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W. M. NECKERMAN

FURNACE CHARGING MACHINE

Filed Oct. 16, 1922

Fig. 1.

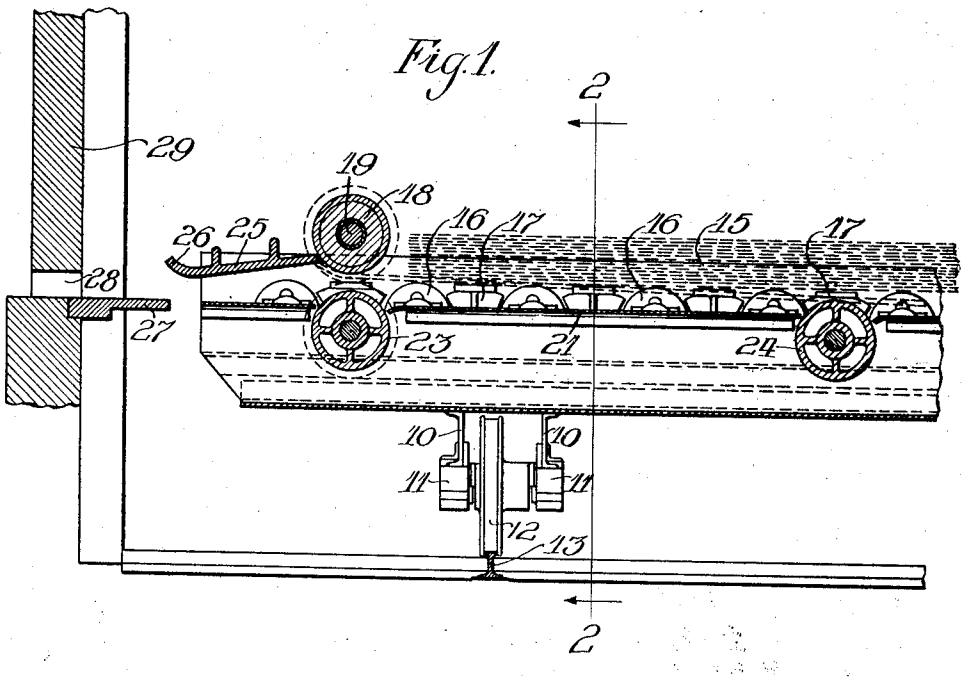
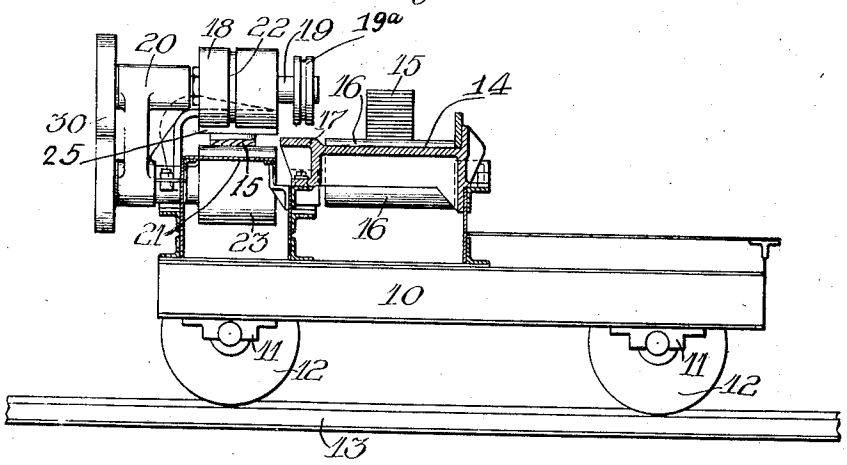


Fig. 2.



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by Dunning & Dunning. Attys.

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UNITED STATES PATENT OFFICE.

WILLIAM M. NECKERMAN, OF YOUNGSTOWN, OHIO, ASSIGNOR TO THE YOUNGSTOWN SHEET AND TUBE COMPANY, OF YOUNGSTOWN, OHIO, A CORPORATION OF OHIO.

FURNACE-CHARGING MACHINE.

Application filed October 16, 1922. Serial No. 594,783.

To all whom it may concern:

Be it known that I, WILLIAM M. NECKERMAN, a citizen of the United States, residing at Youngstown, in the county of Mahoning and State of Ohio, have invented certain new and useful Improvements in Furnace-Charging Machines, of which the following is a specification.

The machine of this invention is designed primarily for the charging into a furnace of long thin flexible sheets of metal, technically known as skelp, which sheets are heated in the furnace to a welding heat and are thereafter drawn out at the far end of the furnace and run through formers which transform the sheet into a tube. In the operation of such a machine, it is essential that the skelp sections, one at a time, be advanced rapidly and accurately into the mouth of the furnace and hurled from the machine with sufficient force to carry each section well within the body of the furnace; and it is also necessary to provide means for the positive traveling of the carriage step by step across the mouth of the furnace, so that the skelp sections will be deposited side by side within the furnace and in closely adjacent parallel relation to one another.

The machine of the present invention employs a magnetic roller for carrying forward the skelp sections and securing a sufficient grip on each section to impart the necessary thrust thereto. The magnetic roller, which is positively driven, occupies an elevated position with respect to the skelp sections upon which it operates; and the present invention is designed primarily to so arrange the feeding platform with respect to the elevated magnetic roller that the skelp sections will be lifted by magnetic action and gripped firmly to the surface of the roller without being thereby misdirected in their line of travel toward the furnace mouth.

Experience has shown that, where an elevated magnetic roller has been employed, it is difficult to so regulate the magnetic flux as to positively carry forward the skelp section without occasionally causing a skelp section to cling or adhere so firmly to the roller as to cause its forward end to be lifted to a point above the furnace mouth, thereby tending to jam the apparatus, with a consequent interruption in its performance and an occasional breakage of the mechanism.

The charger of the present invention is so designed as to permit the employment of a relatively strong magnetic flux so that the positive feeding action of the magnetic roller will be utilized, and at the same time to provide suitable means for stripping each skelp section from the magnetic roller and for positively guiding and directing its forward end into the furnace mouth.

The invention also relates to the construction of the charger as a whole and to the arrangement provided for stacking the skelp in suitable and convenient relation to the feeding means, so that the skelp sections may be readily delivered to the magnetic roller in orderly succession and without undue effort on the part of the operator.

In the drawing:

Figure 1 is a longitudinal sectional elevation of the forward or delivering end of the charger showing its relation to the furnace mouth; and

Fig. 2 is a cross sectional elevation taken on line 2—2 of Fig. 1.

The charger, as a whole, is built upon a carriage comprising transversely extending bottom sills 10 provided with journal boxes 11 for the journaling of two pair of wheels 12 which travel on rails 13, the rails extending transversely of the furnace mouth and in parallel relation to the forward wall of the furnace. The drawings show but a single pair of these sills, but it will be understood that the arrangement is duplicated at the outer end of the carriage.

The cross sills 10 serve to support a longitudinally extending elevated table 14 above which a stack of skelp sections 15 is deposited. The table 14 is broken at recurrent intervals to provide for the protrusion of the upper surface of a set of supporting idle rollers 16 upon which the skelp stack directly rests, the arrangement being such as to permit a stack of skelp to be shoved inwardly along the rollers to the proper position from which to begin the feeding operation.

The table 14 at its inner side is provided with a series of slightly elevated edge flanges

17 whose upper surfaces are in aligned relation to one another and to the upper surfaces of the rollers so that skelp, one at a time, can be slid from the stack laterally and dropped into position to be engaged by the feeding elements now to be described. At one side of the elevated table, and near the forward end of the carriage, is journaled a magnetic roller 18 which is mounted upon a shaft 19 carried by a bracket 20 suitably secured to a runway 21, which runway lies in parallel relation to the elevated table with its upper surface slightly below the surface of the table. The shaft may be driven by a pulley 19ª as shown or in any other suitable manner. The magnetic roller, as shown, preferably consists of two sections of magnetizable material separated by a gap which may be occupied by a spacer ring 22 of brass or the like, but it will be understood that the specific construction of the magnetic roller forms no part of the present invention, and that the same may be of any suitable and well known construction as regards the means provided for transmitting magnetic flux through the roller surface.

The method of constructing the inner windings and of wiring the roller are well understood to those skilled in the art and need not be here described, nor is it essential that the roller surface itself be of magnetizable material, since a similar result can be attained by the use of nonmagnetizable material, such as manganese steel, provided only that adequate means are employed for directing the magnetic flux through the roller sections at the point of contact with the skelp. It will thus be understood that the term "magnetic roller" is intended to cover any form of roller which is internally provided with magnetic means for ensuring a firm magnetic contact with the skelp, which latter serves to bridge the gap between the roller sections and complete the magnetic circuit.

It will be observed that the lower surface of the magnetic roller occupies a position slightly above the plane of the edge flanges 17, so that the skelp sections might be slipped edgewise from the elevated platform through the gap thus afforded and in position to be lifted by magnetic action into contact with the roller. It is preferred, for purposes of ready manipulation, to deposit the skelp stack slightly to the rear of the magnetic roller, and allow the skelp sections to fall upon a pair of feed rollers 23 and 24 which protrude upwardly through the surface of the runway, the forward roller 23 being located immediately below the magnetic roller. This arrangement permits the skelp sections to be pried from the stack and dropped down onto the feed rollers, and after being initially fed to a point well beneath the magnetic roller to be lifted by magnetic action into contact therewith, after which each skelp section will be positively fed by the magnetic roller, the rear or tail end of each skelp section readily passing over the rear feed roller as it is drawn forward. The skelp sections being flexible will readily accommodate themselves to a certain amount of flexing action occasioned by the lifting of the skelp sections into contact with the magnetic roller.

In practice, each skelp section at its forward end is slightly upturned after the manner of the tip of a ski, in order to afford a certain amount of sled runner effect in sliding the skelp sections into the furnace, but primarily for the purpose of facilitating the passage of the heated sections through the forming die or bell at the far end of the furnace. This formation of the sections, causes the same to adhere very closely to the magnetic roller when the tip end of the section is first engaged by the roller and develops a tendency for the section to curl up around the roller to a greater or less extent, especially when a sufficiently strong magnetic action to insure positive feeding is utilized. To counteract this tendency and to positively direct the skelp toward the furnace mouth, a stripper plate 25 is provided at a point immediately in advance of the magnetic roller, which stripper plate is arranged in oblique relation with respect to the top of the runway over which the rollers advance, the outer or rear edge of the stripper plate, which lies in proximate relation to the roller, being elevated with respect to the inner edge 26, which latter is flared upwardly and overlies a protruding shelf 27 outwardly projecting from the mouth 28 of the furnace 29.

The inner edge of the stripper plate is elevated sufficiently above the plane of the lower surface of the magnetic roller to afford clearance for the upturned ends of the skelp sections, so that as the latter passes under the magnetic roller and are lifted by magnetic action into contact therewith, the tip of each skelp section will contact the under surface of the stripper plate, which is formed of non-magnetic material, thereby guiding and directing the tip of the skelp section obliquely downward while at the same time the magnetic roller will maintain contact with the skelp section throughout its period of advance into the furnace, said contact being effectively maintained by reason of the fact that the skelp will flex or bend sufficiently to accommodate itself to the positions mentioned, which, of course, requires that the magnetic flux be sufficiently strong to maintain contact with the skelp section despite the flexure in the manner stated.

In order to maintain uniformity in the feeding action between the magnetic roller

and the underlying feed roller 23, a pair of friction wheels 30 are provided which are mounted on the shafts of the respective rollers, so that the same will rotate in unison with one another.

In practical operation, a stack of skelp is slid forwardly over the idle rollers 16 on the elevated platform until the forward end of the stack is closely adjacent to the magnetic roller. The operator then grasps the uppermost skelp section from the stack and pries off the rear end which falls inwardly and slides over the edge flanges 17 toward the runway carrying down the forward end of the skelp until the skelp assumes a position in the runway pointing directly toward the furnace mouth. The feed rollers 23 and 24, being positively driven, will advance the skelp section sufficiently to bring it within the influence of the overlying magnetic roller, which flexes the forward end of the skelp section upwardly by magnetic action, and as soon as contact with the magnetic roller is effected, the skelp section will be fed forward rapidly and hurled into the furnace mouth with sufficient force to carry the rear end of the skelp section several feet inside of the furnace. As the skelp section advances, its tail end will drag along the runway and its forward end will be flexed downwardly by contact with the stripper plate, thus bowing the skelp section upwardly at an intermediate point which produces in the skelp section the effect of a wave crest which runs rapidly from end to end.

It will be noted, however, that at no times will the flexing action be excessive, and in view of the fact that the magnetic roller occupies a position but slightly above the surface of the runway and the lower rollers located therein, a firm and uniform magnetic grip is maintained at all times on the skelp section. The structure is one which permits the skelp sections to be delivered in rapid order to feeding position and at the same time insures means for positive and certain feeding of the skelp sections forwardly with sufficient speed and precision to hurl them with the force necessary to carry them well within the furnace mouth. The arrangement, furthermore, is one which enables a sufficiently strong magnetic flux to be maintained to insure a positive gripping of all skelp sections despite irregularities of contour in the sections and without danger that some of the skelp sections will cling so closely to the magnetic roller as to tend to interfere with the proper guiding of the skelp sections to the furnace mouth.

I claim:

1. In a furnace charger, the combination of a carriage provided with a runway for sections of metal, a magnetic roller elevated above the runway, a stripper plate in advance of the magnetic roller, and a feed roller located in the runway below the magnetic roller, substantially as described.

2. In a furnace charger, the combination of a carriage provided with a runway for sections of metal, a magnetic roller elevated above the runway, a stripper plate in advance of the magnetic roller, said plate extending obliquely downwardly forward from said roller, and a feed roller located in the runway below the magnetic roller, substantially as described.

3. In a furnace charging machine, the combination of a carriage provided with a runway for metallic strips, a magnetic roller elevated over the runway, and a feeding roller in the runway below the magnetic roller, the carriage being further provided with an elevated platform laterally adjacent the runway for the deposit of a stack of metallic strips, and a plurality of idle rollers protruding through said platform, substantially as described.

4. In a furnace charging machine, the combination of a carriage provided with a runway for metallic strips, and further provided with an elevated platform adjacent the runway, said platform having along its inner edge a series of edge flanges elevated slightly above the surface of the platform, a plurality of rollers mounted within the platform and protruding above the surface thereof to have their feeding surfaces in the same plane with the edge flanges, a magnetic roller overlying the runway and adapted to be engaged by metallic strips in the runway, and a stripper plate overlying the runway in advance of said roller, substantially as described.

5. In a furnace charging machine, the combination of a carriage provided with a runway for metallic strips, and further provided with an elevated platform adjacent the runway, said platform having along its inner edge a series of edge flanges elevated slightly above the surface of the platform, a plurality of rollers mounted within the platform and protruding above the surface thereof to have their feeding surfaces in the same plane with the edge flanges, a magnetic roller overlying the runway and adapted to be engaged by metallic strips in the runway, and a stripper plate overlying the runway in advance of said roller, said stripper plate extending obliquely forward and downward from said roller, substantially as described.

6. In a furnace charging machine, the combination of a carriage provided with a runway for metallic strips, and further provided with an elevated platform adjacent the runway, said platform having along its inner edge a series of edge flanges elevated slightly above the surface of the platform, a plurality of rollers mounted within the

platform and protruding above the surface thereof to have their feeding surfaces in the same plane with the edge flanges, a magnetic roller overlying the runway and adapted to be engaged by metallic strips in the runway, a stripper plate overlying the runway in advance of said roller, said stripper plate extending obliquely forward and downward from said roller, and a feed roller protruding through said runway and underlying the magnetic roller, substantially as described.

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