Jan. 14, 1941. L. W. NASH ET AL 2,228,477

UNWINDING REEL AND CARRIAGE ASSEMBLY

Filed June 27, 1938 2 Sheets-Sheet 1

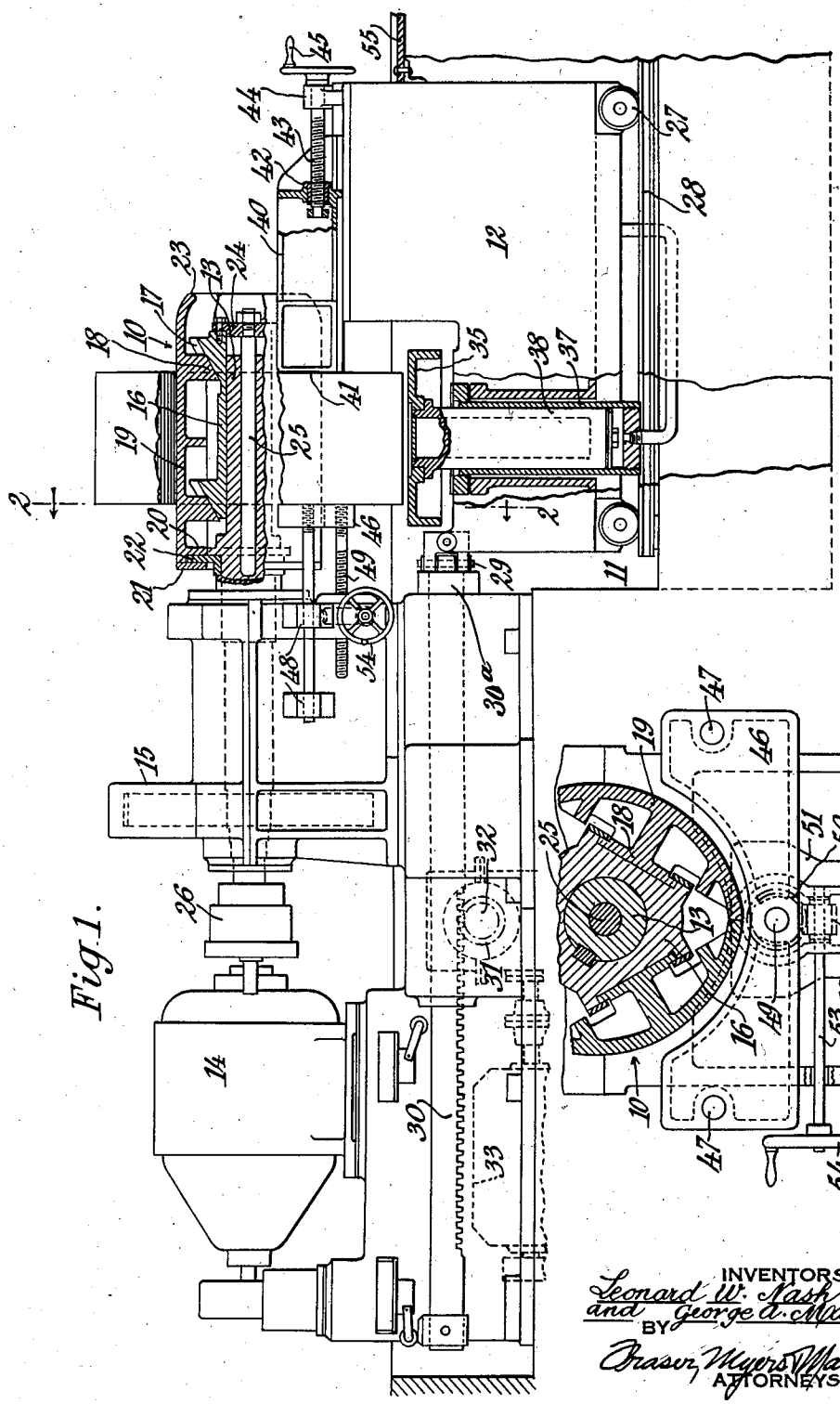

Fig. 1.

Fig. 2.

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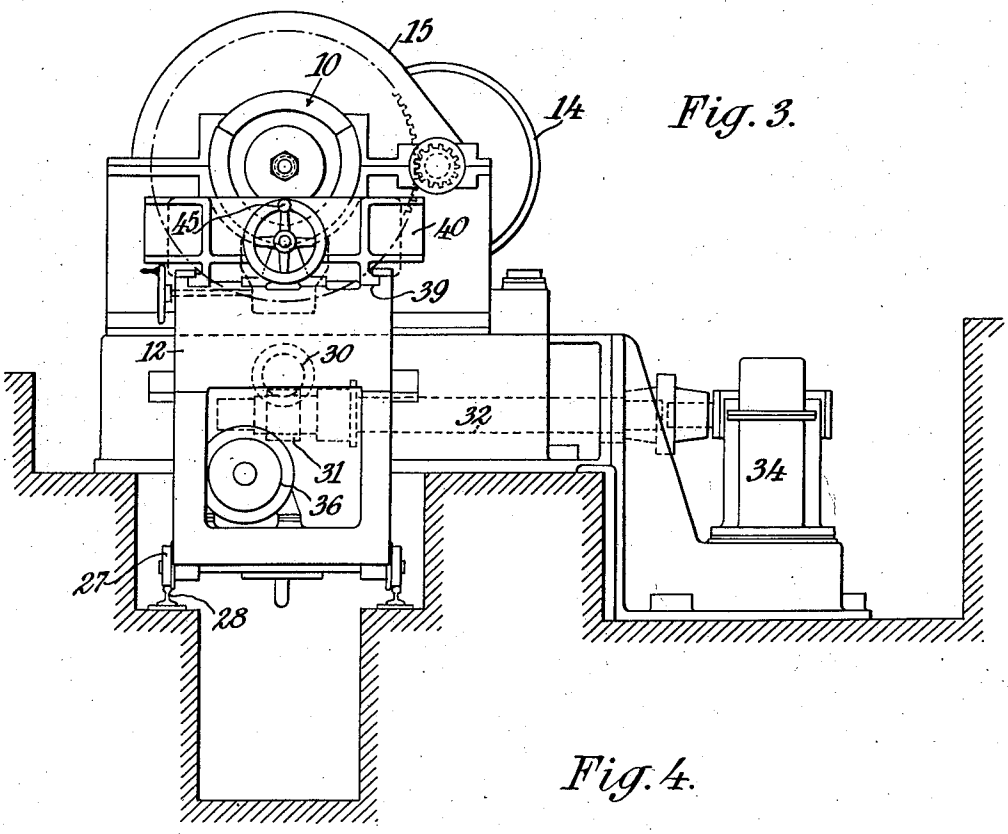


Fig. 3.

Fig. 4.

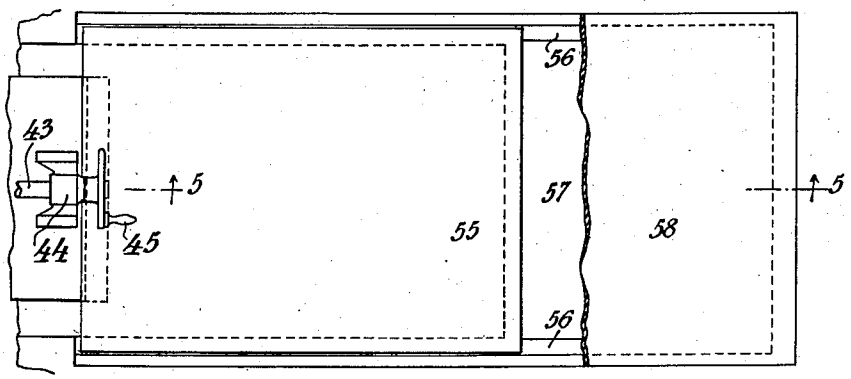
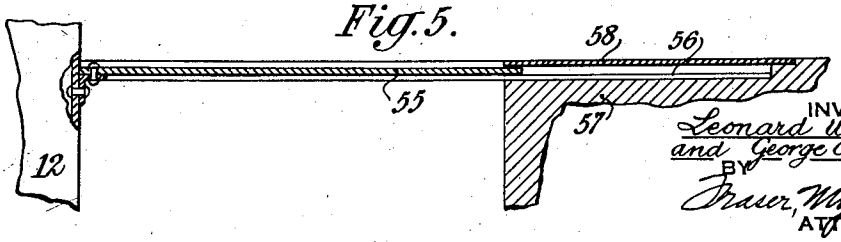


Fig. 5.



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UNITED STATES PATENT OFFICE

2,228,477

UNWINDING REEL AND CARRIAGE ASSEMBLY

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2 Claims. (Cl. 242—79)

Our present invention relates to an unwinding reel and carriage assembly for handling coils of strip material, and more particularly for positioning coils of such material for unwinding and feeding to machines or apparatus, for further treatment.

In the rolling of hot and cold strip metal, both ferrous and non-ferrous, the strip material at one or more stages in the procedure is wound into coils which must be subsequently unwound in the course of further treatment of the metal. Various means have been proposed for the handling of these coils, with greater or less success. Most of these coils are initially wound on a mandrel and discharged therefrom to provide coreless coils. These are then transferred to unwinding reels which are of various types. In one form of apparatus the coils are transferred to expansible mandrels from which they are unwound, but because of the lack of means for centering the coils on the mandrels and the tendency for the convolutions to telescope in the application of the coils to the mandrel, this practice has given way to the use of what are known as cone reels.

The cone reels, while possessing the advantage of facilitating handling and centering of the coils, also possess certain objectionable characteristics, for example, (*a*) the pressure of the cones have a tendency to spoil the edges of the innermost convolution of the strip; (*b*) in unwinding strip metal from such reels it is important to hold the last few convolutions tightly, which fact, together with the pressure on the edges of said convolutions, results in much spoilage and scrap at the end of such coils; (*c*) it is difficult to definitely control the amount of tension since too little pressure on the coil ends allows the coil to slip, and too much pressure damages the edges of the strip.

The objects of our present invention are to overcome the deficiencies and objectionable characteristics of the prior art devices. This we accomplish by providing a collapsible mandrel and a loading carriage for cooperation therewith whereby the following advantages are realized: (1) the edges of the strip are not distorted; (2) strip of various widths can be equally well handled and centered on the mandrel; (3) the expansion of the mandrel against the innermost convolution of the coil serves to hold with sufficient pressure to transmit the full power of the motor; (4) while a coil is being unwound, another coil may be deposited on the carriage ready for loading onto the mandrel as soon as the coil thereon is unwound, thus providing a substantial saving in operating time; (5) the relationship of parts makes the mill more accessible since the loading carriage is below the floor level and a sliding plate covers the pit when the carriage is in place under the mandrel.

The present invention will be better understood from the detailed description which follows, when considered in connection with the accompanying drawings, wherein:

Figure 1 is a side elevation of our invention with certain parts broken away to better illustrate the construction thereof.

Fig. 2 is a section taken along the plane of the line 2—2 of Fig. 1.

Fig. 3 is an end elevation of the apparatus shown in Fig. 1 when viewed from the right thereof.

Fig. 4 is a fractional top plan view of the carriage pit and the sliding floor plate for covering the same.

Fig. 5 is a longitudinal section taken substantially along the plane of the line 5—5 of Fig. 4.

Referring to the drawings, our invention comprises a mandrel indicated generally by the reference character 10, a pit 11 below the mandrel and within which a carriage 12 is movable and adapted to be brought into underlying relation to the mandrel.

The mandrel 10 is of the collapsible type and consists of a core or shaft 13 which is supported at one end and free at its other end, the supported end of the shaft being driven by a motor 14 through a drive gear 15 in a manner which is well known. Slidably but non-rotatably mounted on the core or shaft 13 is a sleeve 16 provided on its surface with two sets of inclined slideways 17 which are axially spaced apart. Mounted to ride in the inclined slideways 17 are lugs 18 depending from arcuate segments 19. The arcuate segments adjacent one end thereof are each formed with an inwardly-directed flange 20, and at the ends with an annular plate 21 providing an annular recess into which extends an outwardly-directed flange or ring 22 fixedly mounted on the shaft housing. The flange and recess relation thus described functions to preclude longitudinal movement of the arcuate sections while permitting radial movement thereof when the sleeve 16 is moved axially. The arcuate segments 19 at their outer end are turned or beveled inwardly, as indicated at 23, to facilitate the application of a coil of strip material onto the mandrel.

The sleeve 16 at its outer end is connected by a plate 24 to a rod 25 which extends through an axial bore in the mandrel shaft, which rod at its opposite end is connected to a piston (not shown) mounted within a fluid pressure cylinder 26. As shown in Figs. 1 and 2, the sleeve 16 is in its outermost position, i. e., with the lugs 18 of the arcuate segments in their innermost position on the inclined slideways 17. When air or other pressure fluid is admitted to the cylinder 26 to move the piston therein to the left, as viewed in Fig. 1, the rod 25 is moved in the corresponding direction and carries with it the sleeve 16. In the course of this movement the inclined slideways 17 force the lugs 18 radially outwardly to expand the arcuate segments 19.

The carriage 12, which is disposed in the pit 11, is provided with wheels 27 which ride over a trackway 28, and said carriage is adapted to be moved over said trackway by being coupled, as at 29, to one end of a rack 30 which is adapted to be longitudinally moved by means of a pinion 31 mounted on a shaft 32 which is driven by a motor 33 through a speed reducer 34. The movable carriage 12 has a fixed stroke and is limited in its movement to the left as viewed in Fig. 1 by the engagement of a collar 30a fixed on the rack bar with the end wall of the machine base.

Mounted on the carriage 12 is a vertically adjustable platen 35 which may be suitably raised and lowered by fluid pressure or mechanical means, and for this purpose the carriage is fitted with a motor (not shown) and a pump 36 for supplying the fluid to a cylinder 37 within which extends a piston 38 depending from the platen 35. The platen is adapted to support a coil of strip material and raise it into coaxial alignment with the mandrel and present said coil onto the mandrel as the carriage moves the platen into underlying relation to the mandrel.

For definitely positioning the coil of strip material on the mandrel 10 with respect to the center line thereof, the carriage 12 at its top is formed with a slideway 39 within which is adjustably slideable a gauge member 40 having an end wall 41 for engagement with the end of a coil supported on the platen. For adjusting the member 40, a fixed nut 42 mounted in the rear wall of the member has threaded therethrough a screw 43 which is supported in a bearing 44 and has connected to the outer end thereof a hand wheel 45.

The positioning of the coil of strip material supported on the platen 35 can also be adjusted with respect to the center line of the mandrel by a plate 46 which is carried by the mandrel support and adjustable longitudinally of the mandrel. This plate has extending rearwardly from the opposite sides thereof guide rods 47 extending through guides 48 mounted on the opposite sides of the mandrel supporting housing and a screw-threaded spindle 49 which is screw-threaded through a worm gear 50 held against longitudinal movement within a bearing housing 51, the worm gear being in mesh with a worm 52 mounted on a shaft 53 and adapted to be rotated through an operating hand wheel 54.

It will thus be seen that by means of either or both of the adjustable members 40 and 46 a coil of strip material supported on the platen 35 when moved onto the mandrel 10, may be definitely positioned thereon, and as the mandrel is expanded against the inner convolution of the coil, the coil will be held ready for unwinding.

The pit 11 below the mandrel 10 extends a substantial distance beyond the mandrel in the vertical plane of the center line thereof so that the carriage 12 can be moved to a position beyond the free end of the mandrel for receiving a coil of strip while a second coil is being unwound from the mandrel. In this way no time is lost in supplying a fresh coil to the unwinding reel when required. To avoid having an exposed open pit adjacent the unwinding reel, we provide a sliding floor plate 55 of a width to completely cover the pit, which latter, at its side walls, is formed with rabbets 56 for supporting the lateral edges of the floor plate, one end of the plate being connected to the rear of the carriage 12 so as to be movable therewith. When the carriage is moved out of coil positioning relation to the mandrel, the floor plate 55 will be moved into a shallow cutout in the surface of the permanent floor 57 which may have a fixed floor plate 58 disposed thereover so as not to interfere with the movement of workmen over said portion of the floor.

In the operation of our invention the carriage 12 will initially be in the portion of the pit beyond the free end of the mandrel. The platen on the carriage will be lowered to a level to receive a coil of strip material and the member 40 will be adjusted so as to bring the end wall 41 thereof into such relation to the end of the coil on the platen, that the particular coil when moved onto the mandrel will be properly centered thereon. When a coil is thus mounted, the platen is then elevated to bring the axis of the coil substantially into coincidence with the axis of the mandrel, and the carriage is then moved to the left until the collar 30a comes into engagement with the end wall of the machine base. In the course of such movement the coil will be presented over the mandrel in desired position at the limit of movement of the carriage. Preferably the adjustment of the member 40 is such that quite independently of the adjusting plate 46 the coil will be properly positioned. However, if desired, the adjusting plate 46 may be relied upon solely as the means for positioning the coil with respect to the mandrel. Or, if desired, both adjustable means may cooperate to definitely position the coil on the mandrel, as will be quite apparent. When the coil is properly positioned on the mandrel, the wedge-carrying sleeve 16 is moved to the left by admitting fluid under pressure into the cylinder 26 to radially expand and force the mandrel segments into tight engagement with the innermost convolution of the coil. This expansive force can be made sufficiently great to tightly hold the coil and provide the necessary tension thereto during the unwinding operation. The coil having been mounted on the mandrel, the platen is lowered and the carriage withdrawn for receiving another coil and making the same ready for reception by the mandrel when the coil thereon has been completely unwound.

From the foregoing detailed description it will be appreciated that with the apparatus of our invention the various objects and advantages set forth in the opening statement of this specification are readily realizable. It will be understood, however, that the means herein disclosed are subject to modification within the range of engineering skill without departing from the spirit of the invention as defined by the appended claims.

What we claim is:

1. In combination, a mandrel support having a shaft and means for rotating said shaft, an expansible mandrel mounted on said shaft, a movable support having a vertically adjustable platen adapted to be brought into underlying relation to the mandrel and axially move a coil supported on the platen onto the mandrel, and adjustable means on the movable support adapted to be set prior to positioning the coil on the mandrel for controlling the position of the coil on the mandrel.

2. In combination, a mandrel support having a shaft and means for rotating said shaft, an expansible mandrel mounted on said shaft, a movable support having a vertically adjustable platen adapted to be brought into underlying relation to the mandrel and axially move a coil supported on the platen onto the mandrel, and a locator plate mounted on the movable support and adjustable prior to positioning the coil on the mandrel for controlling the position of the coil on the mandrel as the movable support having a coil thereon is brought into underlying relation to the expansible mandrel.

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