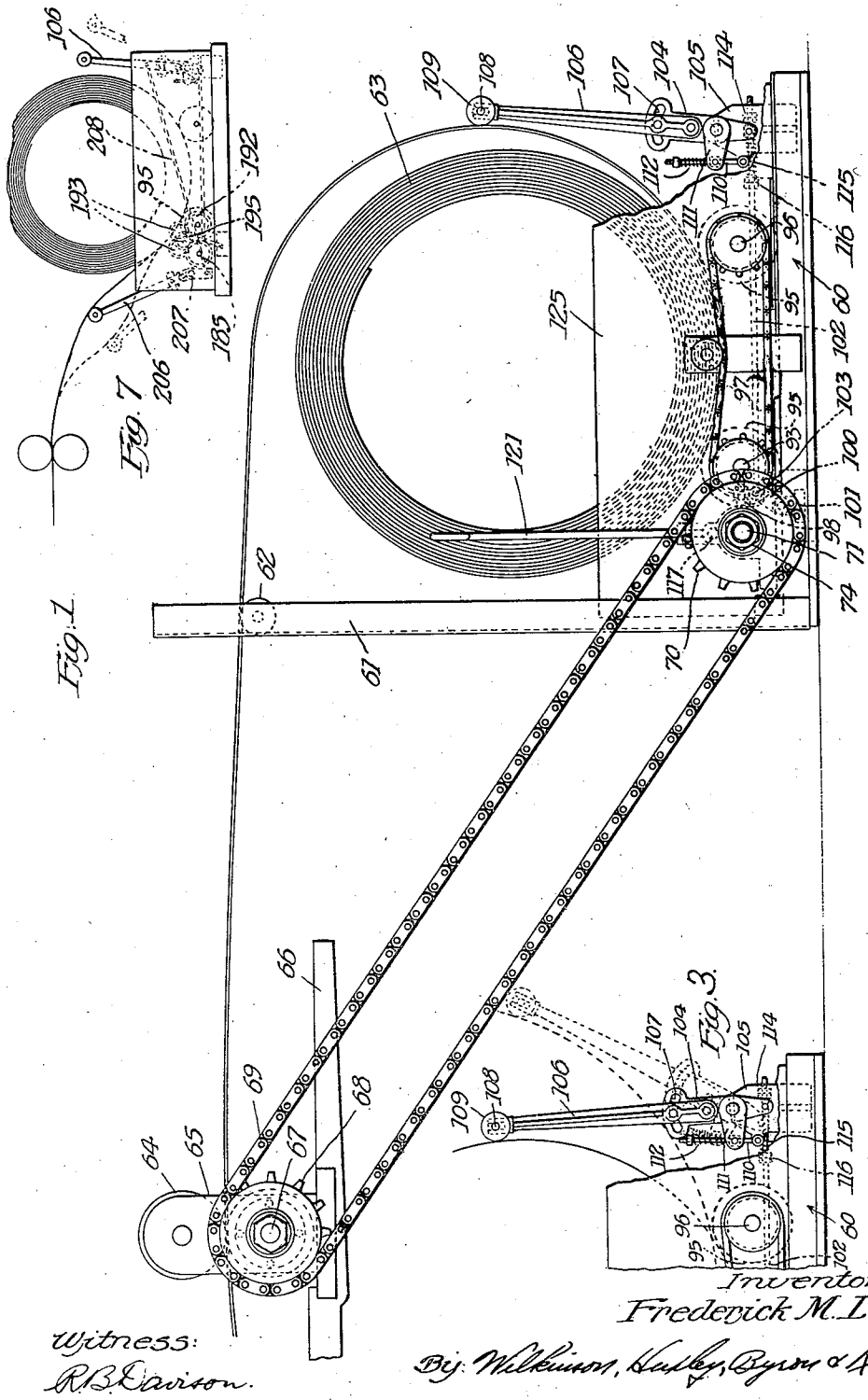
Oct. 20, 1936. F. M. LITTELL 2,058,329

AUTOMATIC REEL

Filed March 12, 1934 3 Sheets-Sheet 1



Witness:
R. B. Davison.

Inventor:
Frederick M. Littell.
By: Wilkinson, Huxley, Byron & Knight
Attys.

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AUTOMATIC REEL

Filed March 12, 1934 3 Sheets-Sheet 2

Fig. 2

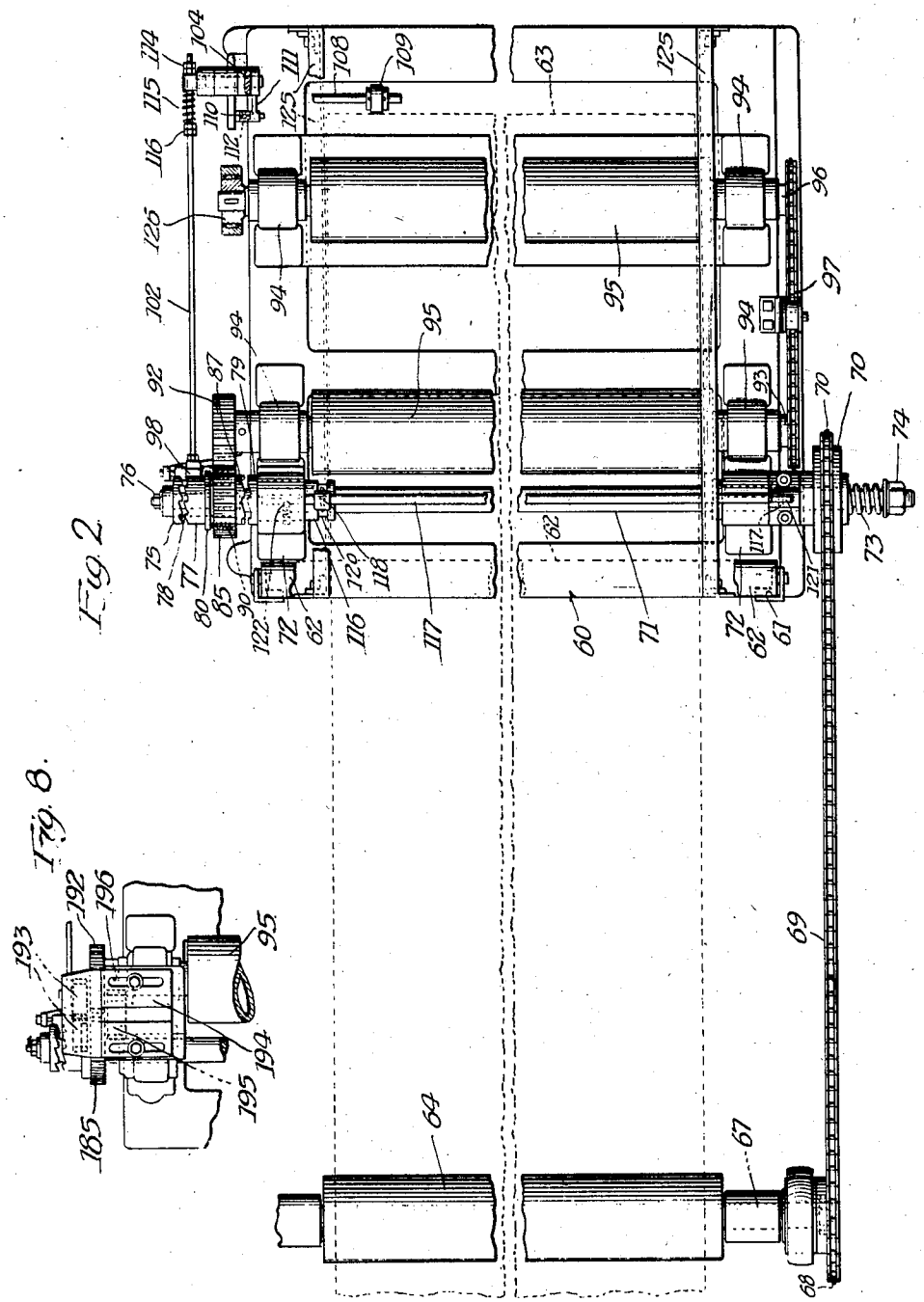


Fig. 8.

Inventor:
Frederick M. Littell.

Witness:
R. B. Davison

By Wilkinson, Huxley, Byron & Knight
Attys

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AUTOMATIC REEL

Filed March 12, 1934 3 Sheets-Sheet 3

Fig. 4.

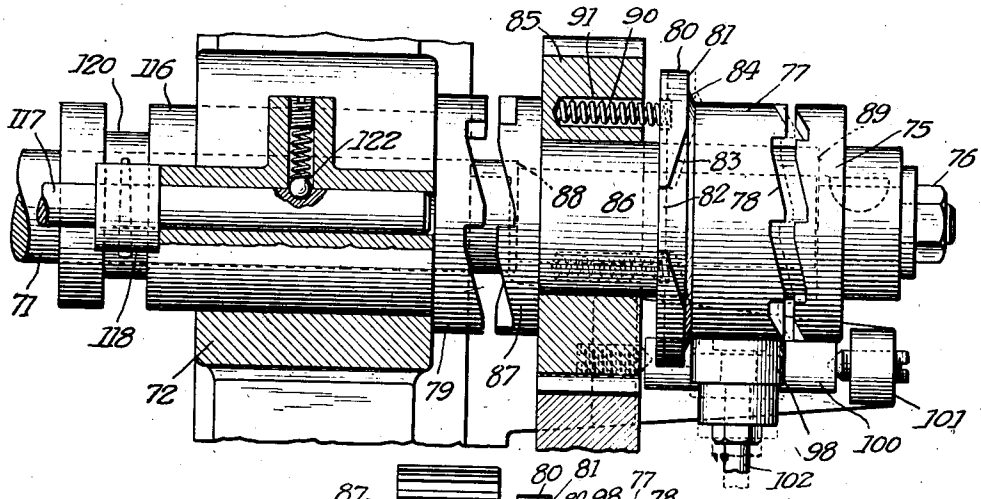


Fig. 5

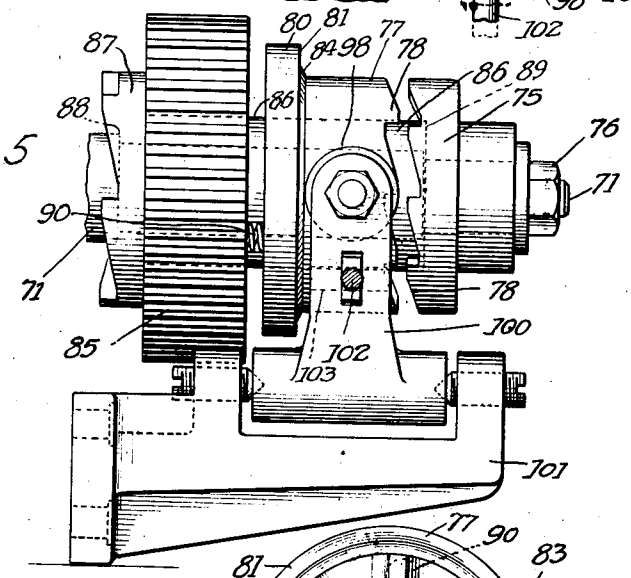
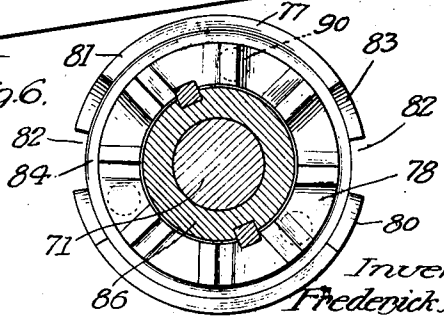


Fig. 6.



Witness
R. B. Davison.

Inventor:
Frederick M. Littell.
By Wilkinson, Huxley, Byron & Knight
Attys.

Patented Oct. 20, 1936 2,058,329

UNITED STATES PATENT OFFICE

2,058,329

AUTOMATIC REEL

Frederick M. Littell, Chicago, Ill., assignor to F. J. Littell Machine Company, Chicago, Ill., a corporation of Illinois

Application March 12, 1934, Serial No. 715,098

10 Claims. (Cl. 242—78)

The invention relates to reels for supporting coil stock and has reference more particularly to mechanism for driving said reels for feeding stock material to metal working machines such as punch presses and the like.

The several operative units which go to make up the feeding mechanism of said machines are usually mounted in longitudinal alignment upon an elongated press bed and actuated intermittently from the plunger or drive shaft of the machine which they serve. As shown in Patent No. 1,885,612 granted to Frederick J. Littell November 1, 1932, the drive for the stock supporting reels has incorporated some form of overrunning clutch in order to allow the coil to continue its rotation after the driving element has ceased operation. Especially is this necessary when the stock supporting reel is driven from the feeding mechanism of the metal working machine since the weight of the coil must be isolated from the driving element or otherwise there would be a variable momentum depending upon the weight of the coil to be stopped by the same which would seriously affect the accuracy of the feed to the machine.

Power driven reels constructed as above have not been entirely satisfactory since the feed to the machine is generally intermittent and if the reel is driven continuously an excess of stock results, forming loose outer loops in the coil. These outer loops of excess stock also form when the drive to the reel is intermittent since the drive in this case must incorporate an overrunning clutch which allows the reel to rotate after the drive ceases, thus adding to the excess stock at each stopping of the drive.

The present invention has for its object to provide novel drive mechanism for rotating stock supporting reels which will maintain the outside loop free of the coil and of the proper size to insure accurate and efficient operation of the feeding mechanism to which the stock material is presented.

Another object of the invention is to provide supporting means for coil stock with a power drive which will operate to apply the power to the periphery of the coil and which will incorporate an overrunning clutch and novel automatic mechanism for connecting and disconnecting the drive in accordance with the amount of accumulated excess stock.

A further object of the invention is to provide a novel form of clutch for connecting and disconnecting the power drive to the stock supporting rollers which will be sensitive in operation, controlling comparatively large driving forces through the clutch and which will allow continued rotation of the coil after the application of power thereto.

With these and other objects in view, the invention may consist of certain novel features of construction and operation, as will be more fully described and particularly pointed out in the specification, drawings and claims appended hereto.

In the drawings which illustrate an embodiment of the device and wherein like reference characters are used to designate like parts—

Figure 1 is a side elevational view of a peripheral type of reel embodying the improvements of the invention;

Figure 2 is a plan view of the apparatus shown in Figure 3;

Figure 3 is a detail elevational view of the control arm showing its various positions for connecting and disconnecting the drive to the reel;

Figure 4 is an enlarged fragmentary plan view, parts being shown in section, of the clutches for driving the reel forwardly and rearwardly including the associated parts for actuating the clutches respectively;

Figure 5 is a fragmentary elevational view showing the mounting for the operating lever of the forward clutch;

Figure 6 is a front elevational view of the clutch control collar.

Figure 7 is a side elevational view showing a modification of the invention for use when the coil stock is placed on the reel in reversed position; and

Figure 8 is a fragmentary top plan view showing details of a reversing drive for the supporting rolls.

Figures 1 to 8 inclusive show the invention applied to a reel of the peripheral type comprising a supporting base 60 of substantially rectangular shape having secured to one end thereof uprights 61 joined at their top by an idler roller 62 which supports the stock material being unwound from the coil 63. The coil is supported for rotation on base 60 and driven by power means which will now be described.

As the stock material is supported for feeding to a metal working machine the drawings show for purposes of illustration a set of feed rolls for a punch press consisting of the rolls 64 suitably journalled in bearings 65 mounted upon a press bed 66. The shaft 67 carrying the lower feed roll is provided at its outer end with a sprocket wheel 68 meshing with the endless chain 69 which con-

nects at its other end with sprocket 70 for driving shaft 71 which is journalled in bearings 72 supported by the base 60. From the foregoing it will be observed that the supporting means for the coil of stock is driven from the feed rolls 64. The feed rolls for feeding stock to punch presses, for example, are intermittently driven, which means that the coil of stock is likewise intermittently driven and therefore the drive must include an overrunning clutch in order that the momentum of the rotating coil will not affect the feeding of the stock by the feed rolls.

The sprocket wheel 70 is mounted on shaft 71 to provide a friction clutch, being held in driving relation to the shaft by the heavy coil spring 73 confined between the friction disc engaging the sprocket wheel and the lock nut 74 which is threaded to the end of the shaft. The other end of the driving shaft is provided with a jaw clutch consisting of a clutch member 75, Figure 4, suitably keyed to driving shaft 71 and held to the shaft by the locking nut 76 and a companion clutch member in the form of a collar 77, the member and collar having opposed clutch surfaces in the form of teeth 78. The clutch collar has an integral flange 80 provided with a face 81 concentric with the collar and which is interrupted at diametrically opposite points forming the openings 82, Figure 6, the openings and face 81 being connected by the sloping surfaces 83. Extending diagonally from face 81 and joining with the clutch collar 77 is a bevelled face 84 which is concentric with the collar and uninterrupted throughout its extent.

The clutch collar 77 and gear 85 are suitably keyed to rotate with a sleeve 86 which is mounted on driving shaft 71 for rotation independently thereof and provided at one end with a clutch face 87 forming one member of a reversing clutch to be presently described. The end of the drive shaft 71 is reduced in diameter to receive the sleeve 86 forming a shoulder 88, preventing axial movement of the sleeve toward the left, Figure 4, the other end of the sleeve fitting within recess 89 formed in clutch member 75 and being held against movement toward the right. The gear 85 is fixedly keyed to the sleeve 86 while the clutch collar 77 rotates with the sleeve but has movement axially thereof, being resiliently urged in a direction toward clutch member 75 by the coil springs 90 housed within openings 91 formed in the gear and engaging with flange 80 of the clutch collar. With the clutch collar free to move axially of the sleeve in a direction toward the right, Figure 4, it will be understood that the clutch teeth 78 of the members engage and the drive from shaft 71 takes place through member 75, collar 77 and gear 85 to pinion 92, suitably keyed to shaft 93 journalled in bearings 94 and meshing with said gear. Shaft 93 mounts one of the driving rolls 95 supporting the coil of stock, the other roll being mounted by shaft 96 also suitably journalled in bearings on base 60 in spaced relation with shaft 93. Shafts 93 and 96 are operatively connected by an endless chain 97 and therefore rotate in unison to rotate the coil 63.

With respect to the above form of drive the invention proposes to provide clutching and declutching mechanism having automatic operation in accordance with the size of the outermost loops of the coil representing the accumulation of excess stock. The clutch collar 77 is cammed into and out of clutching engagement by a cam roller 98 carried by a lever 100 pivotally supported for substantially frictionless movement by bracket 101. Pivotal movement of the lever 100 and therefore movement of the cam roller 98 with respect to faces 81 and 84, respectively, is effected through means of the rod 102 pivotally connecting at one end with the lever, as at 103, and at its other end to the member 104. Bracket 105 journals the member, which carries an arm 106 adjustable with respect to the member by means of the arcuate slot 107 formed therein. To the upper end of arm 106 is pivotally secured a rod 108 carrying on its outer end the roller 109 adapted to contact the outermost loop of the coil. The pivotal mounting of rod 108 on its supporting arm allows the operator to throw the roller out of engagement with the coil of stock when it is necessary to remove the coil for any reason or in the event a new coil is to be placed on the supporting structure. Pivotally secured to bracket 105 is a rod 110 which has operative engagement with arm 111 forming part of member 104. The coil spring 112 confined between the end of rod 110 and the connection of arm 111 therewith yieldably urges the member 104 in a counter-clockwise direction, thereby maintaining roller 109 in contact with the outside loop of the coil of stock. As shown in Figure 3 arm 106 has two extreme positions, the one shown in full line representing the clutching position and thus the transmission of power to the coil of stock, while the location of the lever in dotted lines is an extreme position where the clutch is disconnected. Between these two positions and more specifically within several degrees of the vertical position of the arm a variation in the movement of the arm to one side or the other will cause actuation of the clutch. However, movement of roller 109 from the extreme of one position to that of the other causes a very slight movement of the pivoted lever 100 and thus camming roller 98. This results from the following structure. The depending end of member 104 is operatively associated with shaft 102 and is held in operative relation therewith by the locking nuts 114 threaded to the end of the shaft. Any movement of roller 109 in a counter-clockwise direction therefore causes engagement of the depending end of member 104 with the locking nuts 114 and movement of the shaft to the right. However, oscillation of the arm 106 by movement of roller 109 in a clockwise direction will cause movement of the shaft due to compression of the coil spring 115 confined between the stock 116 and the connection of the arm with said shaft.

With the arm 106 in the full line position of Figure 5 where the same is located to the left of a vertical plane passing through the pivot of said arm, it will be observed that shaft 102 has been shifted toward the right to rock lever 100 and withdraw camming roller 98. This locates the roller in engagement with face 81, which face has interruptions in the form of openings 82 receiving the camming roller, permitting axial movement of the clutch collar 77 into clutching engagement with the clutch member 75, the collar being resiliently urged in this direction by coil springs 90. The driving shaft 71 is therefore connected to the rollers 95 through the clutch and connecting gears to cause rotation of the coil. The parts will remain in this position until an excess of stock accumulates, which results in an increase in the size of the outermost loop of the coil 63, forcing roller 109 outwardly, oscillating arm 106 to shift the shaft 102 toward the left. This results in pivotal movement of lever 100 and location of camming roller 98 in

engagement with the bevel face 84, withdrawing clutch collar 77 from its clutching position. This actuation of the clutch disconnects the drive between driving shaft 71 and the supporting rollers and therefore the rotation of the coil ceases. As operation of the feeding mechanism continues, however, the excess stock is gradually used up, resulting in a decrease in the size of the outermost loop and in oscillation of arm 106 until the same is again positioned to cause engagement of the clutch elements and establishing the drive to the rollers.

It will be recalled that the endless chain 69 drives shaft 71 through the sprocket 70 constructed to provide a friction clutch. This is necessary to relieve the feed rolls of the impact and strain which would otherwise be placed thereon by engagement of the clutch elements 75 and 77. The coil of stock is relatively heavy and as a result it is not easily caused to rotate from a position of rest nor can the heavy coil be immediately stopped after rotation has begun. The friction clutch therefore absorbs ... impact due to the engagement of the clutch elements and also allows intermittent operation of the feed rolls. It will also be observed that the members 75 and 77 transmit rotation in one direction only and form a type of clutch known as a jaw clutch which has been selected for illustration for several reasons although other forms of clutches come within the scope of the invention. This clutch has the advantage of permitting the coil to overrun, that is, to continue rotation after the drive to the same has ceased and further incorporates a sensitive clutching and declutching arrangement, which however, is positive in operation. It is possible with this form of clutch to transmit comparatively large driving forces although for actuation of the clutch very little force is required, it being appreciated that the outside loop of the coil is comparatively weak and the amount of pressure available to actuate the clutch small.

It is sometimes necessary to reverse the feeding mechanism which of course requires transmission of the reverse drive to the coil in order that the same will rewind the stock supplied by the feeding means. The invention provides a rewinding clutch comprising clutch members 79 and 87, the former member being integral with sleeve 116 keyed to the driving shaft 71 and journalled for rotation in bearing 72, while member 87 is integral with sleeve 86 previously described. A rod 117 extends above but substantially parallel with drive shaft 71 having one end mounted for axial movement within bearing 72 as shown in Figure 4 and carrying a yoke 118 engaging within the notch 120 provided in sleeve 116. The other end of the rod 117 is suitably connected with a rewind lever 121 adapted for actuation by the operator to locate rod 117 in neutral position as shown in Figure 4 where the same is held by the spring pressed ball detent 122 or into operative position to effect movement of the sleeve 116 to the right, Figure 4, causing engagement of the clutch members 79 and 87. The drive to the coil supporting rollers 95 now takes place through the clutch members 79 and 87, gear 85 and pinion 92.

Figure 2 shows the base 60 provided with spaced thrust plates 125 for centering the coil on the rollers 95 and also shows a brake 126 applied to the shaft 96 journalling one of the rollers for braking the rotation of the heavy coil of stock. By proper adjustment of the brake the momentum of the rotating coil can be checked to a considerable extent while the resistance to initial rotation will not be so great as to materially interfere with the efficiency of the driving mechanism.

In Figure 7 the coil of stock is shown in reversed position on the peripheral type of reel in order that the reverse side of the stock may be upwards when presented to the feeding rolls. Feeding of the stock to the feeding rolls with either surface thereof upward is necessary as the stock has a finished surface and an unfinished surface, and certain blanking operations require that the finished surface be "up" while for other operations this is reversed. Therefore the coil stock in some operations is supported on the reel as shown in Figure 1, and for others may be supported in reversed position, as shown in Figure 7. The latter, however, requires an intermediate gear in the drive to the supporting rolls and in order that the overrunning feature of the clutch will not be destroyed the reversing gears are preferably located between the gear 85 and pinion 92.

For accommodating the intermediate gear mechanism the gear on the drive shaft 185 and the pinion 192 on the shaft 93 have a pitch diameter such that the gear and pinion fail to mesh with each other. To operatively connect the gear and pinion, however, so that the latter rotates in a reverse direction from that of the gear, a plurality of idler pinions 193 are provided, journalled for rotation on shafts supported by the bracket 194, Figure 8, and having meshing engagement with each other. For operatively connecting the gear and pinion so that the latter has the same direction of rotation a single idler pinion 195 is provided the same being journalled in bracket 194 and positioned to mesh with said gear and pinion when located in the same vertical plane. The bracket is adjustable by reason of the elongated slots 196 and accordingly the idler pinions 193 or the pinion 195 may be positioned in the vertical plane of pinion 192 and gear 195 to secure the desired direction of rotation of the supporting rolls 95.

With the coil of stock supported on the reel as shown in Figure 9 the single pinion is adjusted for operation to drive the supporting rolls so that the stock is taken from the left hand side of the coil and the excess stock is represented by the surplus material existing between the coil and the feeding rolls. Automatic rotation of the roll in accordance with the quantity of excess stock unwound from the reel is secured through the provision of a second stock engaging arm 206 suitably pivoted at 207 and connecting with arm 106 by means of the rod 208 so that outward movement of arm 206 will result in outward movement of the main arm 106. Actuation of the clutch mechanism through the resilient connections associated with the control arm 106 takes place as the second arm 206 has movement in accordance with the quantity of excess stock. Irrespective of the direction the stock is taken from the coil the same is driven through clutch mechanism incorporating the overrunning feature and through the friction drive from the feeding mechanism. The structure of the invention is therefore adaptable to blanking operations of all kinds and delivery of the stock material to the feeding mechanism is in response to the quantity of excess stock unwound from the reel, the coil also being automatically freed from the drive to permit overrun of the same.

It is to be understood that I do not wish to be

limited by the exact embodiment of the device shown, which is merely by way of illustration and not limitation, as various and other forms of the device will of course be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claims.

I claim:

1. The combination with feeding mechanism of a metal working machine operating on stock material, of a reel for supporting a coil of said stock material, power means operatively connecting with the reel for rotating the same to unwind stock from the reel for presentation to the said feeding mechanism, the said connections between the power means and reel including a clutch for interrupting the drive to the reel, a member associated therewith for actuating the clutch, and an oscillating arm contacting the outermost loop of said coil of stock and connecting with said member, whereby a variation in the size of said outermost loop will oscillate the arm to actuate the member and thus the clutch.

2. The combination with feeding mechanism, of a metal working machine operating on stock material, of a reel for supporting a coil of said stock material, power means operatively connecting with the reel for rotating the same to unwind stock therefrom for presentation to said feeding mechanism, the said connections between the power means and reel including a clutch for interrupting the drive to the reel, a camming roller for actuating said clutch, connections between said camming roller and an oscillating arm positioned for contact with the outermost loop of said coil of stock, whereby variation in the size of said loop actuates the camming roller to connect and disconnect the clutch, and resilient means biasing said arm into engagement with the outermost loop of the coil.

3. The combination with feeding mechanism, of a metal working machine operating on stock material, of a reel for supporting a coil of said stock material, power means operatively connecting with the reel for rotating the same to unwind stock therefrom for presentation to said feeding mechanism, said connections between the power means and reel including a clutch for interrupting the drive to the reel, a camming roller for actuating the clutch, a pivoted member supporting the roller for movement, an oscillating arm yieldingly held in contact with the outermost loop with the coil of stock, and connections between the arm and the pivoted member, whereby variations in the size of said outermost loop oscillates the arm to cause actuation of the clutch.

4. The combination with feeding mechanism, of a metal working machine operating on stock material, of a reel for supporting a coil of said stock material, power means operatively connecting with the reel for rotating the same to unwind stock therefrom for presentation to said feeding mechanism, the said connections between the power means and reel including a clutch for interrupting the drive to the reel, an oscillating arm connecting with the clutch for actuating the same, and resilient means biasing said arm into engagement with the outermost loop of the coil and causing actuation of the clutch to drive the reel when the outermost loop diminishes to a predetermined size.

5. The combination with feeding mechanism, of a metal working machine operating on stock material, of a reel for supporting a coil of stock material, power means operatively connecting with the reel for rotating the same to unwind stock therefrom for presentation to said feeding mechanism, the said connections between the power means and reel including a clutch for interrupting the drive to the reel, a member associated with the clutch for actuating the same, an oscillating arm connecting with said member, said arm having movement in response to the quantity of excess stock unwound from said reel, said connections between the arm and the member including resilient means whereby movement of the arm in one direction is transmitted to the member through said resilient means.

6. A reel including, in combination, a plurality of spaced rollers mounted for rotation and adapted to support a coil of stock, a drive shaft mounted for rotation and operatively connecting with power means, a gear mounted on said drive shaft and having rotation independently thereof, said gear operatively connecting with one of said rollers, and connections between said gear and the drive shaft, said connections including a clutch comprising a pair of members having clutch engaging surfaces, and resilient means carried by said gear and forcing one of said members into clutching engagement with the other member.

7. A reel including, in combination, a plurality of spaced rollers mounted for rotation and adapted to support a coil of stock, a drive shaft mounted for rotation and operatively connecting with power means, a gear mounted on said drive shaft and having rotation independently thereof, said gear operatively connecting with one of said rollers, and connections between said gear and the drive shaft, said connections including a clutch comprising a pair of members having clutch engaging surfaces, one of said members being fixedly secured to the drive shaft and said other member forming a collar and having movement axially of the shaft, said clutch collar being connected to rotate with the gear and being confined between the gear and said first mentioned clutch member, and resilient means carried by the gear and forcing the clutch collar into engagement with said first mentioned clutch member.

8. A reel including in combination a plurality of spaced rollers mounted for rotation and adapted to support a coil of stock, a drive shaft mounted for rotation and operatively connected with power means, and means operatively connecting said drive shaft with one of said spaced rollers including mechanism operative to cause the spaced roller to rotate in the same direction as that of the drive shaft.

9. A reel including in combination a plurality of spaced rollers mounted for rotation and adapted to support a coil of stock, a drive shaft mounted for rotation and operatively connecting with power means, a gear mounted on said drive shaft and having rotation independently thereof, connections between said gear and the drive shaft including a clutch, and means operatively connecting said gear with one of said spaced rollers, said connections being operative to drive said spaced rollers in the same direction as the gear or in a reverse direction with respect thereto.

10. A reel including, in combination, a plurality of spaced rollers mounted for rotation and adapted to support a coil of stock, a drive

shaft mounted for rotation and operatively connecting with power means, a gear mounted on said drive shaft and having rotation independently thereof, said gear operatively connecting with one of said rollers, connections between said gear and the drive shaft including a clutch effective to transmit rotary movement of the drive shaft in one direction only, and other manually actuated means for connecting said gear and drive shaft and operable to transmit rotary movement of said shaft in an opposite direction.

FREDERICK M. LITTELL.