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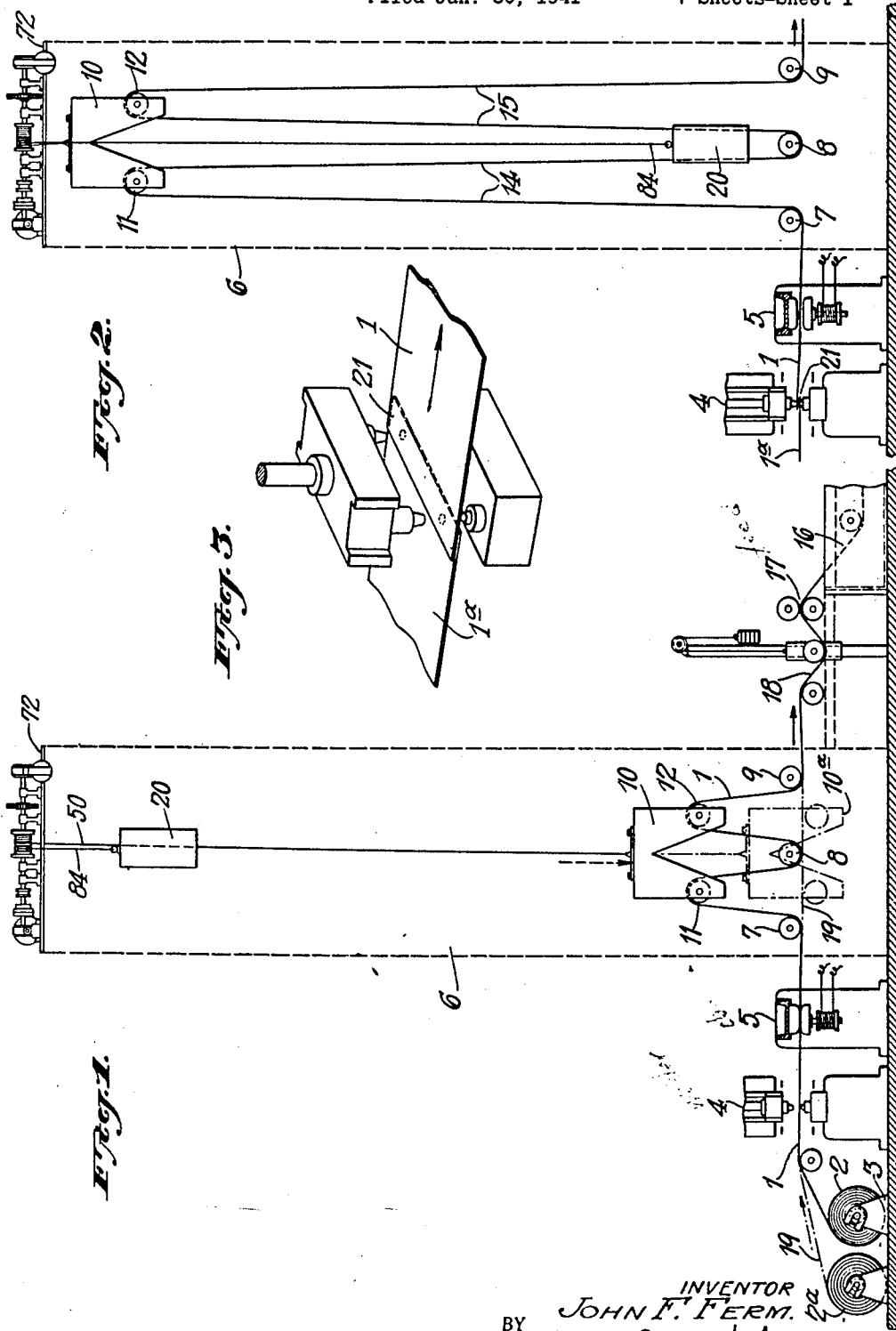
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2,280,943

APPARATUS FOR HANDLING METAL STRIP

Filed Jan. 30, 1941

7 Sheets-Sheet 1



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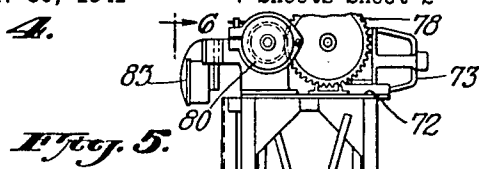
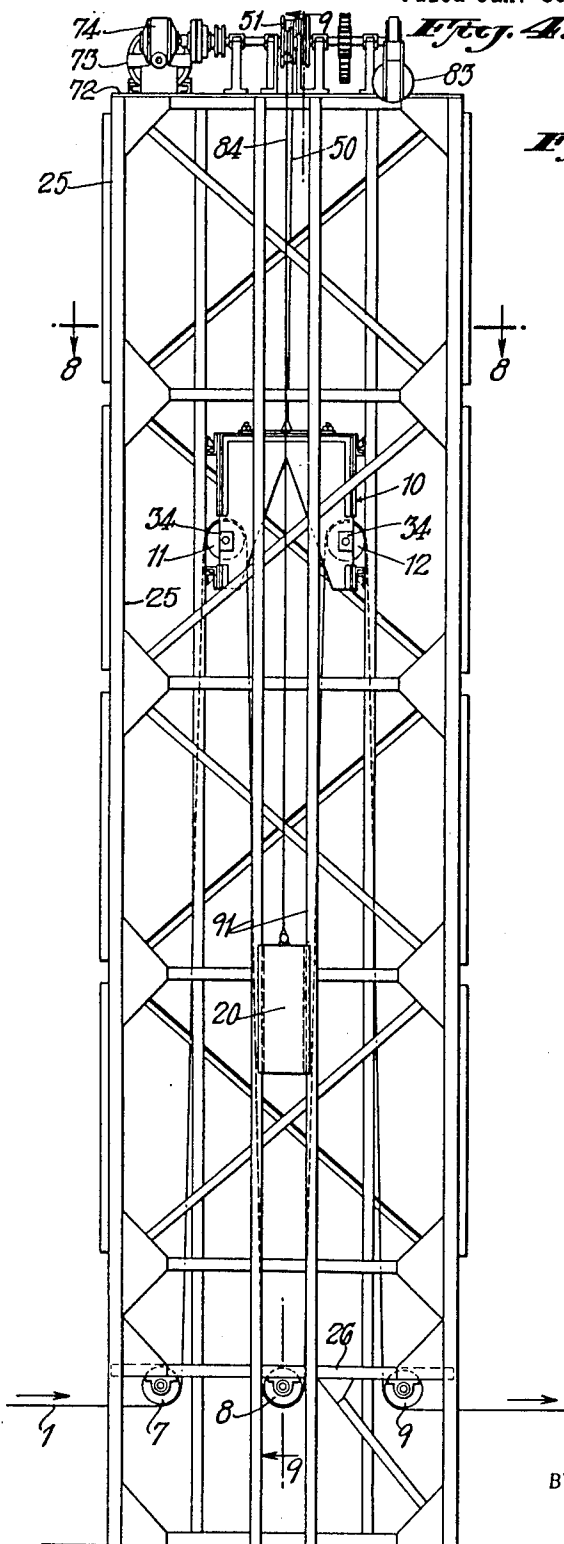
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APPARATUS FOR HANDLING METAL STRIP

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7 Sheets-Sheet 2



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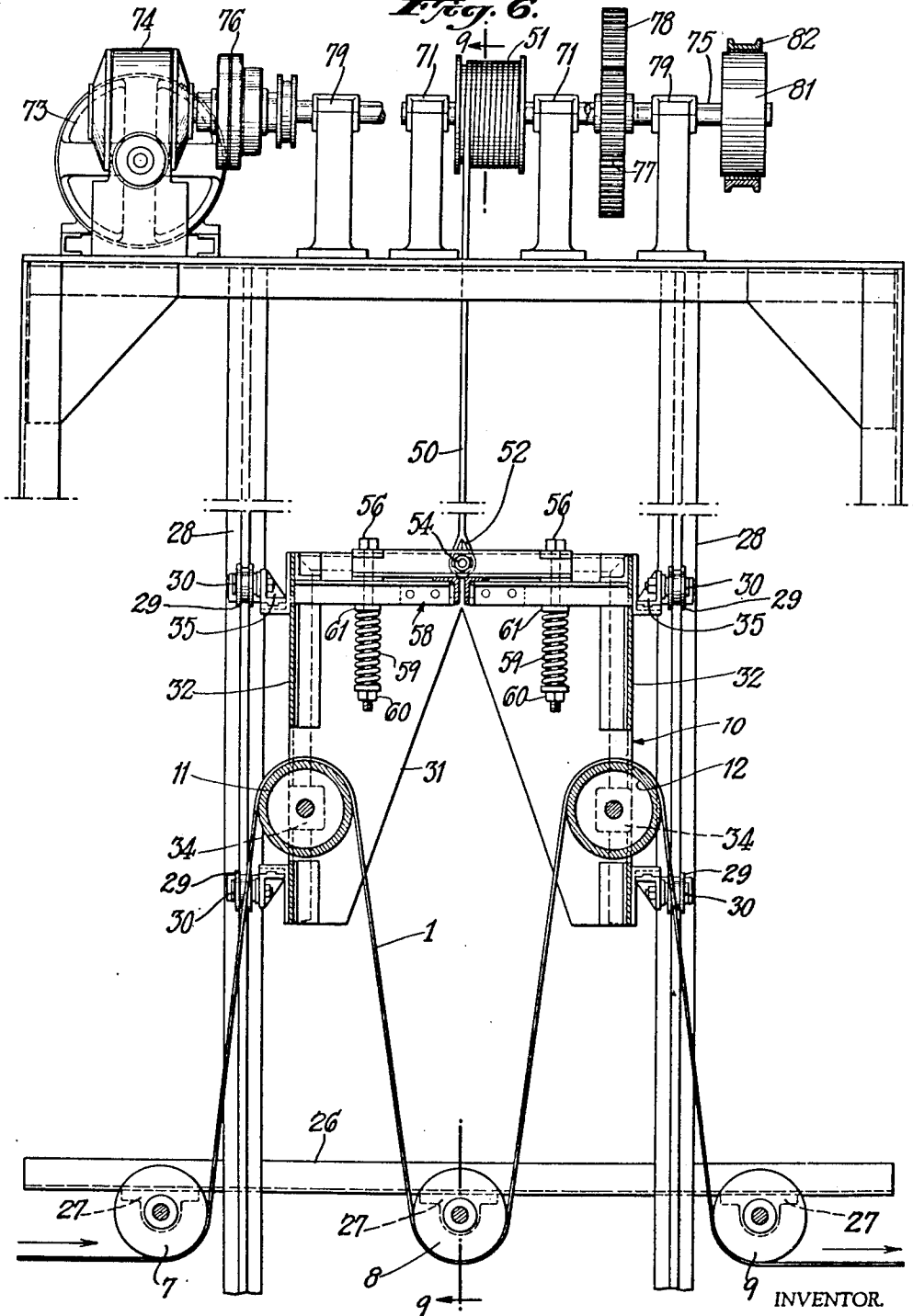
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Fig. 6.



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Fig. 7.

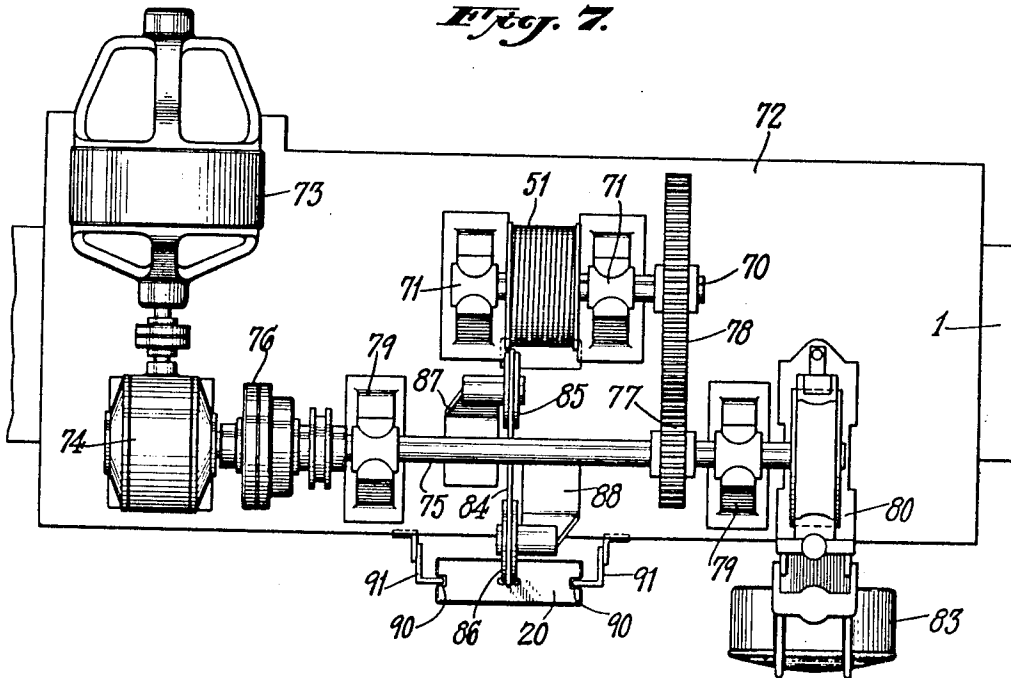
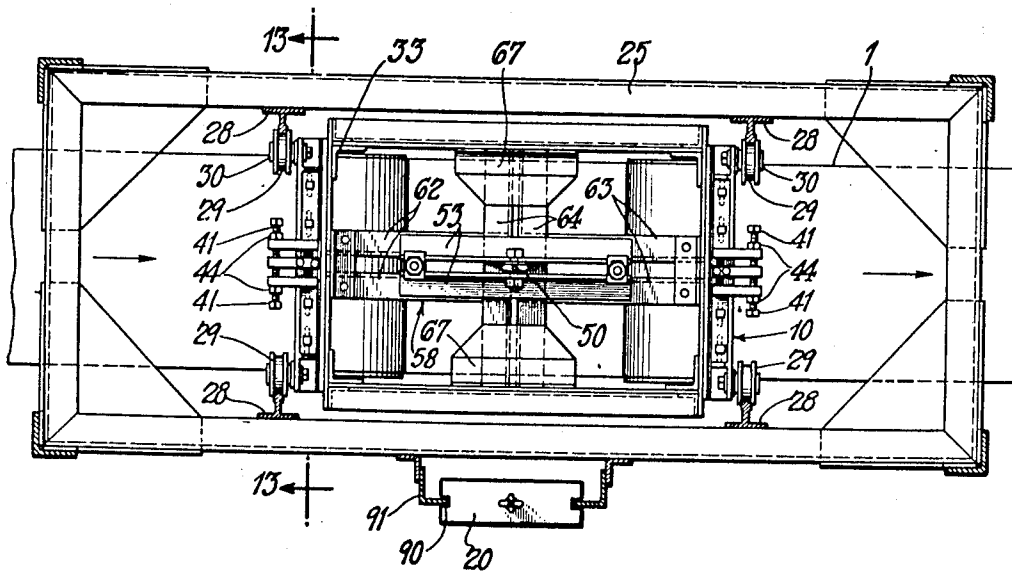


Fig. 8.



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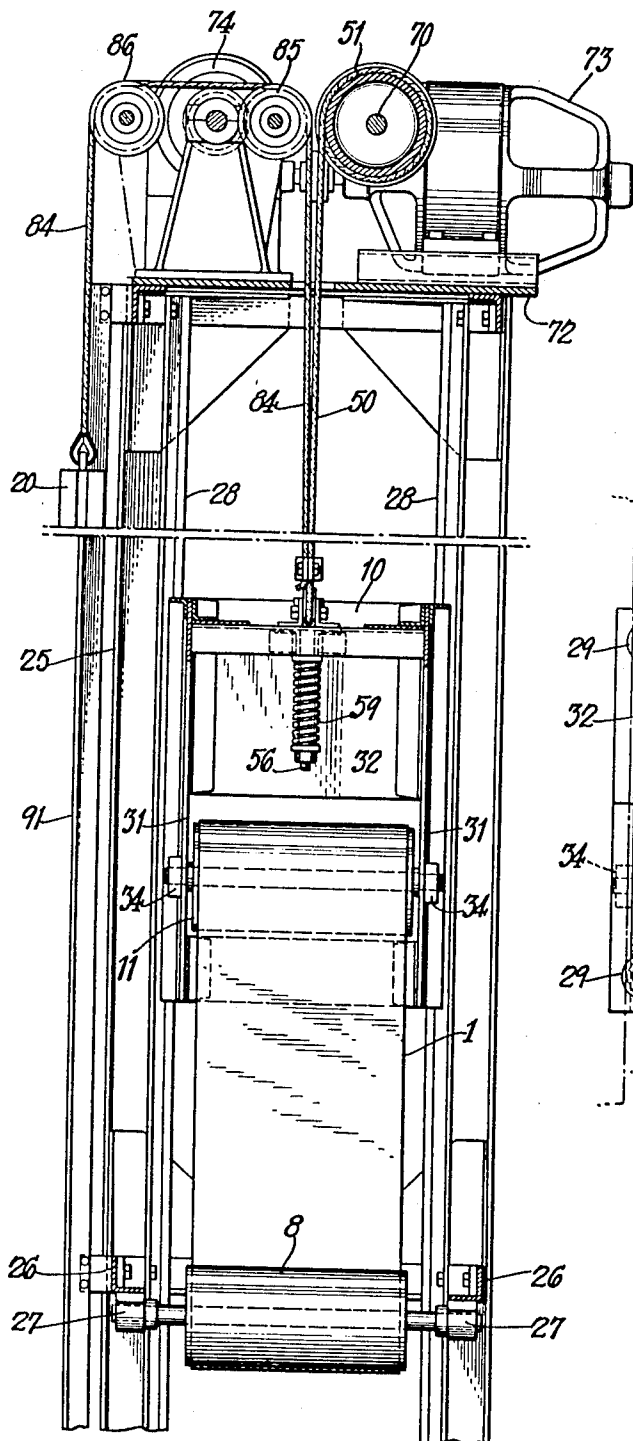


Fig. 9.

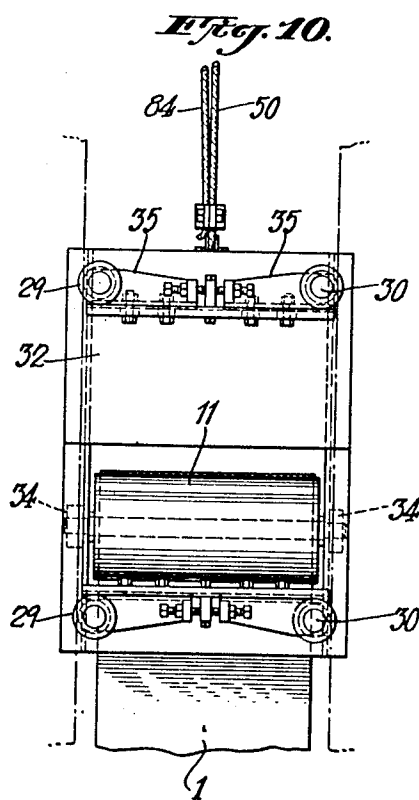


Fig. 10.

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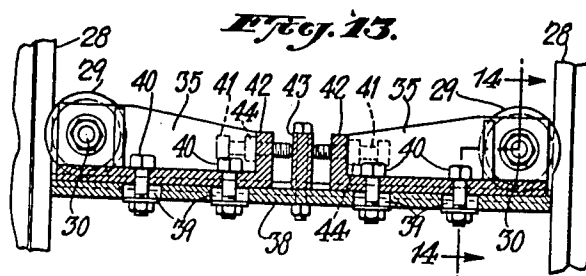
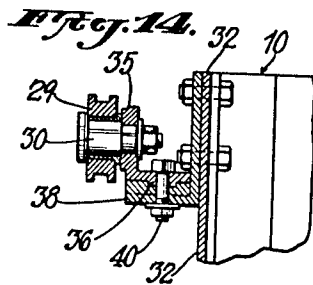
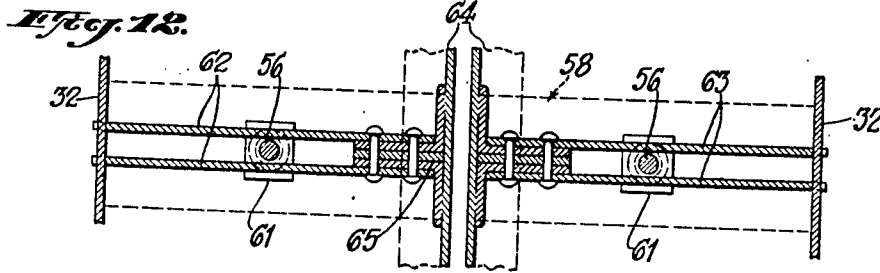
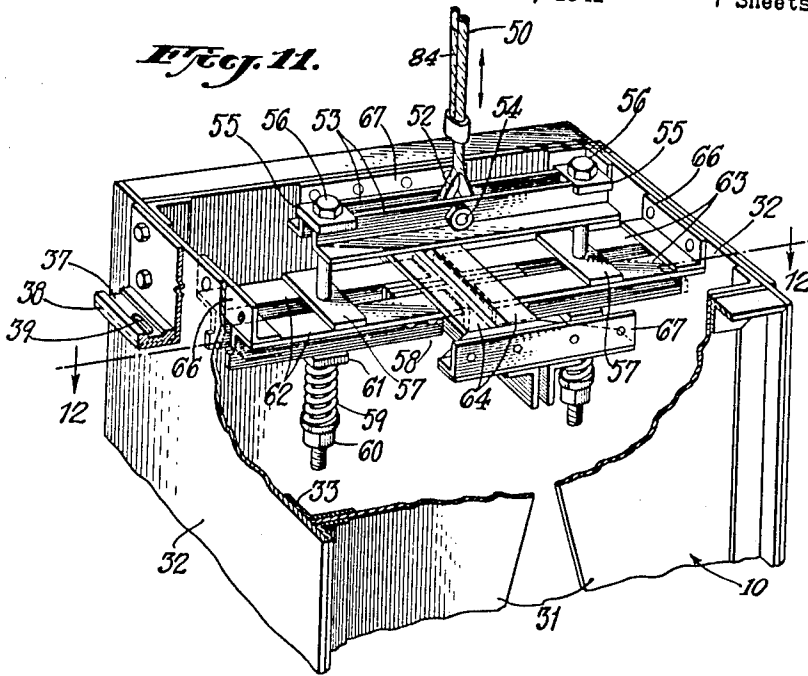
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APPARATUS FOR HANDLING METAL STRIP

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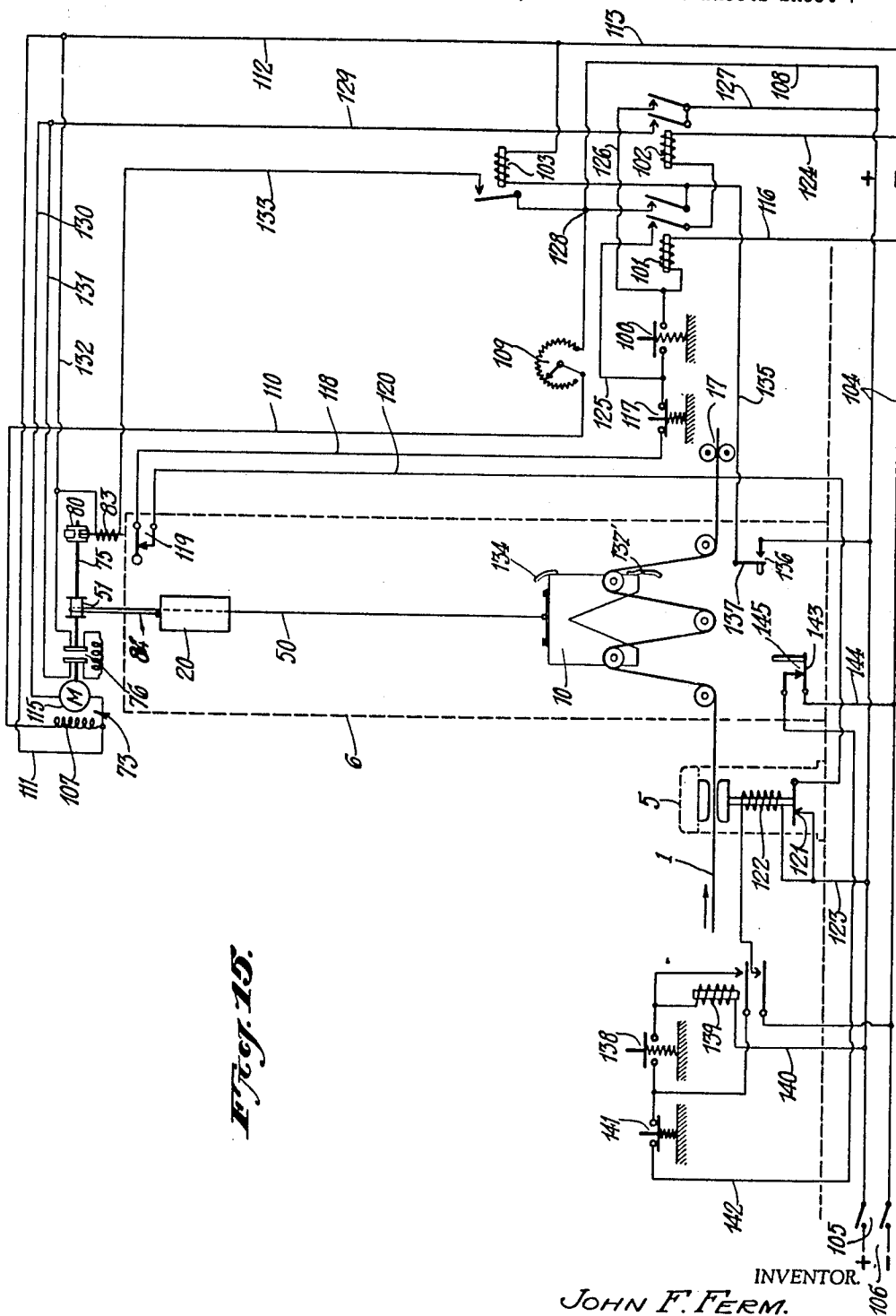


Fig. 15.

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UNITED STATES PATENT OFFICE

2,280,943

APPARATUS FOR HANDLING METAL STRIP

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Application January 30, 1941, Serial No. 376,659

10 Claims. (Cl. 271—2.2)

This invention pertains to apparatus for feeding strip material, particularly cold metal strip, and its object is to provide a mechanism for converting an intermittent feed of the strip into a continuous feed at constant speed without permitting the strip to accumulate in loose or otherwise injurious condition.

The invention finds particular application in the continuous processing of metal strip, such as in the progressive annealing thereof, or in the tin plating and subsequent brightening of steel strip as a continuous operation. In such processes, the strip must be fed continuously and at substantially constant speed, since intermittent feed would result in overannealing and breakage of the strip or overplating in localized areas, etc. On the other hand, the strip is ordinarily delivered to the processing apparatus in the form of separate coils or reels which are welded end-to-end as required to form the continuous strip fed through the processing apparatus. This welding is of course a time-consuming operation which necessitates intermittently stopping the feed of the strip entering the processing apparatus long enough to effect welding each time one coil is exhausted and a new coil required. A situation thus arises where feed of the strip must be intermittent at one point and continuous and of constant speed at other points. These conditions could be met by accumulating the intermediate strip in loose folds as the end of a coil is approached whereby the constant speed feed through the processing apparatus could proceed without interruption during welding of the strip ends, but this is quite injurious to the strip due to localized sharp bending, scratching of the surface, etc., productive of breakage during feeding, flaws in the plated material, etc.

The present invention overcomes such defects by providing a slack take-up mechanism for accumulating a reserve of the strip between a series of rolls which are relatively displaceable in a direction preferably transverse to that in which the strip is fed, this reserve being accumulated by relative displacement of said rolls as the end of a coil approaches, and being thereafter paid out at constant speed from the output side of the mechanism by return of said rolls, while at the same time the strip is held stationary at the input side to effect welding. Upon completion of the welding and return of said rolls to their normal positions, the constant speed feed of the strip is resumed throughout the mechanism to similarly feed the strip from a new coil.

In general arrangement, the slack take-up apparatus comprises a vertical, structural steel framework of open construction and of box-like contour, this framework having journaled to the lower portion thereof a series of horizontally

disposed and spaced idler rolls, and supporting guides for a vertically displaceable carriage to which other horizontally disposed and spaced idler rolls are journaled. The strip is fed alternately under and over the idler rolls journaled to the framework and those journaled to the carriage, whereby elevation of the carriage accumulates a reserve of the strip between the two sets of idler rolls which are thus relatively displaceable in a direction transverse to the general direction of feed of the strip. For elevating the carriage, cables extend to the top of the framework and there pass over a winding block driven by an electrical motor through suitable clutch, gearing and braking equipment, all mounted on top of the framework. At the base of the slack take-up unit on the input side is mounted a clamping device, for clamping the strip to be fed into the slack take-up unit during welding, the welding device being mounted adjacent this clamp. Electrical control equipment is provided for controlling the operation of the carriage from the base of the unit, this control equipment including protective electrical switches actuated by the carriage in its normal and elevated positions, for automatically shutting off the motor in the elevated position of the carriage, for preventing operation of the clamping device with the carriage in its normal position, etc., as described below.

Referring now to the accompanying drawings for a detailed description of the invention:

Figs. 1 and 2 are semi-diagrammatic views of the apparatus in side elevation, illustrating the feed of the strip from a coil or reel, past the welding and through the clamping devices, thence through the slack take-up unit, and thence into the processing apparatus, Fig. 1 showing the carriage in lowered position, and Fig. 2 the carriage in its elevated position. Fig. 3 is a partial perspective view of the welding device.

Figs. 4 to 14, inc., show the mechanical construction of the slack take-up unit, Figs. 4 and 5 being views in side and end elevation respectively of the entire assembly. Fig. 6 is an enlarged view, in partial section, taken along 6—6 of Fig. 5. Fig. 7 is a view in top elevation as viewed from above in Fig. 4; while Figs. 8 and 9 are sections at 8—8 and 9—9 of Fig. 4, respectively. Fig. 10 is a view of the carriage in end elevation; while Fig. 11 is a perspective view of the top portion thereof, with portions broken away to show the construction more in detail. Fig. 12 is a section at 12—12 of Fig. 11. Fig. 13 is a sectional view of a portion of the carriage taken at 13—13 of Fig. 8; while Fig. 14 is a further sectional detail thereof taken at 14—14 of Fig. 13.

Fig. 15 shows diagrammatically the electrical control circuits of the apparatus.

Referring to Fig. 1, the metal strip 1 to be processed, is supplied from a coil or reel 2 thereof, rotatably mounted on supports 3, the strip being fed through a welding device 4 and a normally open clamping device 5, into the slack take-up unit, indicated in outline at 6. As explained more fully hereinafter, the slack take-up unit is provided with a series of horizontally disposed and spaced idler rolls 7, 8, 9, journaled to the framework of the unit, and is also provided with a vertically displaceable carriage 10, traveling in guides of the framework as later explained, to which carriage are journaled other horizontally disposed and spaced idler rolls 11, 12. Within the slack take-up unit, the strip is fed alternately under and over the idler rolls 7, 11, 8, 12 and 9, respectively, whereby elevation of the carriage will cause a reserve of the strip to be accumulated between rolls 11, 12 journaled to the carriage and rolls 7, 8, 9 journaled to the framework, in the manner illustrated at 14, 15 of Fig. 2. Reverting to Fig. 1, the strip passes out of the slack take-up unit under roll 9, and thence into the processing apparatus, indicated in this instance as an electroplating bath 16, into which the strip is fed at constant speed between power-driven pinch rolls, such as 17, preceded, in this instance, by a "dancer" roll assembly 18, the latter for preventing slight strip accumulations between the slack take-up and the pinch rolls.

During the normal feed of the strip, the carriage is in the lowermost position indicated at 10a of Fig. 1, and the clamp 5 is open, so that the strip may be fed directly from reel 2 and in a substantially straight line through the slack take-up unit, as indicated at 19, and thence into the processing apparatus 16 through 17 and 18. As the end of reel 2 approaches, however, the operator elevates carriage 10 to its uppermost position to accumulate the strip reserve 14, 15, Fig. 2. During elevation of the carriage, the strip is of course unreel from coil 2 much more rapidly than it is fed into the processing apparatus 16.

With the carriage thus elevated, the operator observes the strip feed until the end of reel 2 comes under the welding device 4, as shown in Fig. 2, whereupon the clamping device 5 is operated to arrest the strip feed at the input side of the slack take-up unit. Meantime, the pinch rolls 17, driven at constant speed, continue to feed the strip at constant speed from the output side of the slack take-up, whereby the carriage is pulled down against the counterbalancing action of a weight 20 and the friction brake 80, thereby to pay out the reserve 14, 15. Meantime, the operator laps the end 1a of a new strip coil 2a over the end of the old strip 1 under the welding device 4 and welds the ends together as indicated at 21. When now the carriage 10 returns to its lowermost position 10a, Fig. 1, clamp 5 is released to resume the normal strip feed.

Referring now to the remaining figures for a detailed explanation as to the construction whereby the above operations are effected, the rectangular structural steel framework of the slack take-up is indicated generally at 25. Figs. 4 and 5. This framework includes horizontal members, as at 26, to which journal housings 27, Figs. 6 and 9, are secured, and into which the frame supported idler rolls 7, 8, 9 are journaled.

The framework is provided with vertical guides 28, Figs. 6 and 8, in the form of T bars, which engage peripheral grooves in rollers 29, journaled to studs 30, Fig. 14, mounted on carriage 10

as explained below, for providing vertical displacement of the carriage.

The carriage 10 comprises generally, as shown in Figs. 6, 8 and 11, a box-like structure composed of side plates, such as 31, 32, welded to angle bars, as at 33. Secured to the opposite side plates 31 are journal housings 34 into which the idler rolls 11, 12 are journaled.

As shown in Figs. 8, 10, 13 and 14, the studs 30 for the carriage idler rolls 29, are bolted to angle members 35 individual thereto, each angle member 35 being provided on its under side with a rib 36, Figs. 6, 14, slidable in a cooperating groove 37, Fig. 11, of a supporting angle plate 38, which in turn is bolted to a side plate 32 of the carriage 10, as shown in Fig. 14. Each supporting plate 38 is provided in the grooved portion 37 with one or more elongated slots 39, Figs. 11, 13, through which bolts 40 pass, through closely fitting apertures of the stud supporting angle members 35, for bolting members 35 to members 38 in such manner that by loosening up on bolts 40 the roller stud supporting members 35 may be adjusted longitudinally along grooves 37 for adjusting the rollers 29 toward or away from the carriage guides 28, thereby to assure that the peripheral grooves of these rollers will engage the carriage guides without binding. Once the proper adjustment is made, the bolts 40 are of course tightened up to maintain the adjustment. To prevent the roll stud supports 35 from backing away from the carriage guides 28 under impact of the rolls against the guides during operation, each support 35 is provided in addition to bolts 40, with a bolt 41 threaded through an upstanding end portion 42, Fig. 13 of member 35, and bearing against an upstanding member 43 bolted to member 38. The bolts 41 are provided with lock-nuts 44, for locking the bolts in desired positions of adjustment.

The carriage 10 is supported by a cable 50 passing over a winding drum 51 mounted on top of the framework 25. This carriage is resiliently suspended from the cable through what amounts to a shock-absorbing mounting which will now be described with reference to Figs. 6, 9, 11 and 12. The cable terminates at the carriage in an eyelet 52 disposed between a pair of parallel angle bars 53 and secured thereto by a bolt 54 passing through apertures in the angle bars and the cable eyelet. The angle bars 53 are maintained properly spaced by plates 55, resting on the upper edges of angles 53, these plates being appropriately grooved on their under sides, as indicated in Fig. 11 for spacing the angle bars as shown.

Passing through plates 55 are bolts 56 which also pass through other plates 57 secured to a framework 58 mounted on carriage 10. On the under side of the framework 58, bolts 56 pass through helical springs 59 and terminate in nuts and washers 60, the latter bearing against the springs. Also interposed between frame 58 and the springs 59, are bearing plates 61. The framework 58 comprises, as shown in Figs. 6, 8, 11 and 12, a built-up structure of spaced angle members 62, 63, crossed at the center by other angle members 64 riveted together by means of flats and angles, as shown at 65, Fig. 12, the framework being in turn riveted to the carriage side plates 31, 32, by means of the angle members 66 and fish plates and angles 67.

By virtue of this construction, a resilient and stretchable coupling is interposed between cable 50 and the carriage 10, consisting of bolts 56 and

springs 59, whereby, under a sudden jerk, the carriage may pull away from the cable support in the manner illustrated in Fig. 11, whereby the carriage is cushioned against shock and snapping of the cable avoided.

Referring now more particularly to Figs. 6, 7 and 9, the mechanism for elevating the carriage 10 includes the drum 51 on which cable 50 is wound, this drum being mounted on a shaft 70 journaled through bearing members 71, mounted on a plate member 72 surmounting the framework 25. Drum 51 is power driven from an electrical motor 73 through a worm and gear assembly 74, the latter driving a shaft 75 through a magnetic clutch 76, shaft 75 in turn driving the drum 51 through reduction gears 77, 78 keyed to shafts 75 and 70 respectively. All of the equipment in question is mounted on plate 72, shaft 75 being journaled through bearings 79 supported thereby. For locking drum 51 against undesired rotation when clutch 76 is released, shaft 75 is provided with a brake 80 comprising a brake drum 81 keyed to shaft 75 and a cooperating brake shoe 82, magnetically actuated by a solenoid 83.

For counterbalancing the weight of carriage 10, a second cable 84, Figs. 7, 9, extends therefrom over sheaves 85, 86, journaled to bearing members 87, 88, mounted on plate 72, cable 84 extending thence downwardly to the counterweight 20, containing lateral grooves 90 into which extend angle members 91 secured to frame 25, for guiding the counterweight in its movement up and down.

Referring now to Fig. 15, the electrical circuits thereof control the operations of the driving motor 73, magnetic clutch 76, magnetic brake 80, and the magnetic clamp 5, in such manner as to provide for raising and lowering the carriage 10 and clamping the strip 1, as required in accordance with the procedure above outlined in connection with Figs. 1 and 2. During normal operation, that is, with the carriage 10 in its lowest position 10a, Fig. 1, the motor is inoperative, the magnetic clutch and clamp released, and the brake applied. In this connection, the brake is of such construction as to apply the braking action so long as its solenoid 83 is deenergized, which latter represents the normal condition for the solenoid.

Operation of the motor and engagement of the clutch to elevate carriage 10, and the simultaneous energization of the brake solenoid to release the brake, are initially under control of a "start" switch 100, Fig. 15, depression of which operates a relay 101, which in turn operates a second relay 102 and a third relay 103, the second relay controlling circuits for energizing the motor and magnetic clutch and the third relay controlling a circuit for energizing the brake solenoid. In addition, relays 101 and 102 are provided with contacts such that upon operation they lock-up under control of each other to hold each other as well as relay 103 operated, whereby once operated by momentary depression of the "start" switch, these relays are no longer controlled by that switch, but are subsequently released by other means as hereinafter explained.

The circuits for effecting the above stated operations are energized from a supply line 104, connected through knife switches 105 to a source of direct current power 106. The shunt field excitation winding 107 for motor 73 is permanently connected across the supply line 104 over the following circuit: conductor 108, rheostat 109, con-

ductor 110, shunt field winding 107, and conductors 111, 112, 113 seriatim. The shunt field of the motor is therefore continuously energized whereby energization of the motor armature 115 will cause the motor to operate.

As explained, energization of the motor armature is under control of relay 102, which in turn is under control of relay 101, the operating circuit of which is traced as follows from the negative to the positive sides of supply line 104: conductor 116, winding of relay 101, "start" switch 100, a normally closed "stop" switch 117, conductor 118, a normally closed switch 119, conductor 120 to the magnetic clamping device 5, armature and normally closed back contact 121 of a solenoid 122 actuating the clamping device, and over conductor 123 to the supply line. Since this circuit is normally closed except for the start switch, closure of the latter will energize relay 101.

Relay 101 on operating completes a circuit to operate relay 102 traced from the negative side of supply line 104 over conductor 124, winding of relay 102, inner armature and front contact of relay 101 and over conductor 125 to the "stop" switch 117, from which point on to the positive side of the supply line, the circuit is the same as that traced for relay 101.

Relay 102 upon operating over this circuit remains energized since its circuit does not include the "start" switch; and it also completes a circuit to hold relay 101 operated, traced as follows across the supply line: conductor 116, winding of relay 101, conductor 126, outer front contact and armature of relay 102, and conductor 127. Relays 101 and 102 thus lock-up through contacts of each other.

Relay 101 operates relay 103 over the following circuit: conductor 113, winding of relay 103, outer armature and front contact of relay 101 to connection 128, returning over conductor 108.

Relay 102 upon operation as aforesaid, completes the following circuit to energize the motor armature 115: positive side of supply line 104, conductor 127, inner armature and front contact of relay 102, conductors 129, 130 seriatim, motor armature 115, and conductors 111, 112, 113 seriatim. Relay 102 also completes the following circuit for energizing the magnetic clutch 76: conductor 127, inner armature and front contact of relay 102, conductors 129, 131, magnetic clutch 76, and conductors 132, 112, 113 seriatim. Motor 73 is thus energized and magnetic clutch 76 engaged.

Concurrently brake 80 is released by energization of solenoid 83 under control of relay 103 over the following circuit: conductor 108 to connection 128, armature and front contact of relay 103, conductor 133, solenoid 83, and conductors 132, 112, 113 seriatim.

With motor 73 thus energized, magnetic clutch 76 thus engaged, and brake 80 thus released, the motor will drive winding drum 51 as above described, thereby to elevate carriage 10. Elevation of the carriage can be arrested at any height thereafter by depression of the "stop" switch 117, which opens the holding circuit for relay 102, release of which also releases relay 101 to stop the motor and deenergize the magnetic clutch over the circuit above traced.

If, however, the "stop" switch is not depressed, carriage 10 will continue to rise to the top of the slack take-up unit whereupon it will be arrested automatically by engagement of a lug 134, mounted on the carriage, with the projecting

resilient arm of switch 119, whereby the switch will be opened to release relay 102 and with it relay 101, thereby to open the energizing circuit for the motor armature and the magnetic clutch.

The brake solenoid 83 is also deenergized upon opening of relay 101, to apply the brake 80 upon stopping the motor, and the brake continues to be applied while the carriage 10 is in elevated positions. Thus the operation of the apparatus thus far described, in general is as follows: By pushing the starting button 100, the carriage will rise until stopped by the stop button 117, the upper limit stop switch 119, or the clamp limit switch 127. The carriage will remain where stopped until the strip tension pulls it down against the resistance exerted by the brake. The carriage on reaching a point about one foot from the bottom will actuate switches described below, which open the clamp 5 and release the brake, and by means which will now be described, the brake will again set before the carriage reaches the end of its downward travel.

A switch 136, which may be mounted on the lower portion of the frame 25, is provided with a resilient switch arm 137, which is adapted to engage a lug 137' on the carriage 10, when such carriage is lowered to a position as above stated, for example, about one foot from the bottom of its travel. Thus switch 136, which is normally open, is now closed, and remains closed for a short period, for example, while the carriage is being lowered about four inches further. Thereupon, as lug 137' passes below switch arm 137, the switch 136 opens again. The terminals of switch 136 are connected respectively to the positive side of the power supply and to relay 103 (through connection 135). Thus, the closing of switch 136 serves to close relay 103 and energize brake solenoid 83 to release the brake, for a short period just before the carriage reaches its lowermost position. This allows the carriage to settle to its lowermost position without causing any excessive tension on the strip. The brake solenoid is thus energized to release the brake only when the motor 73 is running or while lug 137' is passing switch 136. Thus the brake acts as a drag for maintaining substantially the same tension on the strip while it is being fed from the accumulation in the slack producer, as it does when the strip is being fed directly from the pay-off block. The brake functions as the tension device for the strip as the carriage is pulled down by the strip. The counterweight 20 will prevent such lowering of the carriage, however, so long as the magnetic clamp 5 is released, but as soon as the clamp 5 is actuated to prevent further feeding of the strip into the slack take-up, the tension thereupon exerted on the strip by the pinch rolls will suffice to gradually lower the carriage to its normal position while paying out to the processing apparatus the reserve of accumulated strip.

Energization of the magnetic clamp is under control of an "actuating" switch 138, energization of which completes a circuit to operate a relay 139, operation of which in turn completes a circuit to energize the solenoid coil 122 of the clamp thereby to close the clamp. The circuit for relay 139 is traced as follows: from the positive side of supply line 104 to conductor 140, winding of relay 139, actuating switch 138, a normally closed "release" switch 141 to conductor 142, contacts of a switch 143, to the negative side of the supply line over conductor 144. Switch 143 is provided with a resilient switch arm 145 which

engages carriage 10 in its lowermost or normal position to hold the switch open at such times, but which disengages the carriage while elevated, to close the switch at such times. This is merely a protective feature to prevent closure of the magnetic clamp while the carriage is lowered, since there would then be no reserve of strip in the slack take-up for the pinch roll 17 to draw on, whereby the pinch rolls would pull directly against the clamped strip causing breakage. Relay 139 completes an obvious circuit for energizing the clamp solenoid 122, traced through the lower armature and front contact of relay 139. Also relay 139 upon operation completes an obvious locking circuit for itself arranged in shunt to the actuating switch, this circuit being traced through the upper armature and front contact of the relay. Once operated, therefore, release of this relay and of clamp 5 is under joint control of the switches 141 and 143, depression of the first of which releases the clamp when desired, while depression of the second occurs automatically upon return of the carriage to its normal position.

As explained above, the holding circuit for relay 102 is traced through the normally closed armature and back contact of the clamp solenoid 122, whereby operation of the clamp opens the holding circuit at this point to release relay 102 and with it relay 101, thereby to stop the motor and disengage the magnetic clutch 76. This also is a protective feature, since if the motor continues to operate and elevate the carriage upon actuation of the clamp, the tension exerted on the strip by pinch rolls 17, would break the strip.

I claim:

1. Apparatus for feeding strip material continuously from an intermittent source, comprising: a series of rolls over which the strip is fed, an elevatable carriage for displacing certain of said rolls with respect to others for variably looping the strip therebetween, a cable and drum for elevating said carriage, a motor and interposed magnetic clutch for releasably driving said drum, a magnetic brake therefor, switch actuated relay means for energizing said motor and clutch and for releasing said brake to elevate said carriage, means including a switch responsive to a preselected elevation of said carriage for deenergizing said motor and clutch and actuating said brake, and means including a switch responsive to subsequent descent of said carriage to a lower elevation, for releasing said brake.

2. Apparatus for feeding strip material continuously from an intermittent source, comprising: a magnetic clamp for the strip, a series of idler rolls over which the strip is passed, and power driven strip feed rolls arranged in sequence, an elevatable carriage for displacing certain of said idler rolls with respect to others for variably looping the strip therebetween, a cable and drum for elevating the carriage, a motor and interposed magnetic clutch for releasably driving the drum, a magnetic brake therefor, switch actuated means for energizing said motor and clutch and for releasing said brake to elevate said carriage, means including a switch responding to a first preselected elevation of said carriage for deenergizing the motor and clutch and actuating said brake, switch actuated means for energizing said clamp, and switch controlled means responsive to subsequent descent of said carriage to a second preselected lower elevation for automatically releasing said clamp and for momentarily releasing said brake.

3. Apparatus for feeding strip material continuously from an intermittent source, comprising: a magnetic clamp for the strip, a series of idler rolls over which the strip is passed, and power driven strip feed rolls arranged in sequence, an elevatable carriage for displacing certain of said idler rolls with respect to others for variably looping the strip therebetween, a cable and drum for elevating the carriage, a motor and interposed magnetic clutch for releasably driving the drum, a magnetic brake therefor, switch actuated means for energizing said motor and clutch and for releasing said brake to elevate said carriage, means including a switch responding to a first preselected elevation of said carriage for deenergizing the motor and clutch and actuating said brake, switch actuated means for energizing said clamp, switch controlled means responsive to subsequent descent of said carriage to a second preselected lower elevation for automatically releasing said clamp and for momentarily releasing said brake, and means responsive to actuation of said clamp while said carriage is between said first and second preselected elevations, for deenergizing said motor and clutch and actuating said brake.

4. Apparatus for feeding strip material continuously from an intermittent source comprising: a vertical framework, an elevatable carriage therein, strip rolls journaled to said frame and carriage respectively for variably looping the strip therebetween, a cable and drum for elevating the carriage, an electrical motor and interposed magnetic clutch for releasably driving the drum, a magnetic brake therefor, a second cable passing from said carriage over sheaves to a suspended counterweight, and means for electrically actuating said motor, clutch and brake.

5. Apparatus for feeding strip material continuously from an intermittent source comprising: a vertical framework, an elevatable carriage therein, strip rolls journaled to said frame and carriage respectively for variably looping the strip therebetween, a cable and drum for elevating the carriage, an electrical motor and interposed magnetic clutch for releasably driving the drum, a magnetic brake therefor, a second cable passing from said carriage over sheaves to a suspended counterweight, manually actuated switching means for actuating said motor and clutch and releasing said brake, switching means responsive to elevation of said carriage for automatically releasing said motor and clutch and actuating said brake, and switching means responsive to descent of said carriage for automatically releasing said brake.

6. In a device for feeding strip material continuously from an intermittent source: a framework containing vertical guides, an elevatable carriage arranged to travel on said guides, a cable and drum for elevating said carriage, and means resiliently suspending said carriage from said cable including rigid supporting members secured to the cable and carriage respectively, means slidably bolting said members together, and a helical spring interposed between one of said members and an end of said bolting means, and rolls over which the strip is fed, journaled to said frame and carriage respectively for variably looping the strip therebetween.

7. In a device for feeding strip material continuously from an intermittent source: a framework containing vertical guides and an elevatable carriage provided with rollers traveling on said guides, said rollers being journaled to individual bearing members bolted to supporting members mounted on said carriage, said bearing and supporting members containing cooperating ribbed and grooved portions and elongated bolt-holes for adjustably positioning said bearing members and rolls with respect to said guides, lock-nut bolts threaded through said bearing members and adjustable to bear against members affixed to said carriage for locking said bearing members in desired positions of adjustment, and rolls over which the strip is fed, journaled to said frame and carriage respectively for variably looping said strip therebetween.

8. Apparatus for feeding strip material continuously from an intermittent source, comprising: a vertical framework, an elevatable carriage therein, strip rolls journaled to said frame and carriage respectively for variably looping the strip therebetween, means including an electrical motor for elevating the carriage and an electrically actuated brake for applying braking tension to the strip, means including a switch for energizing the motor to elevate the carriage, means responsive to a preselected elevation of the carriage for automatically releasing the motor and applying the brake, and means responsive to subsequent descent of the carriage for automatically releasing said brake.

9. Apparatus for feeding strip material continuously from an intermittent source, comprising: a magnetic clamp for the strip, a series of idler rolls over which the strip is passed, and power-driven strip feed rolls arranged in sequence, an elevatable carriage for displacing certain of said idler rolls with respect to others for variably looping the strip therebetween, means including an electrical motor for elevating the carriage, and an electrically-actuated brake for applying braking tension to the strip, means including a switch for energizing the motor to elevate the carriage, means responsive to a preselected elevation of the carriage for automatically releasing the motor and applying the brake, and switch-controlled means for energizing said clamp to clamp the strip thereat.

10. Apparatus for feeding strip material continuously from an intermittent source, comprising: a magnetic clamp for the strip, a series of idler rolls over which the strip is passed, and power-driven strip feed rolls arranged in sequence, an elevatable carriage for displacing certain of said idler rolls with respect to others for variably looping the strip therebetween, means including an electrical motor for elevating the carriage and an electrically-actuated brake for applying braking tension to the strip, means including a switch for energizing the motor to elevate the carriage, means responsive to a preselected elevation of the carriage for automatically releasing the motor and applying the brake, switch-controlled means for energizing said clamp to clamp the strip thereat, and means responsive to subsequent descent of the carriage for automatically releasing said clamp and brake.

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