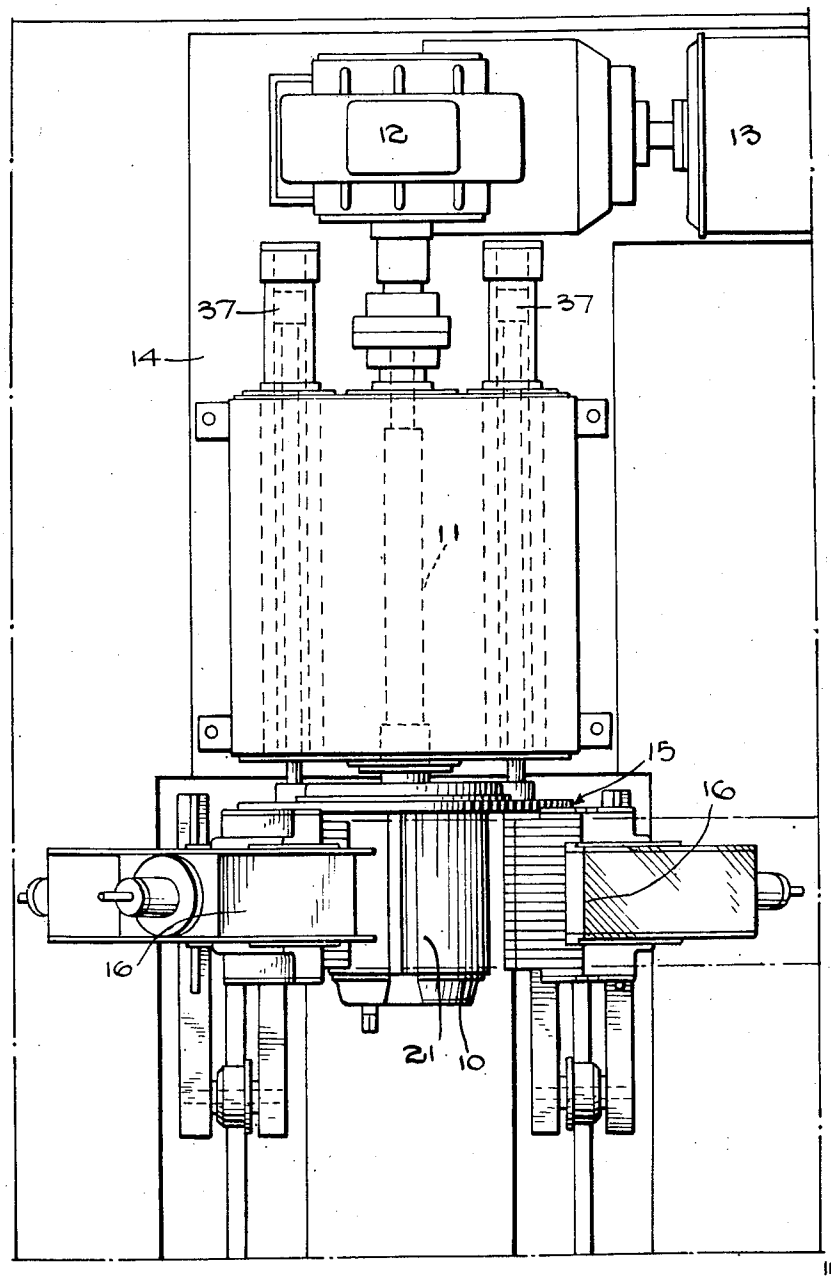
Feb. 19, 1952 J. B. PICTON 2,586,376

MACHINE FOR STRIPPING SHEET METAL

Filed July 27, 1950 4 Sheets-Sheet 1

FIG. 1.



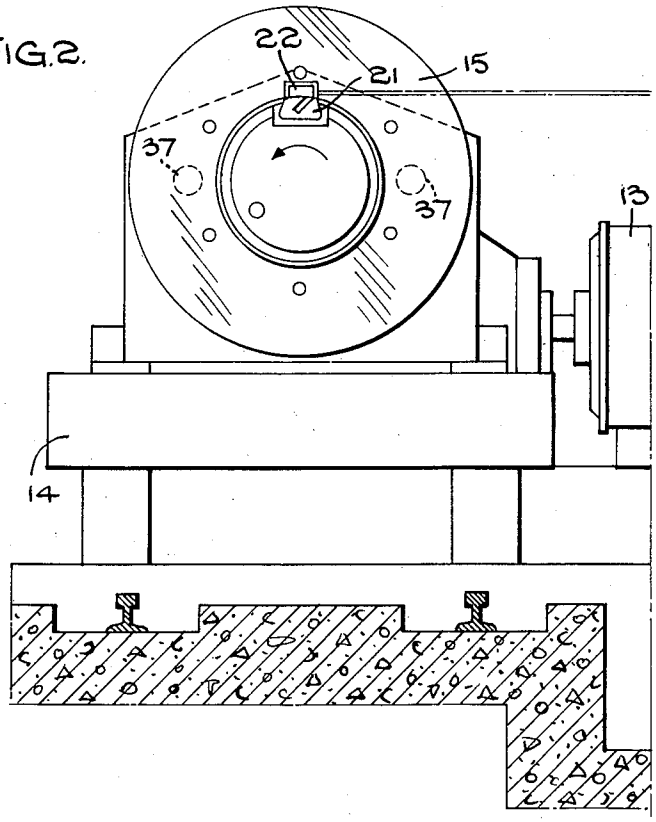
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MACHINE FOR STRIPPING SHEET METAL

Filed July 27, 1950 4 Sheets-Sheet 2

FIG. 2.



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MACHINE FOR STRIPPING SHEET METAL

Filed July 27, 1950 4 Sheets-Sheet 3

FIG.3.

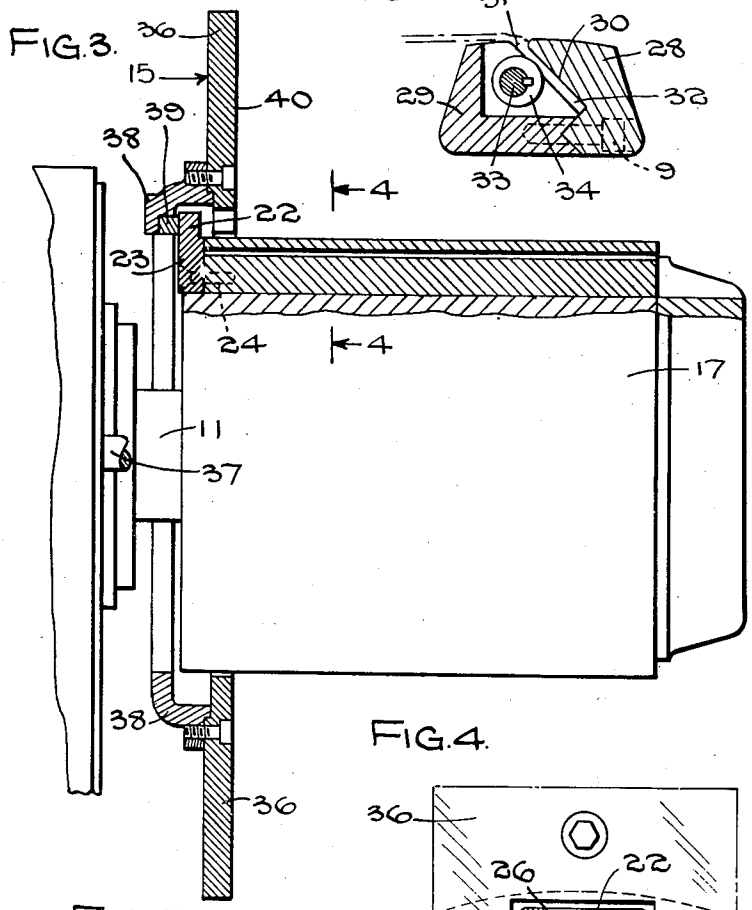


FIG.6.

FIG.4.

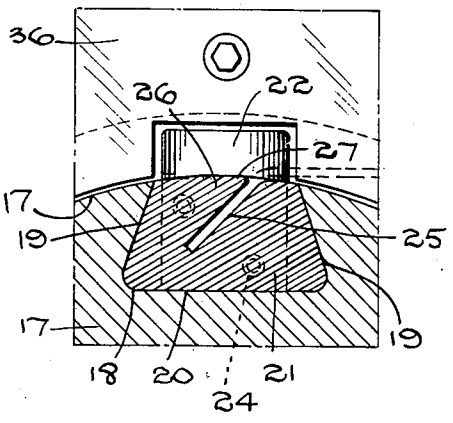
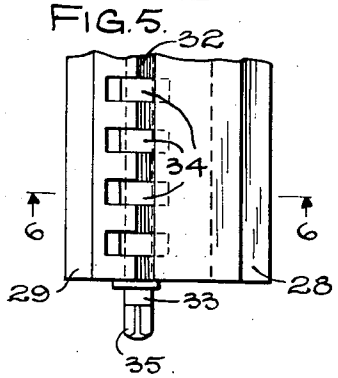


FIG.5.



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MACHINE FOR STRIPPING SHEET METAL

Filed July 27, 1950 4 Sheets-Sheet 4

FIG. 7.

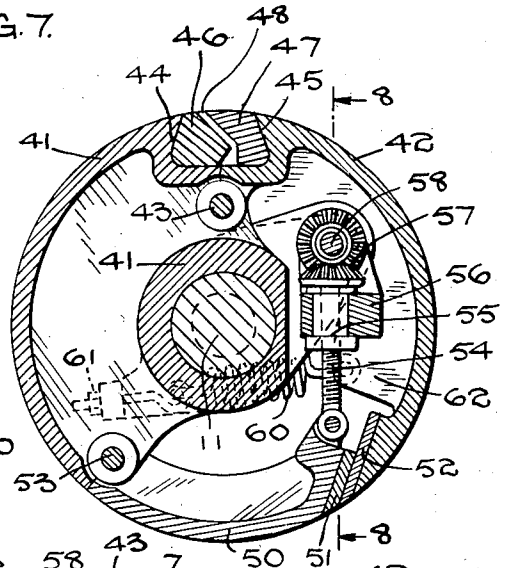
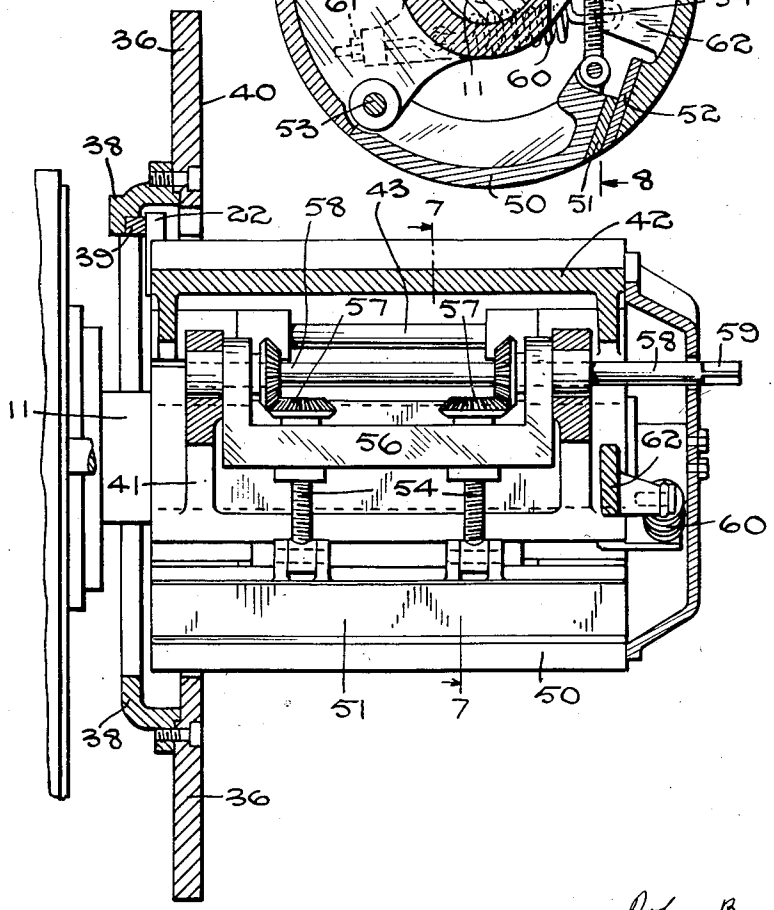


FIG. 8.



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Patented Feb. 19, 1952

2,586,376

UNITED STATES PATENT OFFICE

2,586,376

MACHINE FOR STRIPPING SHEET METAL

John Burley Picton, Wolverhampton, England, assignor to Joshua Bigwood & Son, Limited, Wolverhampton, England, a British company

Application July 27, 1950, Serial No. 176,096
In Great Britain July 30, 1949

15 Claims. (Cl. 242—81)

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This invention relates to winding machines for subjecting sheet metal to a combined winching and coiling action whereby the sheet metal may first be drawn through a pre-treatment apparatus and subsequently coiled so that it is in a form in which it can be conveniently handled for transport and storage. In particular the invention relates to winding machines having a rotary driven winding drum and in operative association therewith an unloader device for removing the coiled sheet metal from the drum in an axial direction upon completion of the coiling process. Such machines will hereinafter be referred to as winding machines of the kind specified.

In winding machines of the kind specified as hitherto constructed the drum is provided with a longitudinal slot extending across its sheet engaging face in an axial direction for the purpose of receiving the leading end of the sheet so that at the commencement of winding the drum may effect a purchase on the former.

It is sometimes found difficult to remove the completed coil from the drum because the stressed condition of the material of the coil causes the end which is received in the slot to bind against the walls thereof.

The object of the present invention is to provide an improved construction with a view to eliminating or reducing this tendency.

With this object in view a winding machine of the kind specified constructed in accordance with the present invention has a winding drum which is provided with a guideway extending longitudinally with respect to the axis of rotation of the drum, said guideway carrying or being adapted to carry a slide movable endwise along and out of the guideway and said slide having an open-mouthed sheet receiving opening extending lengthwise therein and inwardly towards the base of the slide so as to form an anchorage for the sheet when the slide is in position in the guideway, the unloader device including a member engageable with the slide to move same endwise out of the guideway concurrently with unloading of the coiled sheet off the drum.

Since the slide is designed for free endwise movement along the guideway at the appropriate time any binding of the end of the sheet in the slide will not inhibit unloading and the slide can be removed from the sheet after the unloading process, the provision of more than one slide enabling substantially continuous use to be made of the winding machine.

Whilst applicable generally, as for instance, for winding a single sheet of metal through a pre-

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treatment apparatus and into coiled form on the drum the primary and most advantageous application of the invention is to winding machines of the kind specified for use in coiling simultaneously and in side-by-side relationship on a common drum a plurality of strips of sheet metal. For instance, the metal may initially be in the form of a single sheet and the pre-treatment apparatus may comprise a slitting machine, the cutters or slitting tools of which cut the single sheet into a plurality of side-by-side strips as the winding machine draws the sheet therethrough. Alternatively, as another example, a plurality of side-by-side strips may require to be subjected to a chemical pre-treatment process in an apparatus through which they require to be drawn.

In such cases, it has been found in practice that with conventional winding machines of the kind specified the inner ends of adjacent coiled strips of sheet metal tend to be moved into overlapping relationship during the unloading process thus accentuating any possible binding or jamming of these ends in the slot in the winding drum or causing unwinding of the inner turns of the coils.

This tendency is entirely obviated or reduced to a very great extent by use of a winding machine constructed in accordance with the invention.

The invention will now be described with reference to the accompanying drawings, wherein:

Figure 1 shows a general arrangement of a winding machine constructed in accordance with the invention as seen in plan.

Figure 2 is a fragmentary view of the winding drum seen in end elevation.

Figure 3 is a further fragmentary view showing the winding drum in side elevation, the upper part of the drum and the pusher plate being shown in cross section.

Figure 4 is a fragmentary view showing in end elevation a cross sectional view of the guideway in the winding drum with one form of slide mounted therein, the cross section being taken on the line 4—4, Figure 3.

Figure 5 is a fragmentary plan view of an alternative form of slide incorporating locking means for use with a winding drum as illustrated in Figure 3.

Figure 6 is a view of the construction of slide shown in Figure 8 in cross section on the line 6—6 of Figure 5.

Figure 7 is a fragmentary view showing in end elevation and in cross section on the line 7—7

(Figure 8) another construction of winding drum and

Figure 8 is a further fragmentary view of the construction shown in Figure 7 in side elevation and in cross section on the line 8—8 of Figure 7.

As seen in Figure 1, the machine comprises a winding drum 10 driven through a shaft 11 and a reduction gear box 12 from an electric driving motor 13 all of which are supported upon a suitable bed structure 14. At the rearward end of the winding drum 10 is provided an unloader device 15 for displacing in an axial direction forwardly of the forward end of the drum, the coil or coils of sheet or strip metal wound thereon on completion of winding operations.

In addition to these parts and at a position spaced radially outwardly from the surface of the drum there is provided a coil gripping and holding device 16, the function of which is to support finished coils during and after their removal from the drum to permit these coils to be bound with wire and thus secured against uncoiling, during which process the winding drum can be employed for coiling fresh sheet or strip material. The device 16 is described and claimed in my co-pending application Numbered 172,101, entitled "improvements relating to machines for slitting and coiling sheet metal," and filed on July 5, 1950, now patent No. 2,579,700, dated December 25, 1951, and will not therefore be further described in the present specification.

The machine illustrated in Figure 1 is intended primarily for winching and coiling a sheet of metal subjected to pre-treatment in a slitting machine so that in fact after the metal has been drawn by the winding machine through the slitting machine it is in the form of a plurality of strips of sheet metal lying side by side.

Whilst this is the primary and intended use of the machine it is contemplated that it may be put to other uses, for example, drawing one or more strips of sheet metal and in the latter case, these strips lying side by side through another form of pre-treatment apparatus, for example, a chemical apparatus in which is carried out one step of a finishing process.

In the illustration shown in Figure 1 the winding drum 10 is indicated generally and may be of either of a number of alternative forms, one of which is illustrated in Figures 2 and 3 and another of which is illustrated in Figures 7 and 8.

Referring firstly to the construction shown in Figures 2 and 3, the winding drum is a cylindrical structure, the cylindrical wall 17 of which has formed therein a guideway 18, of which the side walls 19 diverge from each other in a direction towards the central region of the drum, the base 20 of the guideway 18 being flat and parallel to a tangent to the circumference of the drum at the mid-point of the guideway.

The guideway extends across the whole length of the circumferential surface of the drum and is open at the forward end of the drum.

Mounted in the guideway is a slide having a body 21 of elongated form and of cross-sectional shape conforming to that of the guideway so that the slide is free to move endwise along the guideway and can, when required, be completely expelled from the guideway through the open end thereof.

For this purpose the slide is provided with a radially projecting head 22 formed on an end plate or member 23 secured in any suitable manner to the body of the slide as, for instance, by means of countersunk screws 24.

Extending the length of the body is a sheet receiving opening or slot 25, the term "sheet receiving opening" being used in the generic sense and including the case where the sheet material is in the relatively narrow form of a single strip or a plurality of strips arranged side-by-side as when the winding machine is used in conjunction with the slitting machine.

This slot or opening 25 extends inwardly towards the central region of the drum but instead of extending in the true radial direction is tangential to a small diameter pitch circle concentric with the axis of rotation of the drum.

The sense of the inclination of the slot or opening with respect to the true radial direction is such that the slot or opening forms an acute angle with the circumferential face of the drum seen generally at 26, on the leading side of the slot, (having regard to the direction of rotation of the drum indicated by the arrow (Figure 2)) and an obtuse angle on the trailing side of the slot or opening. By inclining the slot or opening in this manner the insertion of the leading end of the sheet material is facilitated and after the drum has rotated through a comparatively small angle an adequate purchase is obtained against the sheet material by reason of the bending of the sheet material as seen in Figures 2 and 4.

In the form of slide illustrated in Figure 4, the body of the slide is of one piece construction and of a rigid character, the thickness of the slot or opening 25 being only just greater than the thickness of the sheet material required to be received in the slot or opening in order that the purchase already referred to may be readily effected.

After a single revolution of the drum upon commencement of winding, the second turn of the coil so formed will bear inwardly against that portion of the sheet material received in the slot or opening and will anchor same firmly in position.

Preferably and as shown in Figure 4, the guideway is accommodated wholly beneath the circumferential surface of the drum and the outer face of the body of the slide as seen at 27, is of curved form having a radius of curvature equal to that of the drum so as to form a continuation of the surface thereof and lie flush with same.

In an alternative form of slide intended for use with a guideway of rigid character as illustrated in Figures 2 and 3, is shown in Figures 5 and 6, the body of the slide here being of two part construction as seen at 28 and 29, these two parts forming side members secured together by bolts 9 and having opposed parallel walls 30 and 31 defining the sheet receiving slot or opening 32.

The side member 29 is further provided with locking means for retaining the sheet material frictionally in the slot or opening 32, comprising a spindle 33 having keyed or otherwise fixed thereto a plurality of gripping cams 34, portions of which project, as seen in Figure 6, into the slot or opening 32 so as to bear against one face of the sheet material received therein. The end of the spindle 33 is squared as at 35 to enable a suitable removable key or handle having a squared socket to be engaged therewith for the purpose of rotating the spindle and cams.

On completion of a coiling operation when it is required to move the coil or coils formed on the drum unloader device 15, comprising an annular plate 36 arranged concentrically with the drum at the rearward end thereof moves endwise over

the drum by means of hydraulic piston and cylinder units 37 (Figure 1).

This plate pushes against the sides of the coils proper and the plate is provided at its inner edge with a backwardly set flange member 38 having a block or facing 39 positioned to engage through a slot in the plate with a rearward face of the head 22 of the slide. The initial spacing between the forward face 40 of the pusher plate and the rearward face of the coil to be engaged thereby is equal to the spacing between the facing or block 39 and the head 22 so that the parts 39 and 36 are operative simultaneously and the main portion of the coil or coils is thus moved simultaneously together with the slide in an axial direction along and off the drum.

In the construction of drum shown in Figure 7 and 8 the drum is again of hollow cylindrical formation but instead of the guideway being rigid, the wall of the drum includes two portions 41 and 42 pivotally connected together by a pintle 43 extending parallel to the axis of rotation of the drum and spaced inwardly of said wall.

The guideway is formed partly in the portion 42 and partly in the portion 41, pivotal movement of these portions relatively to each other resulting in movement of the inwardly diverging walls 44 and 45 of the guideway towards or away from each other depending upon the direction of such pivotal movement. The width of the guideway is thus contracted or expanded.

For employment with this construction of drum, the slide comprises two side members 46 and 47 engaged with the opposite walls 44 and 45 of the guideway respectively and with base portions of the guideway formed respectively in the portions 44 and 42 of the drum wall, the inner faces of these side members being spaced apart and defining a sheet receiving slot or opening 48.

The side members 46 and 47 of the slide are movable towards and away from each other in response to the pressure exerted by the side walls 44 and 45 of the guideway and when a sheet or strip is received in the slot 48 such inward pressure serves both to grip the sheet frictionally in the slot and to clamp the slide in the guideway.

For effecting relative pivotal movement of the portions 41 and 42 any suitable mechanism may be provided, for example, the drum wall may include a further pivotal portion 50 having at one longitudinal edge a facing member 51 engaging a co-operating facing member 52 on the portion 42, the engaging faces of these members being inclined to the circumferential face of the drum so that pivotal movement of the portion 50 transmits pivotal movement to the portion 42.

Movement of the portion 50 about its mounting pintle 53 is controlled by a screw and nut gear of which the screw is seen at 54 and is pivotally connected to the portion 50 and of which the nut 55 is journalled in a bearing block 56 secured to the portion 41 and rotatable by means of bevel gearing 57.

Two screws 54 are provided spaced axially apart and likewise two sets of bevel gearing 57, the driving bevels of which are mounted on a common operating shaft 58 projecting from the forward end of the drum and squared for engagement with a squared socket on a removable key or handle.

The portion 42 is maintained with its facing member 52 in contact with the facing member 51 by means of a coiled tension spring 60 anchored at one end as indicated at 61 to the portion 41 and at the other end to a web 62 on the portion 42.

Although not shown in the drawings the winding drum shown in Figures 1 to 5 may and preferably does incorporate a conventional collapsing flap such as the member 50 seen in Figure 7 in order to free the inner turn of a coil to facilitate unloading. If desired, two flaps, such as 50 and 42, may be incorporated, the latter however not including any portion of the guideway.

What I claim then is:

1. In a winding machine; a rotary winding drum; means for rotating same, said drum having a guideway extending longitudinally with respect to the axis of rotation of the drum; a slide in said guideway mounted for endwise expulsion therefrom, said slide having an open mouthed sheet receiving opening extending lengthwise in relation to said guideway and inwardly towards the central region of the drum to form an anchorage for the leading end of the sheet; and, an unloader device including a member movable axially in relation to the drum and engageable with said slide to expel same endwise from the guideway.

2. In a winding machine; a rotary winding drum; means for rotating same; said drum having an open ended guideway positioned beneath the surface of the drum and extending longitudinally with respect to the axis of rotation of the drum; a slide in said guideway mounted for endwise expulsion therefrom, said slide having an open mouthed sheet receiving opening extending lengthwise in relation to said guideway and inwardly towards the central region of the drum to form an anchorage for the leading end of the sheet; and, an unloader device including a member movable axially in relation to the drum and engageable with said slide to expel same endwise from the guideway.

3. In a winding machine; a rotary winding drum; means for rotating same; said drum having an open ended guideway having side walls diverging from each other in the inward direction towards the central region of the drum, said guideway being positioned beneath the surface of the drum, and extending longitudinally with respect to the axis of rotation of the drum; a slide in said guideway mounted for endwise expulsion therefrom, said slide having an open mouthed sheet receiving opening extending lengthwise in relation to said guideway and inwardly towards the central region of the drum to form an anchorage for the leading end of the sheet; and an unloader device including a member movable axially in relation to the drum and engageable with said slide to expel same endwise from the guideway.

4. In a winding machine; a rotary winding drum; means for rotating same; said drum having an open ended guideway extending longitudinally with respect to the axis of rotation of the drums; said guideway having side walls movable relatively towards and away from each other; a slide in said guideway mounted for endwise expulsion therefrom, said slide having an open mouthed sheet receiving opening extending lengthwise in relation to said guideway and inwardly towards the central region of the drum to form an anchorage for the leading end of the sheet; means on said drum for adjusting the relative position of said walls to clamp or release said slide; and an unloader device including a member movable axially in relation to the drum and engageable with said slide to expel same endwise from the guideway.

5. In a winding machine; a hollow rotary winding drum of generally cylindrical formation; means for rotating same; the cylindrical wall of the drum including at least two portions pivotally connected together about an axis parallel to the axis of the drum and spaced inwardly of said wall, a guideway formed partly in one of said portions and partly in the other, said guideway extending longitudinally with respect to the axis of rotation of the drum; and having opposed side walls movable towards and away from each other during pivotal movement of one of said portions relatively to the other; a slide in said guideway mounted for endwise expulsion therefrom, said slide having an open mouthed sheet receiving opening extending lengthwise in relation to said guideway and inwardly towards the central region of the drum to form an anchorage for the leading end of the sheet; means on said drum for controllably moving one of said drum wall portions relatively to the other about their common pivotal axis to clamp or release said slide; and an unloader device including a member movable axially in relation to the drum and engageable with said slide to expel same endwise from the guideway.

6. In a winding machine; a hollow rotary winding drum of generally cylindrical formation; means for rotating same; the cylindrical wall of the drum including two portions pivotally connected together about an axis parallel to the axis of the drum and spaced inwardly of said wall; a guideway formed partly in one of said portions and partly in the other, said guideway extending longitudinally with respect to the axis of rotation of the drum and having opposed side walls movable towards and away from each other during pivotal movement of one of said portions relatively to the other; a slide in said guideway mounted for endwise expulsion therefrom, said slide having an open mouthed sheet receiving opening extending lengthwise in relation to said guideway and inwardly towards the central region of the drum to form an anchorage for the leading end of the sheet; said drum wall having a third portion pivotally connected adjacent one longitudinal edge to one of the first said portions about an axis parallel to the axis of the drum and spaced inwardly of said wall, and having at its other longitudinal edge a bearing face inclined with respect to the cylindrical face of the drum and engaging a co-operating face on the other of the first said portions, controlling mechanism housed in said drum for moving said third portion angularly about its pivotal axis to effect relative sliding of said co-operating faces and movement of said opposed guide walls towards and away from each other, said controlling mechanism including an operating member positioned and accessible externally of the drum; and an unloader device including a member movable axially in relation to the drum and engageable with said slide to expel same endwise from the guideway.

7. In a winding machine; a hollow rotary winding drum of generally cylindrical formation; means for rotating same; the cylindrical wall of the drum including at least two portions pivotally connected together about an axis parallel to the axis of the drum and spaced inwardly of said wall, a guideway formed partly in one of said portions and partly in the other, said guideway extending longitudinally with respect to the axis of rotation of the drum, and having opposed side walls movable towards and away from each other

during pivotal movement of one of said portions relatively to the other; a slide in said guideway mounted for endwise expulsion therefrom, said slide having an open mouthed sheet receiving opening extending lengthwise in relation to said guideway and inwardly towards the central region of the drum to form an anchorage for the leading end of the sheet; controlling mechanism housed in said drum including a member movable towards and away from the centre of the drum and engaging one of said portions to effect pivotal movement thereof relatively to the other portion, a rotary spindle journalled in bearings fixed to said other portion, and a screw and nut reduction gear operatively interposed between said spindle and said member; and, an unloader device including a member movable axially in relation to the drum and engageable with said slide to expel same endwise from the guideway.

8. In a winding machine; a rotary winding drum; means for rotating same; said drum having a guideway extending longitudinally with respect to the axis of rotation of the drum; a slide mounted in said guideway having an elongated body housed in the guideway and slidable endwise therein, said body having an open mouthed sheet receiving opening extending lengthwise in relation to said guideway and inwardly towards the central region of the drum to form an anchorage for the leading end of the sheet; and said slide having a head projecting outwardly from the mouth of said guideway, and an unloader device including a member movable axially in relation to the drum and engageable with said head to expel the slide endwise from the guideway.

9. In a winding machine; a rotary winding drum; means for rotating same; said drum having a guideway extending longitudinally with respect to the axis of rotation of the drum; a slide mounted in said guideway having an elongated body housed in the guideway and slidable endwise therein, said body having a narrow sheet receiving slot of width only just greater than the thickness of the sheets which it is required to handle, said slot extending lengthwise in relation to said guideway and inwardly towards the central region of the drum in a direction tangential to a pitch circle concentric with the axis of rotation of the drum but of smaller diameter, so that, having regard to the direction of rotation of the drum, the slot walls and the outer face of the drum form an acute angle on the leading side of the slot and an obtuse angle on the trailing side; and, an unloader device including a member movable axially in relation to the drum and engageable with said slide to expel same endwise from the guideway.

10. In a winding machine; a rotary winding drum; means for rotating same; said drum having a guideway extending longitudinally with respect to the axis of rotation of the drum; a slide mounted in said guideway having an elongated body housed in the guideway and slidable endwise therein, said body having an open mouthed sheet receiving opening extending lengthwise in relation to said guideway and inwardly towards the central region of the drum; locking means on said body including a movable member positioned to engage with one face of the portion of a sheet in the opening and retain same therein; and, an unloader device including a member movable axially in relation to the drum and engageable with said slide to expel same endwise from the guideway.

11. In a winding machine; a rotary winding drum; means for rotating same; said drum having a guideway extending longitudinally with respect to the axis of rotation of the drum; a slide mounted in said guideway having an elongated body housed in the guideway and slidable endwise therein, said body having an open mouthed sheet receiving opening and a spindle journalled in and extending lengthwise along the body and having fixed thereto a series of locking cams projecting into said opening to engage with one face of a portion of a sheet in the opening to retain some therein; and, an unloader device including a member movable axially in relation to the drum and engageable with said slide to expel same endwise from the guideway.

12. In a winding machine; a rotary winding drum; means for rotating same; said drum having a guideway including side walls diverging from each other in the inward direction towards the central region of the drum, said guideway being positioned beneath the surface of the drum and extending longitudinally with respect to the axis of rotation of the drum; a slide mounted in said guideway having an elongated body of cross-sectional shape conforming to that defined by said inwardly diverging walls of the guideway and slidable endwise therein, said body having an open mouthed sheet receiving opening extending lengthwise in relation to said guideway and inwardly towards the central region of the drum to form an anchorage for the leading end of the sheet; and, an unloader device including a member movable axially in relation to the drum and engageable with said slide to expel same endwise from the guideway.

13. In a winding machine; a rotary winding drum; means for rotating same; said drum having an open ended guideway extending longitudinally with respect to the axis of rotation of the drum; said guideway having side walls movable relatively towards and away from each other; a slide mounted in said guideway having an elongated body housed in the guideway and slidable endwise therein, said body including relatively movable side members spaced apart to define an open mouthed sheet receiving opening extending lengthwise in relation to said guideway and inwardly towards the central region of the drum to form an anchorage for the leading end of the sheet; said side members engaging the movable walls of the guideway means on said drum for adjusting the relative position of said walls to clamp or release the slide in or from the guideway and simultaneously to clamp or free a sheet portion received in said opening; and, an unloader device including a member movable axially in relation to the drum and engageable with said slide to expel same endwise from the guideway.

14. In a winding machine; a rotary winding drum; means for rotating same; said drum having a guideway extending longitudinally with respect to the axis of rotation of the drum; a slide in said guideway mounted for endwise expulsion therefrom, said slide having an open mouthed sheet receiving opening extending lengthwise in relation to said guideway and inwardly towards the central region of the drum to form an anchorage for the leading end of the sheet; and an unloader device including members adapted to engage substantially simultaneously with one side of a strip metal coil on the drum and with said slide whereby the former together with the slide is unloaded off the drum with the inner end of the coil retained in the slide.

15. In a winding machine; a rotary winding drum; means for rotating same; said drum having a guideway extending longitudinally with respect to the axis of rotation of the drum; a slide mounted in said guideway having an elongated body housed in the guideway and slidable endwise therein, said body having an open mouthed sheet receiving opening extending lengthwise in relation to said guideway and inwardly towards the central region of the drum to form an anchorage for the leading end of the sheet; and said slide having a head projecting outwardly from the mouth of said guideway; and an unloader device including a pusher plate having an opening in register with one end of the drum, means for moving said plate axially in relation to the drum to engage the plate with a strip metal coil thereon, said plate having a backwardly set flange portion at its inner edge positioned to engage simultaneously with the head of the slide.

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