March 31, 1942. A. CALLESON ET AL 2,278,240

COIL UNWINDER

Filed June 8, 1938 5 Sheets-Sheet 1

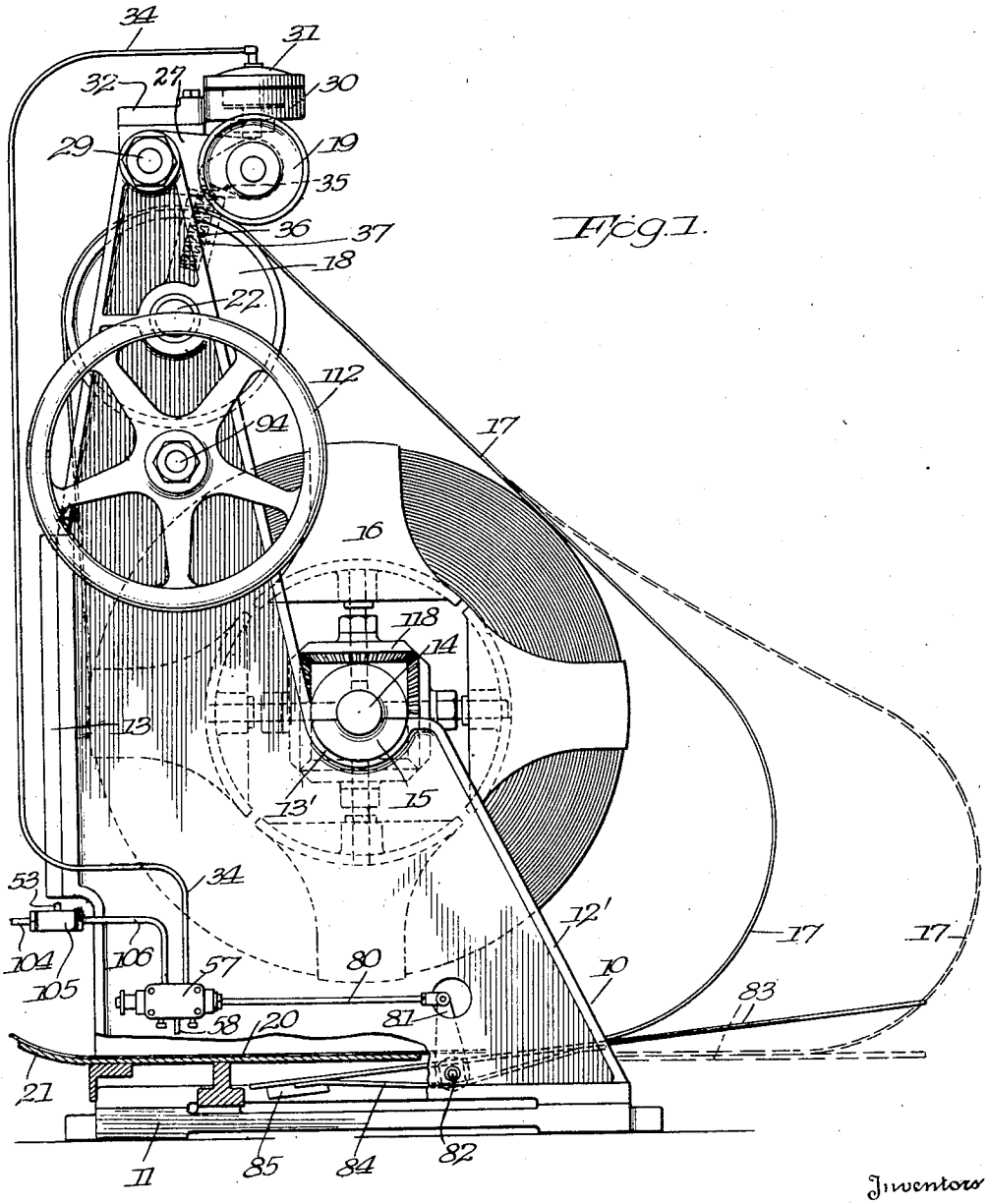

Fig. 1.

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COIL UNWINDER

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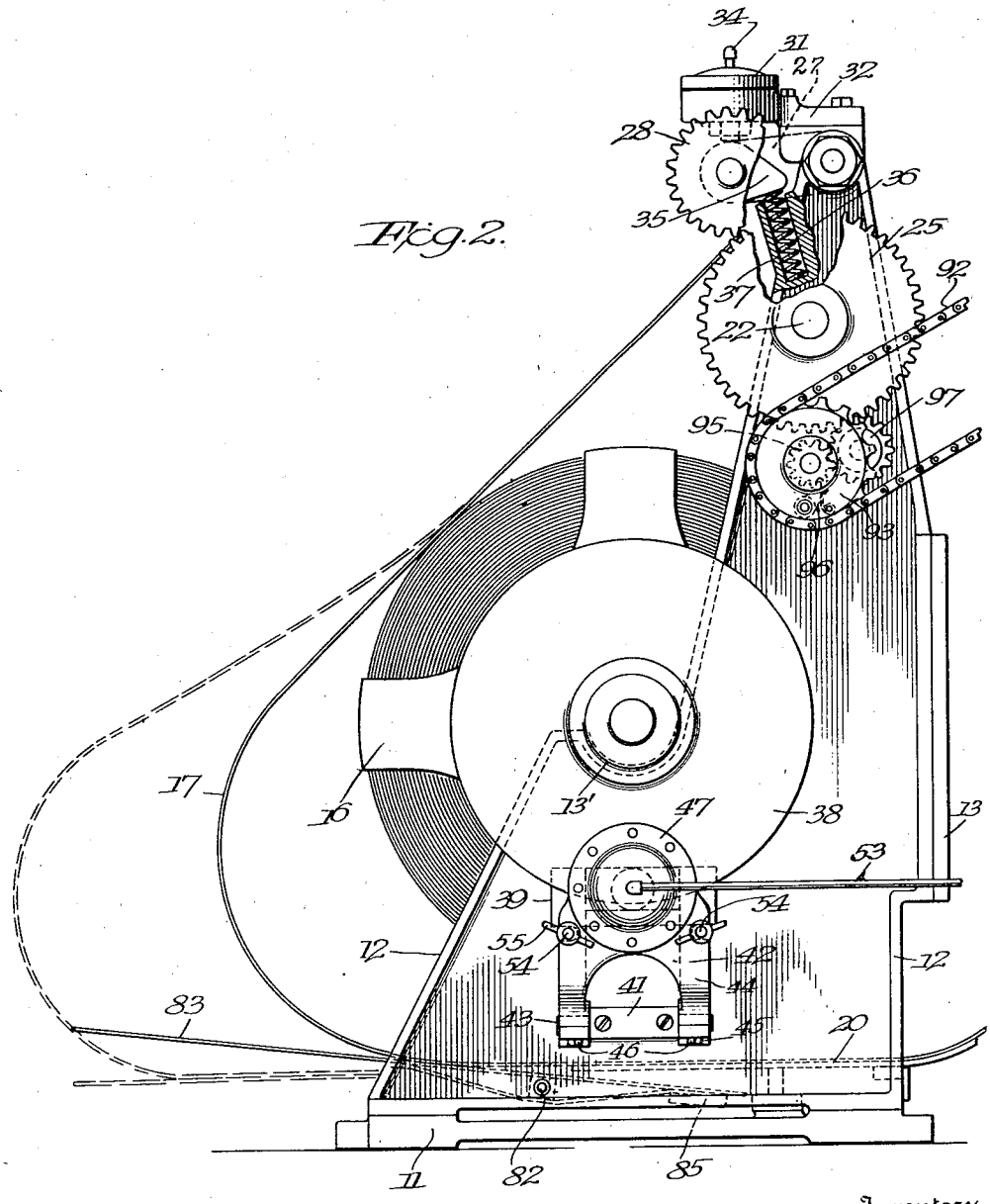
Fig. 2.



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COIL UNWINDER

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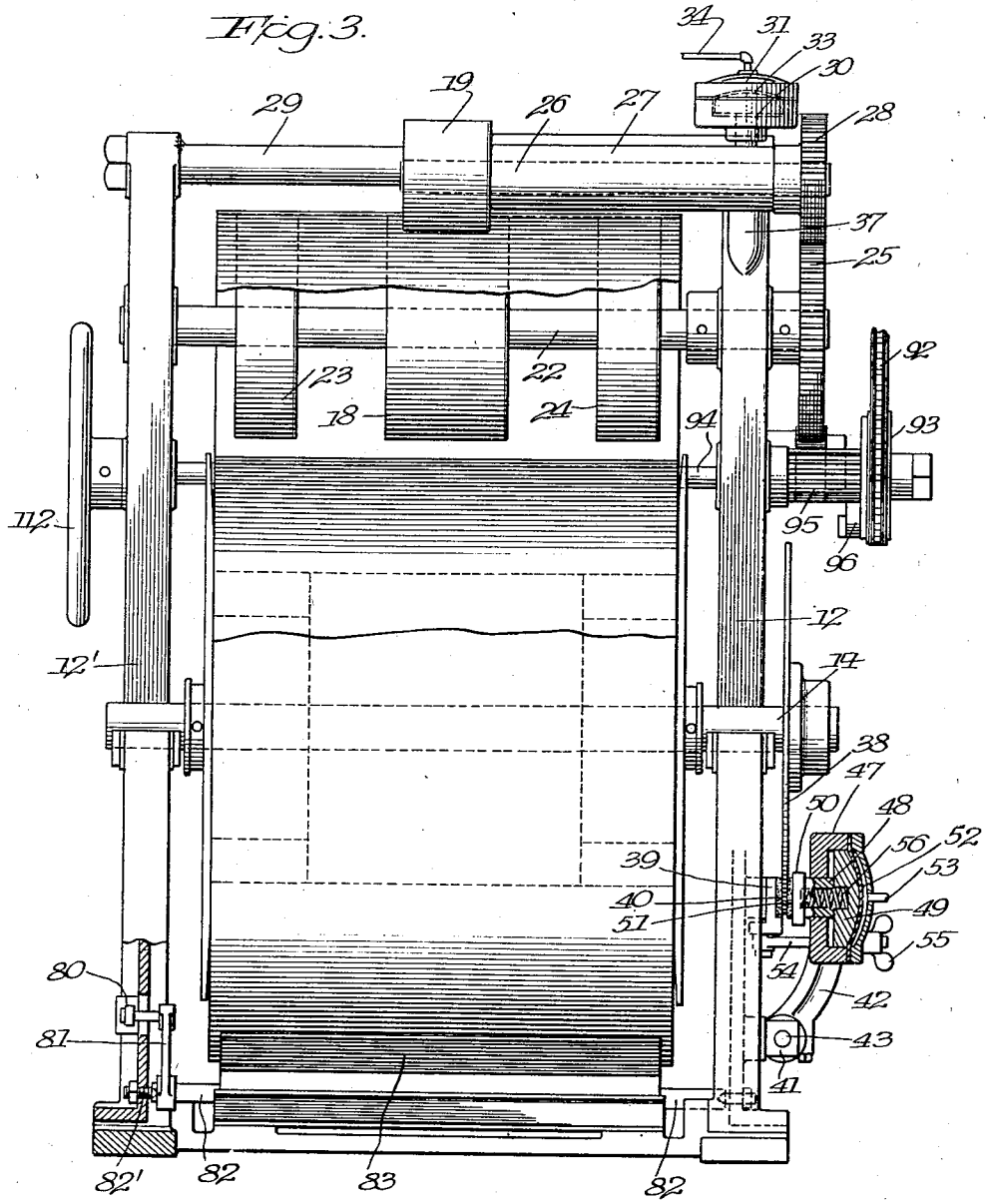
Fig. 3.



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COIL UNWINDER

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Fig. 4.

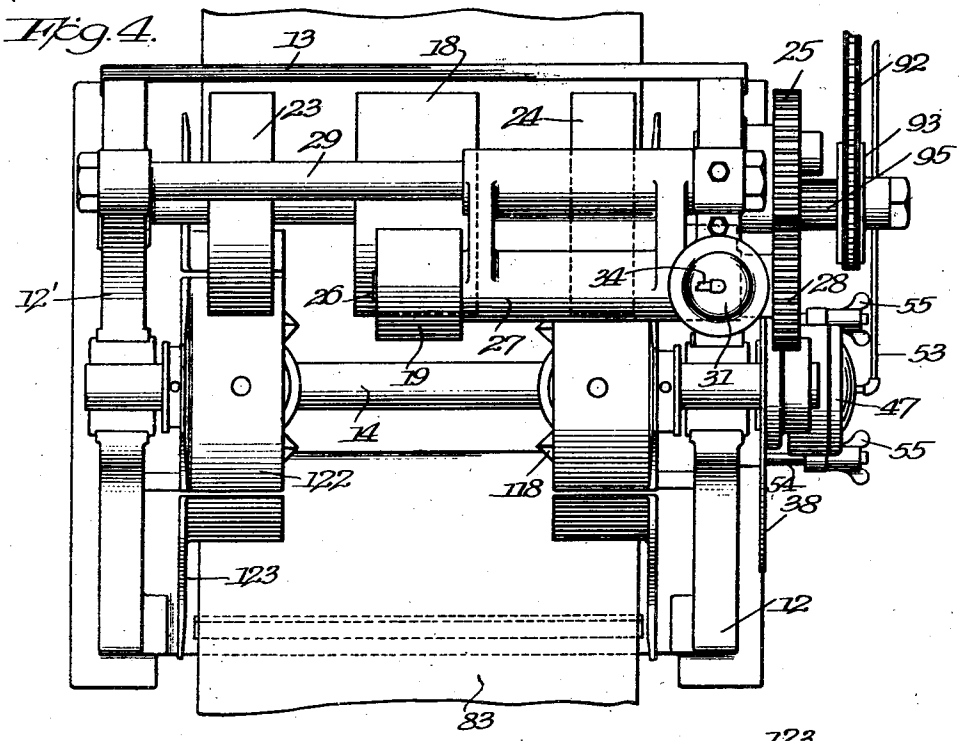


Fig. 5.

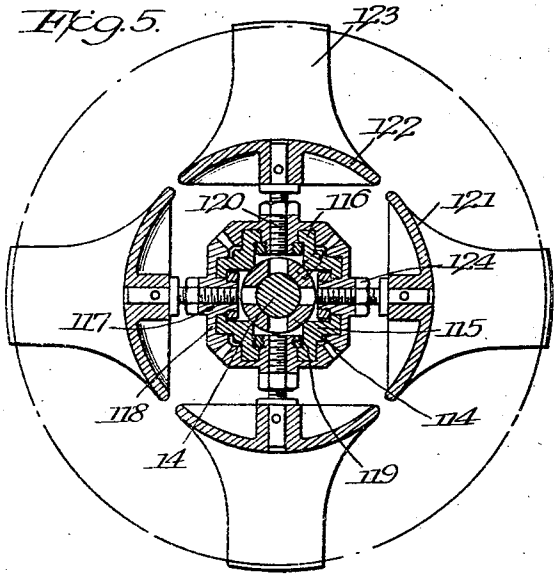
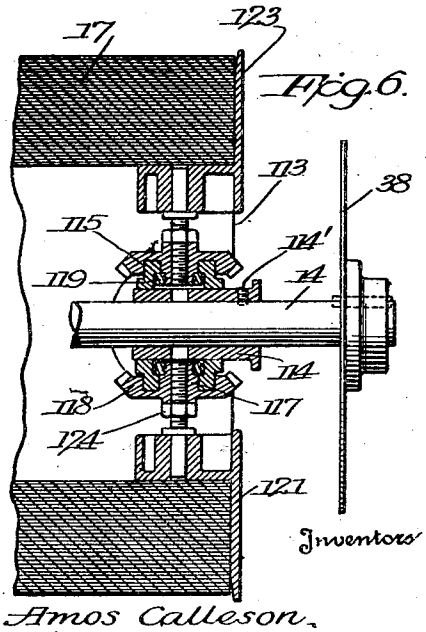


Fig. 6.



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COIL UNWINDER

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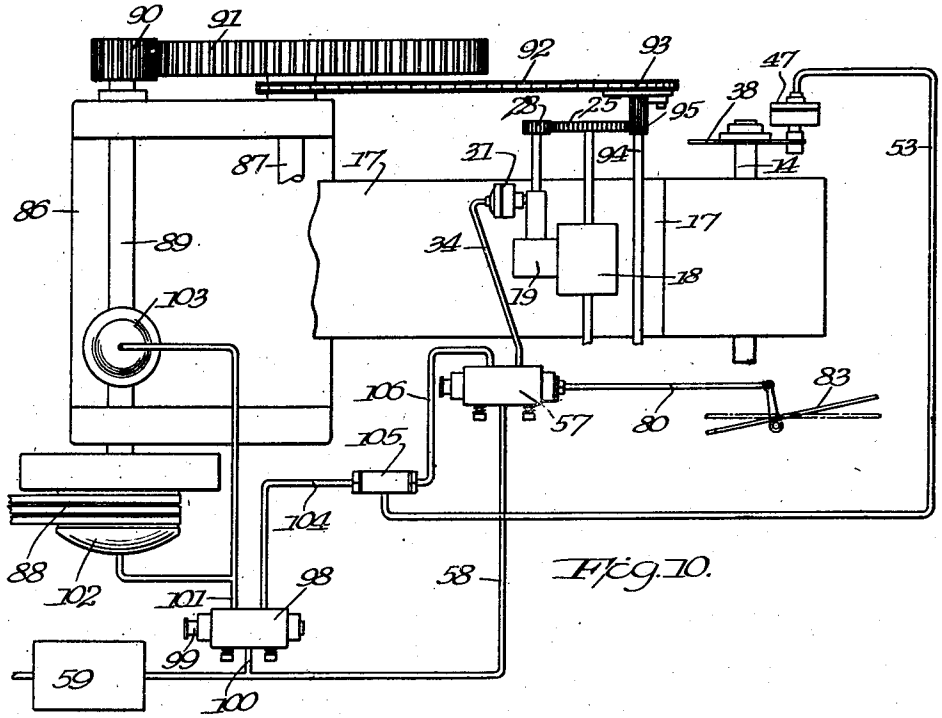

Fig. 10.

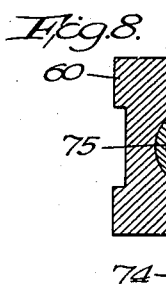

Fig. 8.

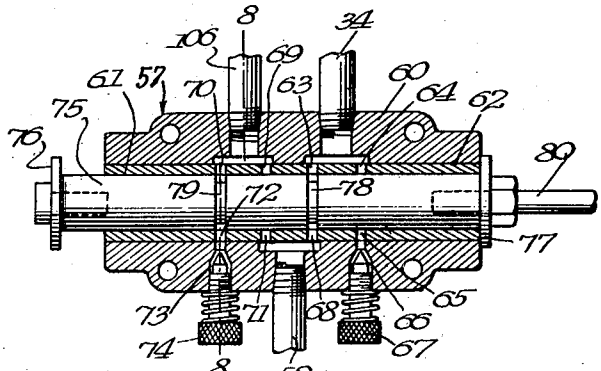

Fig. 7.

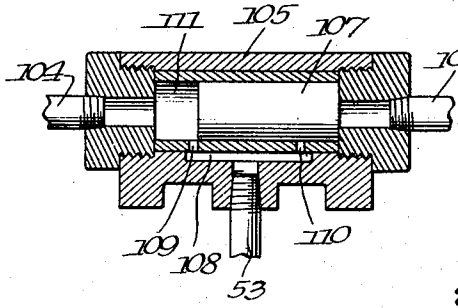

Fig. 9.

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Patented Mar. 31, 1942 2,278,240

UNITED STATES PATENT OFFICE

2,278,240

COIL UNWINDER

Amos Calleson and Edgar A. Calleson, Merrick, N. Y., assignors to Crown Cork & Seal Company, Inc., Baltimore, Md., a corporation of New York

Application June 8, 1938, Serial No. 212,588

14 Claims. (Cl. 242—55)

The present invention relates to machines for unwinding various materials from reels and is particularly useful in unwinding coils of stock material, such as sheet metal, for presentation to a metal working machine such as a press.

In machines of this character, it is important that during the operation of the coil unwinder and the metal working machine or press, that sufficient slack of the stock material be always maintained between the two apparatuses, in order to prevent injury to the stock, unwinder and press. This is accomplished in the present invention by driving the coil unwinder at a slightly greater speed than the feed mechanism of the metal working machine. While this arrangement adequately disposes of one problem, it is necessary that means be provided to regulate the feed of the coil unwinder to insure against excessive building up of the sheet metal stock between the unwinder and the metal working machine.

The primary object of the invention, therefore, is the provision of means for automatically controlling the unwinding of the stock from the coil unwinder whereby the material is properly fed at the desired speed to the metal working machine. This means comprises a set of driving rolls for receiving and frictionally unwinding the coil of stock from the reel. The stock passes from the driving rolls into close proximity to a balance plate movably mounted on the coil unwinder and operatively connected to the drive rolls, whereby should an excess amount of material be unwound, the undesired weight of the slack strip will actuate the balance plate and thereby automatically render the driving rolls inoperative until the weight of the slack is reduced to the desired predetermined amount.

A further object is the provision of a reel brake mechanism operative connected with the balance plate and driving rolls whereby movement of the plate by the excess stock will not only render the driving rolls inoperative, but will also automatically actuate the brake mechanism to apply braking action to the reel until the slack is reduced and normal feed resumed.

Another object is to provide a fluid pressure system associated with the driving rolls, brake mechanism and balance plate, said system including a valve adapted upon movement of the balance plate by an excess amount of stock material, to simultaneously and automatically render the driving rolls inoperative and the brake mechanism operative.

A further object is to associate the feed control means of the coil unwinder with that of the metal working machine or press, whereby upon stoppage of the press, the unwinder will also be automatically stopped.

A still further object is the provision of means for actuating the reel brake mechanism when, for any reason, the press is stopped. This means is auxiliary to the aforementioned brake operating means and is separately actuated and controlled without regard to the movement of the balance plate.

With the foregoing and other objects in view, the invention will now be more fully described, reference being had to the accompanying drawings in which,

Figure 1 is a side elevation of the coil unwinder.

Figure 2 is an elevation taken from the opposite side of the coil unwinder shown in Figure 1.

Figure 3 is a front elevation of the coil unwinder.

Figure 4 is a top plan view thereof.

Figures 5 and 6 are detailed views of the reel.

Figure 7 is an enlarged section of the main air valve.

Figure 8 is a section on line 8—8 of Figure 7.

Figure 9 is an enlarged longitudinal section of a press cut-in valve for controlling the reel brake mechanism from the press, and

Figure 10 is a diagrammatic view showing the coil unwinder, press feed actuating means and the means for driving the coil unwinder feed, and including the fluid pressure system controlling the operations of the same.

Referring now to the drawings and particularly to Figures 1 to 3, the numeral 10 designates generally the coil unwinder frame having a base 11, and spaced side frame sections 12 and 12' respectively extending vertically from the base 11. These sections are connected above the base by a rear plate 13 forming part of the unwinder frame. Each frame section 12, 12' is provided intermediate its upper and lower extremities with a substantially semi-circular stirrup 13' for removably and rotatably supporting one end of a reel shaft 14. Each stirrup (see Figure 1) is preferably provided with a bearing block 15 of Babbitt or other suitable metal which directly engages and supports one end of the reel shaft 14. With this construction, a reel 16 of coiled sheet metal or other stock material 17 may be readily detachably placed in the frame in position to be unwound by rotation of the reel as stock is withdrawn from the coil.

Drive mechanism for coil unwinder

Referring to Figures 1 and 2, the reel 16 is not directly driven, but is rotated by the sheet metal stock 17 as the same is drawn from the reel by passing between a pair of driving rolls 18 and 19 mounted in the frame 10 above the reel 16, and which frictionally act on the metal strip. The sheet metal stock is fed by and through the rolls 18 and 19, and then passes down around and under the reel 16, where it engages and travels on the upper surface of a guide 20 mounted on the base 11. This guide is provided with an extension 21 which projects outwardly and upwardly from the base and directs the stock to the feed mechanism of a press or other metal working apparatus, as will be more fully hereinafter described.

Referring to the drive means for the coil unwinder, the lower driving roll 18 is fixed to a shaft 22 journaled for rotation in the side frame sections 12 and 12'. This shaft (see Figures 3 and 4) also carries rolls 23 and 24 spaced from and positioned on opposite sides of the driving roll 18, and cooperate therewith to adequately support the sheet metal stock 17 as it is unwound from the reel 16. One end of the shaft 22 extends through the side frame section 12, and this extension carries and is fixed to a large gear 25 located exteriorly of this frame section (see Figures 2 and 3).

The upper drive roll 19 is secured to the inner end of a stub shaft 26 (see Figures 3 and 4) which is journaled for rotation in a bracket 27, but is held against longitudinal movement. A small gear 28 is fixed to the outer end of the stub shaft 26 and meshes with the large gear 25. The bracket 27 is swingably mounted on a cross rod 29 extending between and connecting the upper ends of the side frame sections 12 and 12'. The swinging movement to which the bracket 27 is subjected is very slight, since its primary function is to permit the top roll 19 to be raised sufficiently to break the frictional drawing engagement of the sheet metal stock with the driving rolls when it is desired to discontinue the drawing of stock from the reel. In this connection, the teeth of the gears 25 and 28 are cut deep enough to permit the required raising of the drive roll 18, without taking the gears 25 and 28 out of mesh.

The means for controlling the raising and lowering of the upper drive roll to continue or discontinue feeding the strip from the reel comprises a fluid actuated piston 30 (see Figures 1 to 3) which is enclosed in a casing 31. This casing is supported on an arm 32 mounted at the top of the side frame section 12. The interior of the casing 31 constitutes a cylinder for the piston and is provided with an opening in line with the axis of the stub shaft 26 (see Figures 1 and 2). The lower end of the piston 30 projects through this opening in the casing and directly contacts the bracket 27. A flexible diaphragm 33 of rubber or any other suitable material, is secured within the casing above the piston, thereby forming a fluid pressure chamber with which communicates a fluid pipe line 34 for carrying compressed air into the pressure chamber of the casing 31 above the diaphragm and piston to actuate the same. The bracket 27 is provided with an inwardly projecting arm 35 (see Figures 1 and 2) adjacent its outer end which is in line and engageable with the upper end of a coil spring 36. This spring is supported in an upwardly opening pocket 37 formed in the side frame section 12 and exerts an upward pressure against the arm 35.

With the construction just described and assuming that the piston 30 is free of fluid pressure from the line 34, the force of the spring 36 will raise the bracket 27 and roller 19 sufficiently to break the frictional contact between the rolls and the sheet metal stock 17. This renders the driving rolls inoperative to feed the stock, notwithstanding they are being constantly rotated. When, however, fluid pressure is applied through the pipe line 34 to the diaphragm 33 in the casing or cylinder 31, this pressure will move the piston 30 which in turn will engage and swing the bracket 27 and depress the same and the drive roll 19 downwardly against the action of the spring 36. This downward movement of the roll 19 is sufficient to bring the drive roll into feeding relation with the roll 18, i. e., produce frictional engagement of the rolls with the stock, whereby unwinding of the stock from the reel will automatically be continued until the fluid pressure has been relieved from above the piston 30. Upon release of fluid pressure, the spring 36 engaging the arm 35 will lift the same and thereby raise the top feed roll 19 to break the frictional feeding engagement of the rolls 18 and 19 with the strip stock.

Reel brake mechanism

Referring to Figures 2, 3 and 6, there is disclosed a reel brake mechanism for the coil unwinder. As will be presently described, the operating means for this mechanism is associated with the above described drive rolls 18 and 19, whereby the brake will be automatically applied when the drive rolls are rendered inoperative to feed stock. Conversely, the braking action will be automatically relieved when the drive rolls are again and automatically rendered operative. Furthermore, the actuation of these driving and braking elements is automatically controlled by means, which, in turn, are automatically regulated by the stock 17. That is, when an excess amount or weight of stock has been unwound beyond a predetermined permitted slack, the driving means 18—19 will be rendered inoperative and the brake mechanism placed in operation. As soon as the excess weight of stock has been fed to the press, the drive rolls 18 and 19 will again operate to uncoil the stock and the brake mechanism will be released.

The braking mechanism includes a circular plate or disc 38, fixed to one end of the reel shaft 14 (see Figures 3 and 6). As will be observed, this end of the shaft projects beyond the side frame section 12 sufficiently to space the disc 38 from the section 12 to permit it to rotate freely with the reel 16, as the stock material is being unwound therefrom by rolls 18—19. A block 39 is suitably mounted on the lower portion of the side frame section 12, and is provided with an outer surface of friction material 40 which comprehends a substantial area adjacent the periphery of the disc 38 and is adapted to frictionally contact the inner face of the same when braking action is applied to the reel. A second block 41 is fixedly mounted on the frame section 12 below the block 39 and constitutes a base for pivotally supporting a substantially U-shaped bracket 42.

Referring to Figure 2, each end of the block 41 is formed into a reduced bearing member 43 engaging a semi-circular recess at the lower end

of each leg 44. End blocks 45 each provided with a semi-circular recess cooperate with the recess in the end of each leg 44 and are bolted thereto whereby the U-shaped bracket is detachably and swingably mounted on the block 41. Any suitable fastening elements, such as the bolts 46, may be employed for securing the end blocks 45 to the ends of the legs 44.

The upper end of the bracket 42 supports a casing 47 constituting a cylinder for a pressure operated piston 48. This piston may be integral, but as shown in Figure 3, is preferably composed of a section 49 contained wholly within the casing 47 and a section 50 projecting through an opening in the casing and movable into and out of engagement with the disc 38. The inner end of the section 50 is lined with friction material 51, similar to the material 40 and is directly in line therewith, that is, the material 51 comprehends a substantial area within the periphery of the disc 38 and cooperates with the material 40 to apply braking action to the disc 38. A flexible diaphragm 52 is suitably secured within the casing 47 and forms therewith a pressure chamber communicating with a pipe line 53 for applying fluid pressure to the diaphragm and piston to actuate the same.

The bracket 42 being loosely mounted on the block 41, allows the casing 47 to be adjusted with respect to the disc 38 whereby to control the throw of the piston and compensate for wear of the friction material to assure the desired braking action at all times. The means for providing this adjustment comprises a pair of rods 54 (see Figure 3) each secured at one end to the block 39 and having their opposite ends slidably engaging in suitable openings in the bracket 42. Wing nuts 55 are threaded upon the free ends of the rods 54, and by rotating these nuts, the casing 47 and piston 50 carrying the friction face 51 may be adjusted with respect to the disc 38 so that when subjected to fluid pressure, the piston will cause the friction face to engage the disc and exert the desired braking pressure.

With the construction as thus described and assuming that fluid under pressure, such as air, has been introduced through the pipe line 53 to the interior of the casing 47, the diaphragm 52 will be urged inwardly against the piston section 49, which in turn will move the friction surface 51 of the outer piston section 50 into contact with the disc 38. Since the friction material 51 is in register or alignment with the friction material 40 on the fixed block 39, an efficient braking action will be applied to the disc 38 on its opposite sides. This braking will be immediately transmitted to the reel 16 through the shaft 14 and thus will prevent overrunning of the same which would otherwise occur and cause an excess amount of stock to be unwound after the driving rolls 18—19 have been rendered inoperative.

When the fluid pressure is relieved on the diaphragm 52, the braking action of the piston will also be relieved. In order to assure the instant outward movement of the piston section 49 when the fluid pressure has been relieved from the diaphragm, a coil spring 56 (see Figure 3) is positioned between the sections 49 and 50. While this spring is of sufficient strength to effect outward movement of the piston section 49, it is to be understood that it is not of sufficient strength to exert braking pressure on the section 50 when the fluid pressure has been released on the outside of the diaphragm 52.

Controlling means for drive rolls and brake mechanism

Referring now to Figures 1, 2 and 10, it will be observed that pipe line 34 leads to and communicates with a valve 57, shown in Figure 7, which will hereinafter be designated the main air valve. Pipe line 53, however, does not lead directly to valve 57 but connects with a press cut-in valve 105 which is in turn connected to a conduit 106 leading to valve 57, as will later be described. A conduit 58 leading from a source of fluid supply, such as an air supply tank 59 communicates with the valve 57, as shown. The valve 57 (see Figures 7 and 8) may be of any suitable construction and in the present instance, comprises a casing 60 having a cylindrical passage 61 extending longitudinally of and entirely through the casing. A tubular sleeve 62 constitutes a lining for the passage and is provided with spaced ports 63 and 64 located on one side of the valve casing and which communicate with the pipe line 34 leading to the casing 31 and piston 30 of the drive roller mechanism 18—19.

A port 65 is located on the opposite side of the passage 61 from the port 64 and is in direct alignment therewith. This latter port connects with an air exhaust hole or opening 66 leading to the exterior of the valve casing and which is plugged by an air exhaust retarding spring pressed needle valve 67. A fourth port 68 is positioned on the same side of the passage 61 as the port 65 and is in direct alignment with the port 63. This port communicates with the conduit 58 leading from the air supply tank 59.

The above mentioned ports 63, 64, 65 and 66 are located on the right hand side of the valve casing 61 as shown in Figure 7, while a second set of four ports are located on the left hand side of the valve casing. Two of these latter ports, designated as 69 and 70, communicate through valve 105 and line 106 with the pipe line 53 leading to casing 47 of the reel brake mechanism. Directly opposite and aligned with the port 69 is port 71 which, similar to port 68, communicates with conduit 58. At a point directly opposite and aligned with port 70, is a port 72 which, similar to port 65, communicates with an air exhaust hole or opening 73 leading to the atmosphere and controlled by an exhaust retarding needle valve 74, identical to the valve 67.

A valve element 75 is mounted in the passage 61 and is adapted to reciprocate therein within certain limits. Washers 76 and 77 are secured to opposite ends of the valve element to limit the movement thereof in opposite directions. The valve element is provided with annular spaced grooves or recesses 78 and 79 respectively which are so positioned and related to each other and to the above mentioned ports in the casing, that control of the driving rolls and brake mechanism is accomplished upon predetermined reciprocation of the valve element in the passage 61 and registry of the annular grooves with the ports in the various longitudinal positions of the valve 75 in the casing. The operation of this valve and its effect on the driving rolls and brake mechanism will presently be described in detail.

Referring to Figures 1, 3 and 7, it will be observed that the end of the valve element 75 which carries the washer 77, is connected to one end of a valve operating rod 80. The other end of the rod 80 is pivotally connected to a rock arm 81 (see Figure 1) which is fixed to one end of a cross shaft 82, the latter being rotatably and

hence pivotally mounted between the cross frame sections 12 and 12' adjacent the base 11 of the coil unwinder as shown at 82' (see Figure 3). A balance plate 83 is fixed to and supported by the upper side of the cross shaft 82, which, as shown in Figures 1 and 2, is substantially square in cross-section. The greater extent of this balance plate is on the right hand side of the pivot shaft 82, as viewed in Figure 1, while substantially all of that portion of the plate on the left hand side of the shaft 82 is positioned below the guide member 20. A brace 84 connects the underside of the plate with the cross shaft 82, and a weighted element 85 is secured to the underside of that portion of the plate extending below the guide 20.

Normally, the balance plate 83 is in the full line position shown in Figure 1, with the right hand portion maintained in raised position by the weighted element 85. The balance plate will remain in this position as long as the stock material 17 is in its full line position (see Figure 1). In this position, the stock may or may not contact or engage the balance plate. Any engagement, however, will be so slight that the weight of the sheet metal stock will have no effect in moving the balance plate about its pivot. When, however, the stock material builds out to the dotted line position shown in Figure 1, the weight of this excess material will cause the balance plate to pivot upon the shaft 82 from its full line position to the dotted line position.

When the balance plate 83 is in its normal full line position and assuming that the drive rolls 18 and 19 are rotated at their normal operating speed, the valve element 75 will be maintained in the position shown in Figure 7, by the operating rod 80 and the rock arm 81. It will be observed that in this position of the valve element 75, the annular groove 78 is in register with the ports 63 and 68 and thereby places the conduits 58 and 34 in communication. Thus, compressed air from the air tank 59 is transmitted to the casing 31 and piston 30, whereby the drive roll 19 is forced downwardly into engagement with the stock sufficiently to provide a frictional driving contact between the rolls and the stock 17 to unwind stock from the reel. At the same time, the groove 79 places the pipe line 106, valve 105, and pipe line 53, leading to the reel brake mechanism casing 47, in communication with the exhaust opening 73, thereby exhausting air from the pipe line 53 and rendering the brake mechanism and piston 48 inoperative to apply any braking action to the disc 38.

When, however, the stock material has built up a slack above a predetermined weight, so as to move the balance plate from its full line to its dotted line position, this movement of the plate as above described, will be transmitted through the rock arm 81 and actuating rod 80 to the valve element 75, thereby moving the latter to the right in the casing 60 in Figure 7 until the washer 76 abuts the end of the casing. This has the effect of moving the groove 78 in the valve out of register with the ports 63 and 68 and placing the groove 78 in register with the ports 64 and 65. Thus, communication between the pipe lines 58 and 34 is cut off and the pipe line 34 is connected with the exhaust opening 66 leading to the atmosphere. The air is thus exhausted from the pipe line 34, relieving pressure on the top of piston 30. The coil spring 36 immediately raises the bracket 27 and drive roll 19 sufficiently to break frictional contact between the drive rolls and the stock material and to render the uncoiling operation of the coil unwinder inoperative. At the same time that the drive rolls 18 and 19 are rendered inoperative, the brake mechanism is rendered operative by reason of the groove 79 of the valve element 75 registering with the ports 69 and 71. This places the pipe lines 53 (through valve 105 and conduit 106) and 58 in communication whereby air pressure is transmitted to the diaphragm 52 in casing 47 and the piston 48 is forced into braking engagement with the disc 38.

As will be explained hereinafter in greater detail, the stock as it reaches the inclined upper end 21 of the guide 20, passes to the feed mechanism of the press or other metal working machine. This press feed mechanism feeds the stock material into the press at a slightly slower rate than the stock is fed through the driving rolls 18 and 19. This is to prevent the press feed mechanism from exerting any pulling action on the rolls 18 and 19 through the stock material, since such action might tend to injure the stock, the coil unwinder, and possibly the metal working machine. As the stock is thus fed from the drive rolls 18 and 19 at a slightly greater speed than it is taken up by the press feed mechanism, the stock necessarily tends to build out and it is therefore necessary that some means such as the balance plate and its associated elements be provided to automatically control the feed of the stock material.

After the balance plate has been moved about its pivot from its full line to its dotted line position (see Figures 1 and 2), the driving rolls, as above explained, will be rendered inoperative to unwind stock from the reel 16. These driving rolls will remain inoperative until the feed mechanism of the press has taken up the excess or slack stock to the point where the weight of the stock will no longer maintain the balance plate in its dotted line position. As the excess stock material is taken up, it will reach a point where the predetermined weight of the element 85 will overcome the weight of the stock, and thus move the balance plate about its pivot 82. This movement will actuate the valve element 75, sliding it again to the position shown in Figure 7, where air pressure is simultaneously exhausted from the pipe line 53 and applied to the line 34 to again render the drive rolls 18 and 19 operative and the brake mechanism inoperative. These automatic feeding and braking operations will continue as long as the press and coil unwinder are actuated and will effectively control the unwinding of the stock material and the feeding of the same to the press.

Control of coil unwinder by press

Referring again to Figures 2, 3 and 10, there is disclosed the means for driving the rolls 18 and 19 from the press. The press may be of any desired construction and is therefore diagrammatically illustrated and designated as a whole by the numeral 86. The stock material 17 travels from the coil unwinder to the press feed mechanism which is not shown but which includes a shaft 87. The power for operating this press feed shaft is derived through a motor or other prime mover (not shown), which imparts rotary motion to a pulley 88 driving shaft 89 and small and large intermeshing gear wheels 90 and 91 respectively. A sprocket chain 92 transmits power from the press shaft 87 to a sprocket gear 93, loosely mounted for rotation on one end of a

cross shaft 94 which is journalled between the frame sections 12 and 12' of the coil unwinder. Adjacent the sprocket gear 93 is mounted a small gear wheel 95 splined or keyed to the shaft 94. A spring pressed pawl 96 (see Figures 2 and 3) is carried on the sprocket gear 93 and is normally urged into contact with the teeth of the gear 95. Thus, rotary motion from the sprocket gear 93 is imparted to the gear 95 as long as the sprocket wheel is rotating in a counter-clockwise direction, as shown in Figure 2, i. e., as long as stock is being fed to the press. If, for any reason, the rotation of the press feed mechanism is reversed, this reverse movement is imparted to the sprocket chain 92 and sprocket gear 93. Such action, however, merely permits the pawl 96 to slide over the teeth of the gear 95 without imparting reverse rotary motion thereto. The purpose of this construction is to prevent any reversing motion being communicated to the drive or feed rolls 18—19 of the coil unwinder.

The gear 95 meshes with a pinion 97 rotatably mounted on the side frame section 12, and this pinion 97 in turn meshes with the large gear wheel 25 on the shaft 22 carrying the lower drive roll 18. Thus, rotation of the press and press feed mechanism imparts a relative rotation to the gear 25 and to the drive rolls 18 and 19, since as above stated, the gear 25 on shaft 22 meshes with gear 28 on the stub shaft 26 carrying the upper drive roll 19.

In addition to the means for applying braking action to the reel 16 when the drive rolls 18 and 19 are rendered inoperative, means are also provided to effect braking operation of the reel if for any reason the press or press feed mechanism, is rendered inoperative. This means is associated with the fluid pressure operating system and controls both the coil unwinder and the press. It is to be understood that the press 86, which is diagrammatically shown in Figure 10, may be of any desired construction and forms no part of the present invention, other than its association with the coil unwinder.

The numeral 98 designates a press operating valve which is similar in all respects to the valve 57, with the exception that its reciprocating valve element is manually operated through a handle 99. In this connection, a branch line 100 connects the valve 98 with the air supply tank 59 in the same manner that the pipe line 58 connects the valve 57. A pipe line 101 leads from one side of the valve 98 and communicates with an air clutch 102 and an air brake 103 of conventional design. This arrangement is such that when the valve 98 is in position to place the air supply tank 59 in communication with the pipe line 101, the air clutch 102 will be operatively connected to the shaft 89 to operate the press feed, while the air pressure will simultaneously maintain the air brake 103 in released position against the tension of suitable springs (not shown). The other side of the valve 98 connects the tank 59 and branch 100 with a conduit 104. This conduit is connected to one end of a valve 105, which will hereinafter be designated as a press cut-in valve and is shown in detail in Figure 9. The other side of this press cut-in valve is connected with the main air valve 57 through a conduit 106. A reciprocating valve element 107 is mounted within the casing of the valve 105, and is slidable from one end of the same to the other to close off either the conduit 106 or the conduit 104.

In initially describing the connection between the reel brake casing 47 and the air valve 57, the pipe line 53 was described as placing these two members in communication through the medium of the press cut-in valve 105 and conduit 106, whereby fluid pressure from the tank 59 passes through the conduit 58 to the valve 57 and then through the line to the brake, when the valve element 75 is in one position of movement. That is to say, the press cut-in valve 105 is connected to one end of the pipe line 53 and the flow of compressed air to the reel brake casing 47 by way of the pipe line 58, passes through the conduit 106, press cut-in valve 105 and pipe line 53 as above described. During the normal operation of the coil unwinder, the valve 98 will be set to permit flow through the conduit 101 and close off air pressure through the conduit 104 leading to the valve 105. Thus, the compressed air will pass through the conduit 58 to the valve 57, and if this valve has been moved by the balance plate 83 to shut off the flow of compressed air to the driving rolls 18 and 19, the flow of air will be through the conduit 106, which will move the valve element 107 to the left. The valve 105 is so constructed that the pipe line 53 is positioned centrally of the ends of the valve and connects with an elongated port 108 (see Figure 9) which places the pipe line 53 in communication with ports 109 and 110 of the valve casing communicating with opposite ends of the passage 111 within which the valve element 107 is reciprocated. Thus, with the valve element 107 moved to the left of Figure 9, the compressed air will pass through the port 110 to the pipe line 53 and thence to the reel brake casing 47.

While the press 86 and the coil unwinder are operating to unwind and feed the stock material to the press feed mechanism 87, the balance plate 83 will function to reciprocate the valve element 75 of the valve 57 and automatically direct the compressed air either to the driving rolls 18 and 19 or to the reel brake mechanism, depending upon the amount of stock that is being fed to the balance plate. If it is desired to close down the press by actuating the handle 99 of the valve 98, the compressed air entering the valve casing from the pipe section 100 will be directed away from the conduit 101, thereby declutching the air clutch 102 and actuating the brake 103. At the same time, the compressed air will pass through the conduit 104, moving the valve element 107 of valve 105 to the position shown in Figure 9. This movement of the valve element 107 will cause the compressed air to flow through the port 109 to the pipe line 53, and thence to the casing 47 of the reel brake mechanism where it will actuate the piston 48 and apply braking action to the reel 16. Thus, when the press is rendered inoperative, this action will be immediately transmitted to the coil unwinder and prevent any overrunning of the reel 16 after the press is shut down. When the press is again placed in operation by actuating the valve handle 99, the flow of compressed air will be through the conduit 101. Conduit 104 will be shut off from the supply tank 59 and the full air pressure to the coil unwinder will be through the conduit 58 and the valve 57.

After a coil of stock material has been initially placed in the coil unwinder, it is necessary that the free end of the stock be threaded through the drive rolls 18 and 19 when the feed mechanism of the press and unwinder is shut down. Means are provided to facilitate this threading operation and to permit a manual operation of the drive rolls 18 and 19. This is accomplished by mounting a hand wheel 112 (see Figures 1 and

3) on one end of the cross shaft 94. Since the pinion 95 is fixed to the other end of this shaft and is connected to the gear wheel 25 through the gear 97, actuation of the hand wheel 112 will impart rotative movement to the shafts 22 and 26 and actuate the drive rolls 18 and 19. Thus, the end of the stock may be readily fed through the drive rolls, down around the reel to the guide 20 and then up to the press feed mechanism 87.

Reel structure

While any desired type of reel may be utilized to support the stock material in the coil unwinder, the one disclosed in detail in Figures 5 and 6 is preferred. In this construction, a pair of adjustable coil supporting members, indicated as a whole at 113, are mounted on opposite ends of the reel shaft 14. Each member comprises a collar 114, detachably keyed by a set screw 114' to the shaft, and upon this collar is fixed a hub 115 having four integral gear supporting shoulders 116. These shoulders are each provided with a centrally disposed opening for receiving a boss or inwardly extending projection 117 formed as an integral part of bevel gear 118. Shoulders 116 loosely fit into a recess of gear body so as to provide a bearing for same and a nut 119 threadedly engaging the reduced end of the projection or boss 117, loosely confines the gear in position allowing same to be freely rotated. Each bevel gear 118 is also provided with a central threaded opening which receives the threaded shank 120 of a coil supporting segment 121. As shown in Figure 5, each segment is provided with an arcuate section 122 which, with the other sections, forms a substantially cylindrical support for the coiled stock material 17. These segments 121 are each provided with an outer laterally extending flange 123 adapted to engage the edge of the coil and retain the convolutions in proper superposed relation.

When it is desired to place a coil of stock material on a reel preparatory to inserting the reel in the coil unwinder, it is necessary to remove one of the supporting members 113 from the reel shaft 14. This is accomplished by unloosening one of the set screws 114', and removing the member from the shaft. The coil may then be slipped over the shaft and into engagement with the supporting member 113 which has not been removed. The other member is then replaced on the shaft, with its segments in coil supporting position. It is to be understood that when the coil is initially placed on the reel, the segments necessarily loosely contact the inner convolution of the coil. However, as soon as the members are in position on the shaft 14, the segments 121 may be tightly moved into clamping position by rotating one of the bevel gears 118 of each member. This is easily accomplished by applying a wrench or other tool to the hexagonal extension 124 of the gear. This extension may either be an integral part of the gear or a nut welded thereto. This will have the effect of rotating the other three gears of each member and moving the posts or shanks 120 outwardly until the members tightly clamp the inside of the coil.

With respect to the unwinding of the coil as shown in Figures 1 and 2, it is to be understood that that portion of the stock which passes through the drive rolls 18 and 19, and down around the reel to the guide 20, may be broadly considered as comprising the outermost loop or convolution of the coil.

It is to be understood that the forms of the invention shown and described are merely illustrative of preferred embodiments and methods of constructing the same, and that such changes may be made as fall within the purview of one skilled in the art without departing from the spirit of the invention and the scope of the appended claims.

We claim:

1. In a coil unwinder, means for supporting a coil of stock material to be unwound, means for effecting unwinding of the stock material from the coil for presentation to a feeding mechanism, means for applying braking action to the coil, a movable member positioned for contact with the outermost loop of stock material, and fluid pressure means operatively connected to said movable member and said stock unwinding and braking means and adapted upon movement of said member by the outermost loop, to render the unwinding means inoperative and the braking means operative.

2. In a coil unwinder, means for supporting a coil of stock material to be unwound, means for effecting unwinding of the stock material from the coil for presentation to a feeding mechanism, means for applying braking action to the coil, a movable member positioned for contact with the outermost loop of stock material, a fluid pressure system associated with said stock unwinding and braking means, and a valve associated with said system and operatively connected to said movable member and adapted upon movement of said member by the outermost loop to render the unwinding means inoperative and the braking means operative.

3. In a coil unwinder, a reel for supporting a coil of stock material to be unwound, driving rolls positioned adjacent the reel for receiving and unwinding the coil of stock material from the reel, a balance plate movably positioned adjacent the reel for contact with the stock material after it leaves the driving rolls, said balance plate being adapted to be moved by the weight of the stock material when an excess amount thereof has been unwound, and means operatively connecting said balance plate and said driving rolls and adapted upon movement of said plate by the stock material to render the driving rolls inoperative.

4. In a coil unwinder, a reel for supporting a coil of stock material to be unwound, driving rolls positioned adjacent the reel for receiving and unwinding the coil of stock material from the reel, a balance plate movably positioned adjacent the reel and adapted to contact and be moved by the stock material after it leaves the driving rolls, and means including a fluid pressure system and a valve operatively connecting said balance plate and driving rolls and adapted upon movement of said plate by said stock material to render the driving rolls inoperative.

5. In a coil unwinder, a frame having means for detachably and rotatably supporting a reel of coiled stock material, driving rolls mounted on said frame and adapted to receive and unwind the stock material from the reel, a balance plate pivotally mounted on said frame and adapted to contact and be moved by the stock material after it leaves the driving rolls, said balance plate being adapted to be moved by the weight of the stock material when an excess amount thereof has been unwound, and means connecting the balance plate and driving rolls and adapted upon movement of said balance plate by the stock material to render the driving rolls inoperative.

6. In a coil unwinder, a frame, a reel carried by said frame and adapted to support a coil of stock material to be unwound, driving rolls mounted on said frame above the reel and adapted to receive and unwind the stock material from the reel, a balance plate pivotally mounted on the frame below the reel and adapted to contact the outermost loop of stock material after it leaves the driving rolls, means operatively connecting the balance plate and driving rolls whereby movement of said plate about its pivot will render said driving rolls operative or inoperative, and means for normally maintaining said balance plate in position to render the driving rolls operative, said last mentioned means permitting movement of said balance plate about its pivot to render the driving rolls inoperative when the outermost loop of stock material increases in size.

7. In a coil unwinder, a frame, a reel carried by said frame and adapted to support a coil of stock material to be unwound, a pair of superposed driving rolls mounted on said frame above the reel and adapted to receive and unwind the stock material from the reel, one of said rolls being movable into and out of engagement with the other rolls to control the driving effect of the rolls, a fluid pressure operated piston connected to said last mentioned roll to maintain the latter in operative driving relation with the other roll, a fluid pressure system associated with said piston, a valve included in said system and controlling the flow of fluid pressure to the piston, and a balance plate pivotally mounted on said frame below the reel and adapted to contact and be moved about its pivot by the stock material after it leaves the driving rolls, said balance plate being connected to said valve to operate the latter to render the driving rolls inoperative when an excess amount of stock material moves the plate about its pivot.

8. In a coil unwinder, a frame, a reel carried by said frame and adapted to support a coil of stock material to be unwound, a pair of superposed driving rolls mounted on said frame above the reel and adapted to receive and unwind the stock material from the reel, one of said rolls being movable into and out of engagement with the other rolls to control the driving effect of the rolls, a fluid pressure operated piston connected to said last mentioned roll to maintain the latter in operative driving relation with the other roll, a fluid pressure actuated reel brake mechanism carried by the frame, a fluid pressure system associated with said piston and brake mechanism, a valve included in said system and controlling the flow of fluid pressure to the piston and brake mechanism, and a balance plate pivotally mounted on said frame below the reel and adapted to contact and be moved about its pivot by the stock material after it leaves the driving rolls, said balance plate being connected to said valve to operate the latter to render the driving rolls inoperative and the brake mechanism operative when an excess amount of stock material moves the plate about its pivot.

9. In a coil unwinder, a frame having means for detachably and rotatably supporting a reel of coiled stock material, driving means mounted on said frame and adapted to unwind the stock material from the reel, a reel brake mechanism including a plate carried by and rotatable with the reel as the stock material is unwound, a piston carried by the frame and movable into and out of engagement with the plate, a member movably mounted on the frame below the reel and adapted to contact and be moved by the stock material after it leaves the driving means, and means associated with said member, driving means and piston and adapted upon movement of the member by an excess amount of stock material to render the driving means inoperative and operate the piston to move the latter into braking engagement with the plate.

10. The combination with a metal working machine operating on stock material and having a stock feeding mechanism, of means for supporting a coil of stock material, means for effecting unwinding of the stock material from the coil for presentation to the feeding mechanism, a brake mechanism associated with the coil supporting means for braking the coil as it is unwound, a movable member adapted to contact and be moved by an excess amount of stock material as it is unwound, means associated with said movable member, said stock unwinding means and said brake mechanism and adapted upon movement of said member by the excess stock material, to render the unwinding means inoperative and the braking means operative, and means associated with said metal working machine and said brake mechanism for rendering the latter operative when the metal working machine is rendered inoperative.

11. The combination with a metal working machine operating on stock material and having a stock feeding mechanism, of a reel for supporting a coil of stock material to be unwound, driving rolls for receiving and unwinding the coil of stock material from the reel, a reel brake mechanism, a fluid pressure system associated with said driving rolls, brake mechanism and metal working machine, a valve including in said system and adapted to alternately render the driving rolls and brake mechanism operative and inoperative, a movable member positioned adjacent the reel and adapted to contact and be moved by the stock material after it leaves the driving rolls, means connecting the movable member with the valve whereby movement of said member by the stock material will actuate the valve and render the driving rolls inoperative and the brake mechanism operative, and a second valve included in said fluid pressure system and adapted to alternately render the metal working machine and brake mechanisms operative and inoperative.

12. In a coil unwinder, a frame, means carried by said frame and adapted to support a coil of stock material to be unwound, driving means for unwinding the coil of stock material, fluid pressure actuated means for rendering the driving means inoperative, a balance plate pivotally mounted on the frame below the coil supporting means and adapted to receive the stock material as it is being unwound and to be moved about its pivot by the weight of the stock material when an excess amount thereof has been unwound, and means operatively connecting the balance plate with the fluid pressure operated means and adapted to actuate said last mentioned means to render the driving means inoperative when the stock material moves the balance plate about its pivot.

13. A coil unwinder, comprising means for supporting a coil of stock material to be unwound, driving means for unwinding the coil of stock material, fluid pressure actuated means for rendering the driving means inoperative, a pivotally mounted member adapted to engage the stock material as it is being unwound and to be moved

about its pivot by the stock when an excess amount thereof has been unwound, and means operatively connecting said member with the fluid pressure operated means and adapted to actuate said last mentioned means to render the driving means inoperative when the stock material moves said member about its pivot.

14. A coil unwinder, comprising means for supporting a coil of stock material to be unwound, driving means for unwinding the coil of stock material, fluid pressure actuated means for rendering the driving means inoperative, a member movably supported adjacent the coil and adapted to engage the stock material as it is being unwound and to be moved by the stock when an excess amount thereof has been unwound, and means operatively connecting said member with the fluid pressure operated means and adapted to actuate said last mentioned means to render the driving means inoperative when the stock material moves said member.

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