.

It is therefore common practice in the smaller cold rolling plants to uncoil the hot rolled strip and pass it through a roll bending machine in order to break the hot mill scale and open the coil into which bent rods are inserted to maintain the desired spacing of the strip within the coil. The coil is then placed on end in a pickling tank in which relative agitation is produced between the coil and the acid, after which the pickled coil is washed as in usual pickling practice.

This method of pickling coils is slow and costly because of the considerable amount of manual labor required to open the coils, insert the spacing rods and remove them after the pickling operation. Difficulties are also encountered in this operation, particularly in the pickling of coils of wide strip where the upper edges may be properly separated by the bent rods while the lower edges may contact at places resulting in black or unpickled spots.

The object of the present improvement is to provide a pickling machine which overcomes the above mentioned difficulties encountered under present practice and in which coils of strip may be efficiently and economically pickled with a

minimum of time and labor, as effectively as is possible with the expensive continuous type of pickling apparatus used in some of the larger mills.

An important object of the invention is to provide a charging device for charging coils of strip metal into the pickling tank in such manner as to permit the coils of metal to be moved through the tank and to be continuously rotated as they progress through the tank.

Another object is to provide such a charging device with means for permitting the insertion of a mandrel through each coil as it is charged into the pickling tank, whereby the coil may be carried through the tank suspended upon said mandrel.

The above objects together with others which will be apparent from the drawing and following description, or which may be later referred to, may be attained by constructing the improved pickling machine in the manner illustrated in the accompanying drawing, in which

Figure 1 is a longitudinal sectional view of the loose coiler, gravity coil storage, coil loading mechanism and entrance portion of the pickling tank, which comprise the charging device portion of the pickling machine; and

Fig. 2, a top plan view of the mechanism shown in Fig. 1.

Similar numerals refer to similar parts throughout the drawing.

The charging portion of the machine, to which the invention pertains, comprises generally the loose coiler A, the gravity coil storage B, the coil loading mechanism C, and the acid tank D, the entrance end portion of which is illustrated.

The loose coiler A may be of usual and well known construction, comprising a series of bending rolls 10 through which the strip 11 is passed and coiled loosely into a coil 12, which may be supported upon the rolls 13.

For the purpose of bending the outer end of the strip inward against the adjacent layer of the coil, a plunger 15 may be provided and operated as by the air or hydraulic cylinder 16.

After a coil is loosely coiled upon the coiler A, it is discharged upon the gravity coil storage B which may comprise a platform inclined at a slight angle away from the loose coiler, the coil rolling down said platform to the position shown at 12a in Fig. 1 where it engages the stop 17 which is pivoted intermediate its ends as at 18 to the frame 19 and provided with the depending arm 20 pivotally connected as at 21 to the plunger

22 of an air or hydraulic cylinder 23 supported by the frame 19.

Inclined rails 24 are mounted upon the frame 19 and located between the stop 17 and the loading mechanism C. This loading mechanism includes a rocker shaft 25 journaled as in the bearings 26 and provided with a spaced pair of upwardly disposed arms 27 having the forked upper ends 28. A motor (not shown) or other suitable driving means, is provided for oscillating the shaft 25.

A rearwardly projecting foot 29 is carried by the shaft 25 and normally located beneath the projecting end portion 30 of the stop 17. It will be noted that the upper surface 31 of the stop curves upward at the forward end of the projection 30.

When the cylinder 23 is operated the stop 17 is rocked upon its pivot, lowering the curved rear end 32 thereof out of the path of the coil and permitting the coil to roll onto the top surface 31 of the stop, the upwardly curved forward end of the projecting portion 30 thereof checking the forward movement of the coil.

A mandrel indicated generally at 33 is then inserted through the open center of the coil and as the cylinder 23 is reversed, the weight of the coil is transferred to the mandrel which is supported upon the rails 24. The mandrel then rolls downward and forward upon these rails until it is caught in the forked ends 28 of the loading mechanism arms 27, the coil being then in the position shown at 12b in Fig. 1.

The picking unit D is located directly beyond the coil loading mechanism and includes the elongated tank 34 preferably located below the floor level, as shown, and having the rails 35 carried at each side of the tank, which may be connected in any suitable manner to the side walls of the tank near the upper edges thereof.

Above each of the rails 35 is located an endless chain 37 located over sprockets 39, positioned near the forward and rear ends of the acid tank, and over the curved chain guides 41 located below the sprockets 39 and positioned to guide the lower strand of each chain just above and substantially parallel to the corresponding rail.

The chains 37 may be driven in the direction of the arrows shown in Fig. 1 by means of any suitable motor, as shown in my patent above referred to, the movement of the two chains being synchronized as completely illustrated and described in said patent.

A downwardly and forwardly curved guide 58, preferably having an upwardly flared entrance mouth 59, is located near the entrance end of the acid tank adjacent to each of the chains 37 and adapted to receive the pintles 60 of the mandrels 33 to guide each mandrel into position beneath the lower strands of the chains so that the sprockets 61 upon the mandrels will engage the lower strands of the chains 37 as the flanged wheel portions 62 of the mandrels are received upon the rails 35.

The operation of the pickling mechanism forms no part of the present invention, being fully disclosed and claimed in my patent of which this is a division.

After each coil of material is loosely coiled upon the loose coiler indicated generally at A, it is discharged onto the inclined gravity coil storage platform B and rolls down until it contacts the stop 32 as indicated at 12a in Fig. 1. When the cylinder 23 is operated the stop 32 is lowered out of the path of the coil, permitting the coil to roll

onto the upper surface 31 of the stop, the upwardly curved forward end 30 thereof stopping the coil from further forward movement.

A mandrel 33 may then be inserted through the center opening of the coil and as the cylinder is operated to move the stop back to the position shown in Fig. 1, the weight of the coil will be received upon the mandrel which is supported upon the inclined rails 24, permitting the mandrel with the coil thereon to roll forward on the rails until the ends of the mandrel are received in the forks 28 of the coil transfer arms 27.

When the motor or other driving means for the shaft 25 is operated, the arms 27 will be lowered, entering the ends of the mandrel into the curved guides 58 which guide the mandrel down onto the rails 35 where the sprockets 61 of the mandrel are engaged by the drive chains 37 which start the mandrel to rotate forwardly upon the rails.

As the arms 27 are returned to the position shown in the drawing, the charging mechanism is set for another operation as above described, to charge the next coil into the pickling tank.

I claim:

1. Pickling apparatus including a tank and means for charging coils of material into said tank, said charging means comprising an inclined platform adapted to convey the coils forwardly by gravity, a stop member at the lower end of the platform in the path of the coils and having a flat surface adapted to support a coil, inclined rails above the stop member adapted to support a mandrel located through each coil, means for moving the stop member to receive a coil thereon and then to a position to stop the next succeeding coil and out of contact with the first named coil, and charging arms at the lower end of said inclined rails for receiving the mandrel and charging the coil into the tank.

2. Pickling apparatus including a tank and means for charging coils of material into said tank, said charging means comprising an inclined platform adapted to convey the coils forwardly by gravity, a pivoted stop member at the lower end of the platform in the path of the coils and having a flat surface adapted to support a coil, inclined rails above the stop member adapted to support a mandrel located through each coil, means for moving the stop member upon its pivot to receive a coil thereon and then to a position to stop the next succeeding coil and out of contact with the first named coil, and charging arms at the lower end of said inclined rails for receiving the mandrel and charging the coil into the tank.

3. Pickling apparatus including a tank and means for charging coils of material into said tank, said charging means comprising an inclined platform adapted to convey the coils forwardly by gravity, a stop member at the lower end of the platform in the path of the coils and having a flat surface adapted to support a coil, inclined rails above the stop member adapted to support a mandrel located through each coil, means for moving the stop member to receive a coil thereon and then to a position to stop the next succeeding coil and out of contact with the first named coil, and pivoted charging arms at the lower end of said inclined rails for receiving the mandrel and means for swinging said charging arms upon their pivot for charging the coil into the tank.

4. Pickling apparatus including a tank and means for charging coils of material into said tank, said charging means comprising an inclined

platform adapted to convey the coils forwardly by gravity, a stop member at the lower end of the platform in the path of the coils and having a flat surface adapted to support a coil, said flat surface being upwardly inclined at its forward end to check the forward movement of the coil, inclined rails above the stop member adapted to support a mandrel located through each coil, means for moving the stop member to receive a coil thereon and then to a position to stop the next succeeding coil and out of contact with the first named coil, and charging arms at the lower end of said inclined rails for receiving the mandrel and charging the coil into the tank.

5. Pickling apparatus including a tank and means for charging coils of material into said tank, said charging means comprising an inclined platform adapted to convey the coils forwardly by gravity, a pivoted stop member at the lower end of the platform in the path of the coils and having a flat surface adapted to support a coil, inclined rails above the stop member adapted to support a mandrel located through each coil, means for moving the stop member upon its pivot to receive a coil thereon and then to a position to stop the next succeeding coil and out of contact with the first named coil, and pivoted charging arms at the lower end of said inclined rails for receiving the mandrel and means for swinging said charging arms upon their pivot for charging the coil into the tank.

6. Pickling apparatus including a tank and means for charging coils of material into said tank, said charging means comprising an inclined platform adapted to convey the coils forwardly

by gravity, a pivoted stop member at the lower end of the platform in the path of the coils and having a flat surface adapted to support a coil, said flat surface being upwardly inclined at its forward end to check the forward movement of the coil, inclined rails above the stop member adapted to support a mandrel located through each coil, means for moving the stop member upon its pivot to receive a coil thereon and then to a position to stop the next succeeding coil and out of contact with the first named coil, and pivoted charging arms at the lower end of said inclined rails for receiving the mandrel and means for swinging said charging arms upon their pivot for charging the coil into the tank.

7. Pickling apparatus including a tank and means for charging coils of material into said tank, said charging means comprising an inclined platform adapted to convey the coils forwardly by gravity, a pivoted stop member at the lower end of the platform in the path of the coils and having a flat surface adapted to support a coil, said flat surface being upwardly inclined at its forward end to check the forward movement of the coil, inclined rails above the stop member adapted to support a mandrel located through each coil, means for moving the stop member upon its pivot to receive a coil thereon and then to a position to stop the next succeeding coil and out of contact with the first named coil, and charging arms at the lower end of said inclined rails for receiving the mandrel and charging the coil into the tank.

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