June 29, 1943. P. H. WASHAM, JR 2,323,104

UNCOILER

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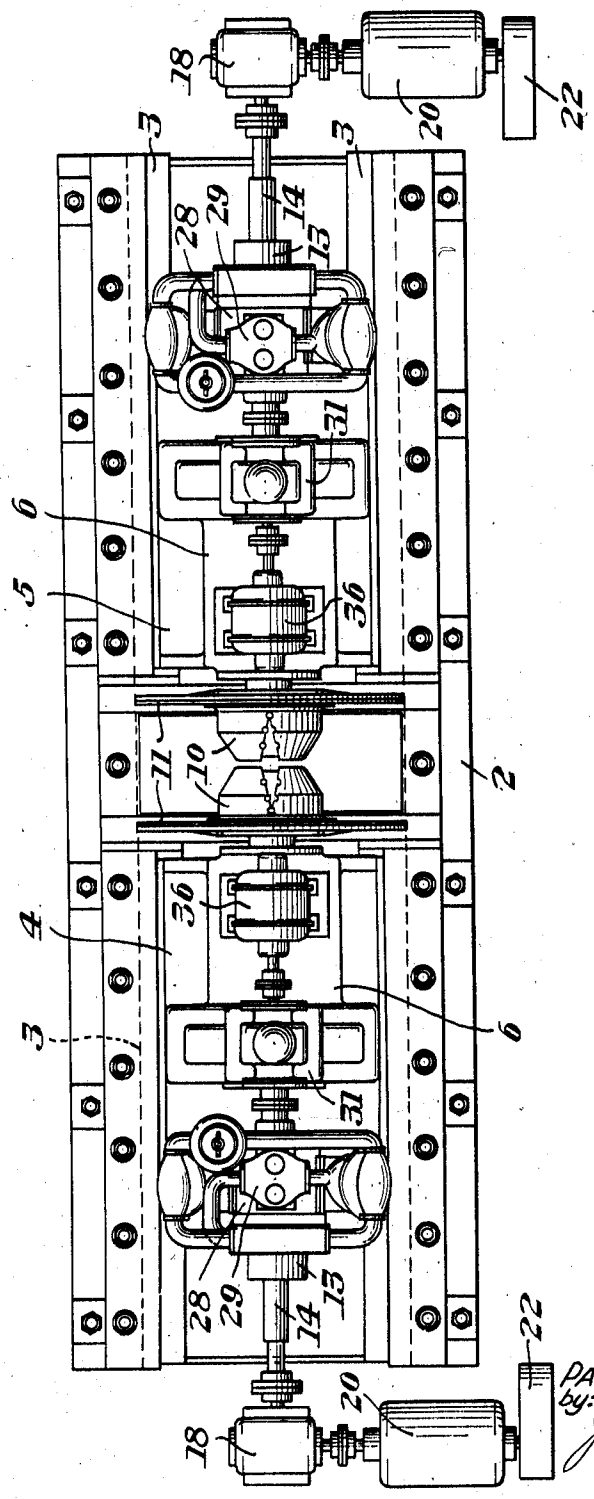


Fig. 1.

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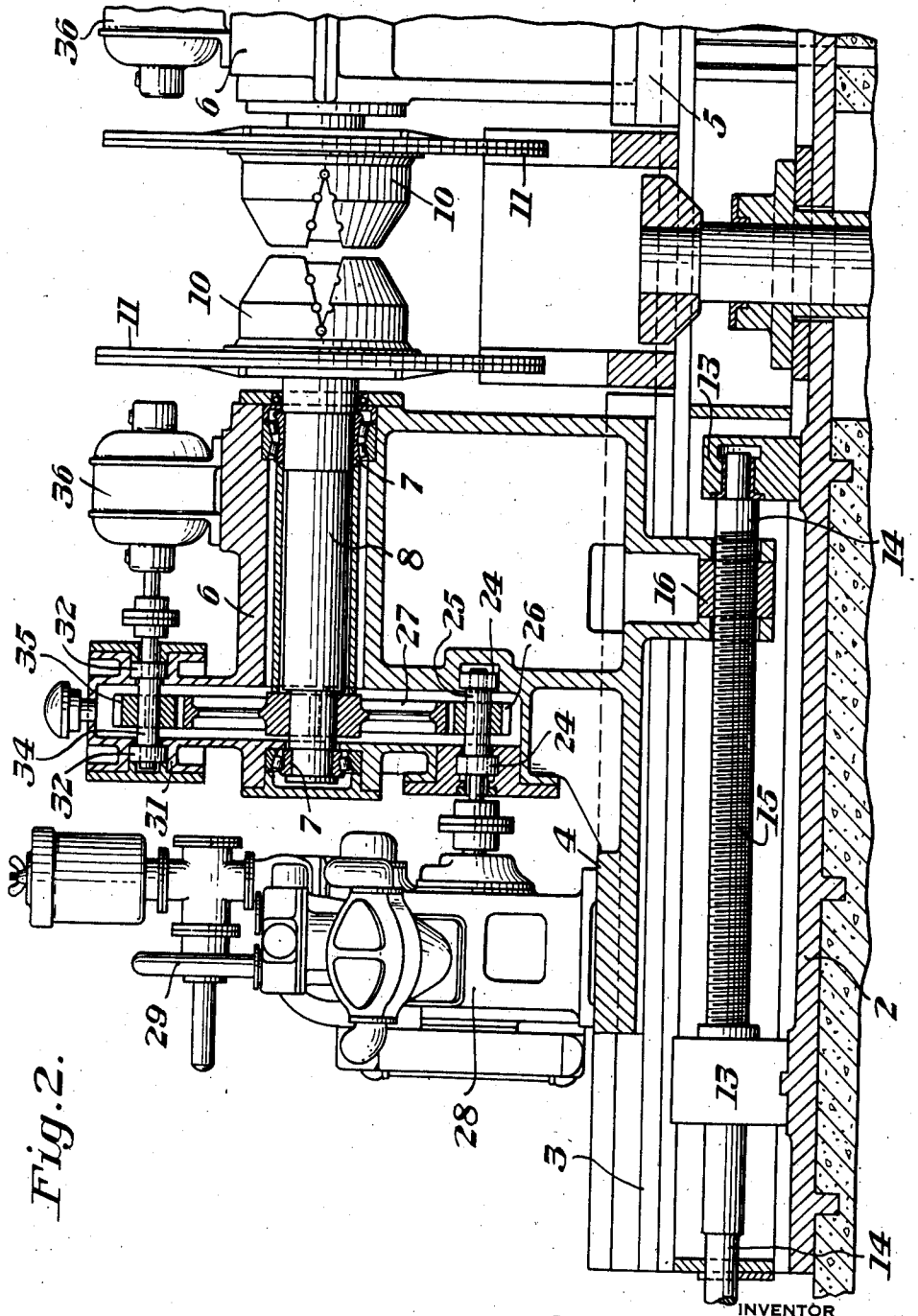


Fig. 2.

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UNCOILER

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3 Claims. (Cl. 242—78)

This invention relates to machines for supporting coiled strip during the unwinding thereof, and more particularly to those uncoilers which are used in the uncoiling of strip metal, such as strip steel.

In the manufacture of strip metal, and particularly strip steel, the strip is rolled to considerable length and formed into coils whereby it may be more conveniently handled. These coils are subsequently unwound and the strip subjected to further processing. It is most desirable to employ an uncoiler which holds the coil being paid off on a mandrel or between a pair of opposed cones, whereby the coil-supporting instrumentalities may have associated therewith means for retarding the rotation thereof to thereby apply back-tension to the coil, and accordingly the strip. Tensional unwinding forces are applied to the strip being uncoiled by the processing means, such, for example, as a temper-rolling mill, an electrolytic cleaning line, etc., which as such forms no part of the present invention and accordingly is neither shown herein nor described more fully hereinafter. A number of types of uncoiling apparatus have been employed to apply the desired back-tension. In the early prior art, the back-tension was provided through the medium of a friction brake. Subsequently there was developed for use in combination with the uncoiler (comprising the coil-supporting means) apparatus which not only applied the desired back-tension but which converted the forces incident thereto into useful work. As an example, sometimes the apparatus combined with the coil-supporting means took the form of the generator of a motor-generator set. However, such apparatus is quite expensive.

It is among the objects of the present invention to provide a simple and inexpensive uncoiler of the class described which establishes the desired back-tension while converting the forces incident thereto into useful work.

Another object is the attainment of the foregoing in such manner as not to present problems of uneven power requirements, whereby smoothness of operation results. More specifically, the teachings of the present invention include the provision of pumps, such as air compressors, which are mechanically connected with the coil-supporting means, in combination with means for eliminating pulsations which are characteristic of the said pumps.

The invention, then, comprises the features hereinafter fully described and as particularly pointed out in the claims, the following description and the annexed drawings setting forth in detail a certain illustrative embodiment of the invention, this being indicative of one of the number of ways in which the principles of the invention may be employed.

In said drawings:

Figure 1 is a plan of the apparatus of the present invention.

Figure 2 is an enlarged side elevation, partly in section, and illustrating in considerable detail one-half of the apparatus, the remainder thereof being identical and deleted in the interests of brevity.

Referring more particularly to the drawings, the numeral 2 designates a bed which provides a pair of opposed ways 3. As in conventional practice, there is seated on the bed 2 for cooperation with the ways 3 thereof, a pair of opposed traverse heads, as indicated at 4 and 5, either or both of which are adapted for reciprocal movement in order to receive and support between them the coil to be paid off. The traverse heads 4 and 5 may embody expanding cones which will be more fully described hereinafter, or in view thereof there may be used a mandrel or other coil-supporting instrumentality which as such forms no part of the present invention.

Each of the traverse heads 4 and 5 carries a superstructure 6, each superstructure comprising a pair of aligned bearings 7. In each pair of aligned bearings 7 there is journaled a rotatable spindle 8, the adjacent ends of the said spindles being opposed and carrying in adjacent relationship one with respect to the other an expanding cone 10 having associated therewith a side-guiding disc 11.

On each side of the transverse vertical center line of the bed 2, and between the opposed ways 3 thereof, there is a pair of aligned bearings 13 each pair of which is disposed beneath one of the traverse heads (4 or 5). In each pair of bearings 13 there is journaled a shaft 14 having an intermediate screw-threaded portion 15. Secured to the bottom of each of the traverse heads (4 and 5) is a nut 16 which depends downwardly between the opposed ways 3 and carries a nut element which is engaged by the screw-threaded portion 15 of the adjacent shaft 14.

Disposed adjacent each end of the bed 2 is a gear reducer 18 which is connected to the drive shaft of an adjacently disposed electric motor 20, each of the said motors 20 being provided with a magnetic brake, as shown at 22. The outer ends of the shafts 14 are suitably connected to the gear reducers 18 and, through the electric

motors 20, move the traverse heads 4 and 5 toward and away from each other, whereby they may engage and disengage the ends of a coil (not shown).

The superstructure 6 of each of the traverse heads 4 and 5 is provided with a pair of aligned bearings 24, the axes of which are below the axes of the respectively adjacent aligned bearings 7 in which the rotatable spindles 8 are journaled. In each pair of aligned bearings 24 there is journaled a shaft 25 which has secured thereto a pinion 26. Each of these pinions 26 is driven from the adjacently disposed rotatable spindle 8 by means of a large driving pinion 27 which is secured to the latter.

Mounted on the outer end of each of the traverse heads 4 and 5 is an air compressor or other pump 28, the driving shaft of which is suitably connected to the adjacent shaft 25.

Each of the pumps 28 (i. e., air compressors in the present instance) is provided with a differential pressure control valve 29 which may be used to regulate the volume of air or other fluid to be admitted thereto. Thus the power requirements of the pumps 28 are proportional to the volume of fluid admitted at the inlet of the differential pressure control valves 29, and disregarding friction, the tension in the strip being uncoiled will be a direct function of the fractional opening of the valves; and the energy required to retard the rotation of the coil and produce the desired back-tension in the strip is converted into useful work in the pumps.

The power required to produce the forward tension which pulls the strip from the coil may be readily indicated in any suitable way, and this indication utilized as a guide for regulating the volume of fluid admitted to the pumps.

As before stated, the teachings of the present invention comprehend the combination with an uncoiling device and a pump (such as an air compressor) of a motor which drives through the pump and not only eliminates pulsations and therefore provides a smoothing effect but which also may be utilized to initiate the payoff of the strip being uncoiled. Accordingly there is mounted on one or both of the superstructures 6 (of the traverse heads 4 and 5) a housing 31 carrying a pair of aligned bearings 32 the axes of which are parallel with the axes of the aligned bearings 7 which were earlier described. Within the aligned bearings 32 there is journaled a shaft 34 which has secured thereto a pinion 35 which meshes with the driving pinion 27 on the adjacent spindle 8. Suitably connected to the shaft 34 is the drive shaft of an adjacently disposed electric motor 36. This electric motor (or motors) 36 is utilized to revolve one (or both) of the cones 10 (or equivalent coil-supporting means), in assisting the initiation of the uncoiling of the new coil through the line which, as before stated, may comprise a temper-rolling mill, an electrolytic cleaning line, etc. Immediately after the initiation of the uncoiling operation, the operation of the electric motor 36 is discontinued, but being geared to the spindle 8, the driving shaft is permitted to freely rotate as the coil is unwrapped by the application of the forward tension through the processing line. The rotation of the driving shaft of the motor 36 provides a smoothing effect similar to that of a flywheel, which eliminates pulsations at the cones 10 due to the uneven power requirements of the pumps 28 to which they are connected.

As the traverse heads 4 and 5 (and accordingly the cones 10) have been separated to admit of the insertion therebetween of a new coil, the motors 20 are operated to return the traverse heads (and the cones) to such position that the said cones hold the coil tightly between them and the end pressure supplied by the shafts 14 prevents slippage of the coil relative to the said cones.

While I have shown and described a specific embodiment of the present invention, it will be seen that I do not wish to be limited exactly thereto, since various modifications may be made without departing from the scope of the invention as defined in the appended claims.

I claim:

1. In a machine for supporting a coiled strip during an uncoiling operation, in combination, a rotatable coil-engaging means, a pump having a driving connection with said rotatable coil-engaging means, and a motor having a driving connection with said rotatable coil-engaging means to effect positive rotation of said coil, said motor also acting as a flywheel to absorb the pulsations of said pump.

2. In a machine for supporting a coiled strip during an uncoiling operation, in combination, opposed rotatable coil-engaging heads each having a generally cylindrical portion for entering a coil and a flat annular portion encircling the generally cylindrical portion for positively engaging the annular end surface of said coil, means for moving said heads toward each other to mutually engage the ends of said coil, a pump having a driving connection with one of said heads, and a motor having a driving connection with the last named head to effect positive rotation of said coil, said motor also acting as a flywheel to absorb the pulsations of said pump.

3. In a machine for supporting a coiled strip during an uncoiling operation, in combination, opposed rotatable coil-engaging heads each having a generally cylindrical portion for entering a coil and a flat annular portion encircling the generally cylindrical portion for positively engaging the annular end surface of a coil, means for moving said heads toward each other to mutually engage the ends of a coil, a pump having a driving connection with each of said heads, and a motor having a driving connection with one of the driving connections aforesaid to effect positive rotation of said coil, said motor also acting as a flywheel to absorb the pulsations of said pump.

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