Dec. 14, 1954 R. M. STIKELEATHER 2,696,882

APPARATUS FOR SEVERING A RIBBON FROM SHEET METAL STOCK

Filed Oct. 12, 1950 4 Sheets-Sheet 1

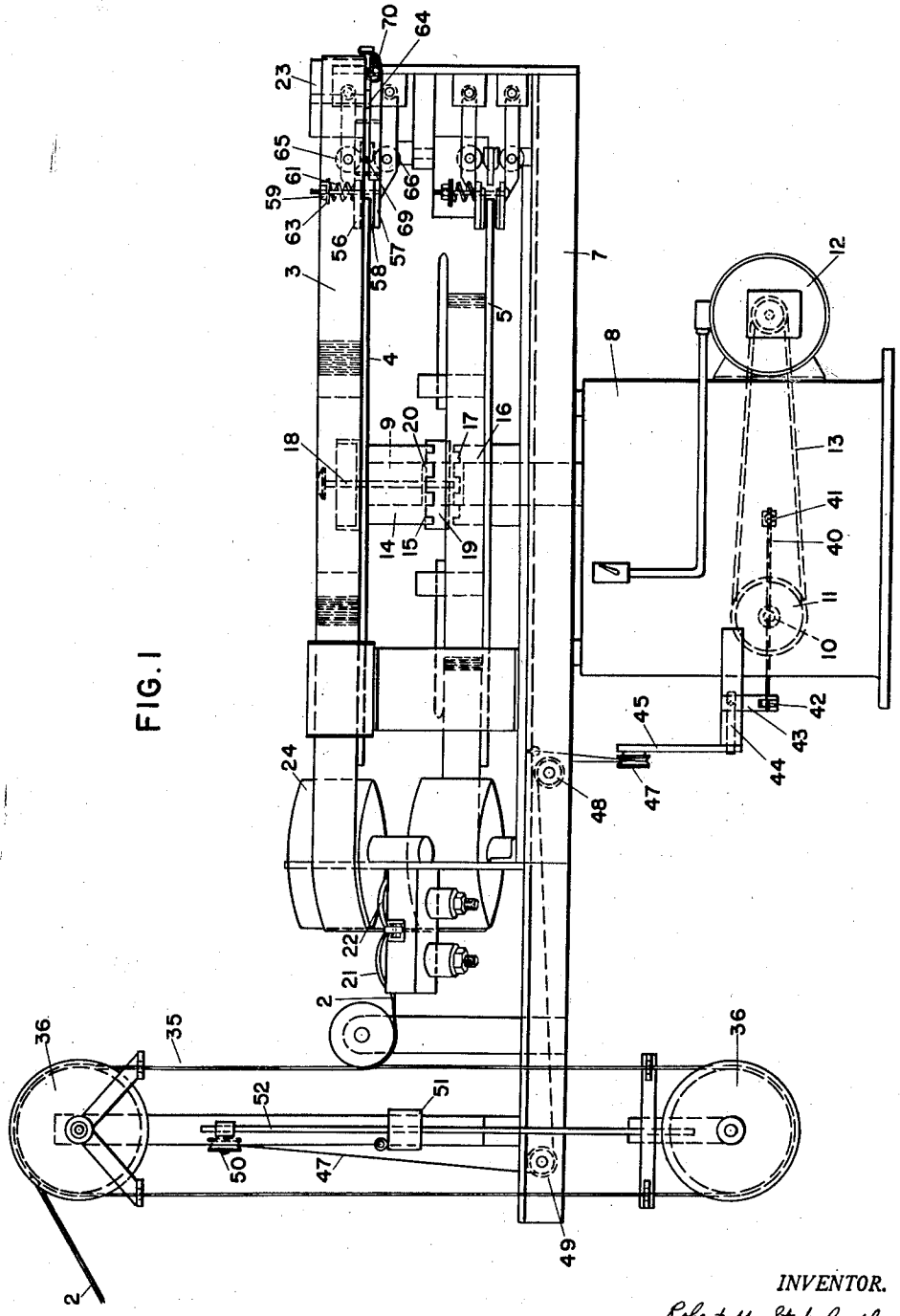


FIG. 1

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APPARATUS FOR SEVERING A RIBBON FROM SHEET METAL STOCK

Filed Oct. 12, 1950 4 Sheets-Sheet 2

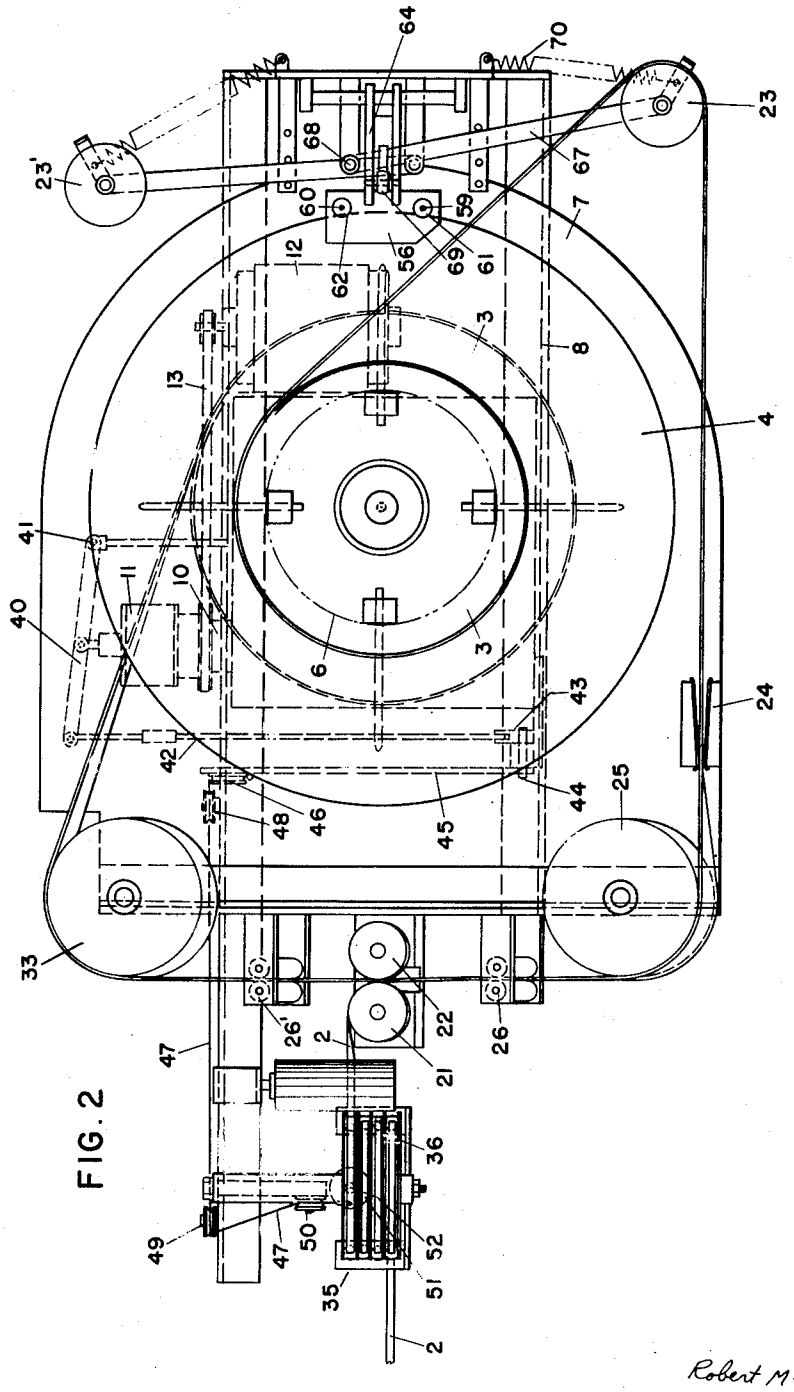


FIG. 2

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FIG. 3

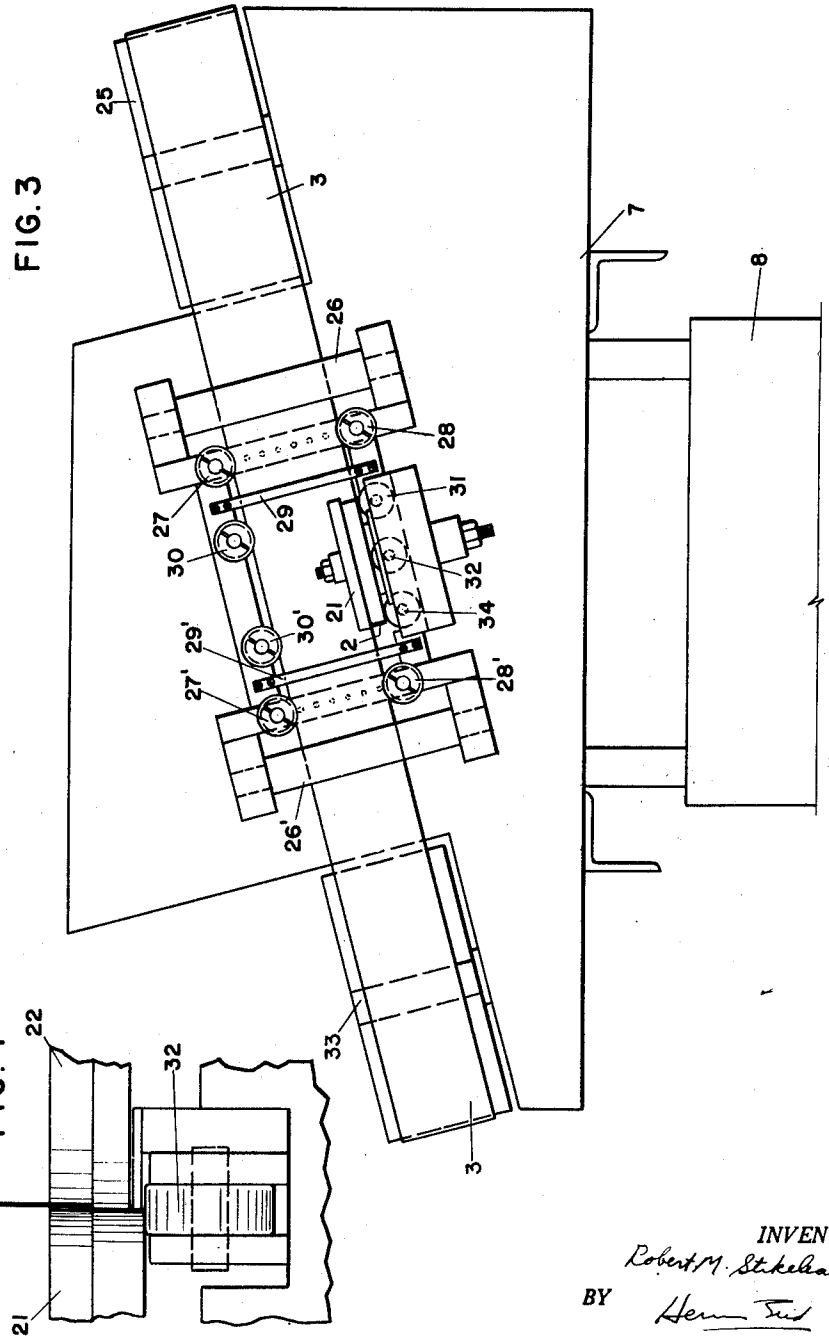


FIG. 4

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FIG. 6

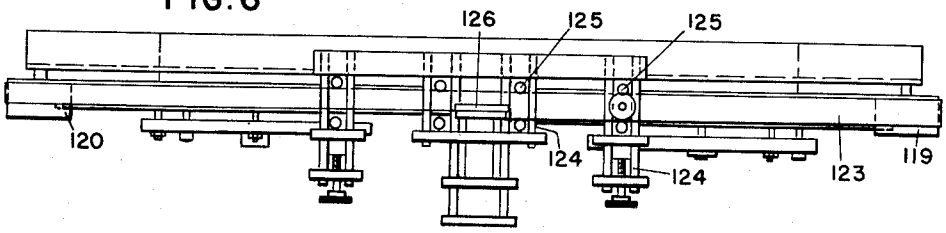


FIG. 5

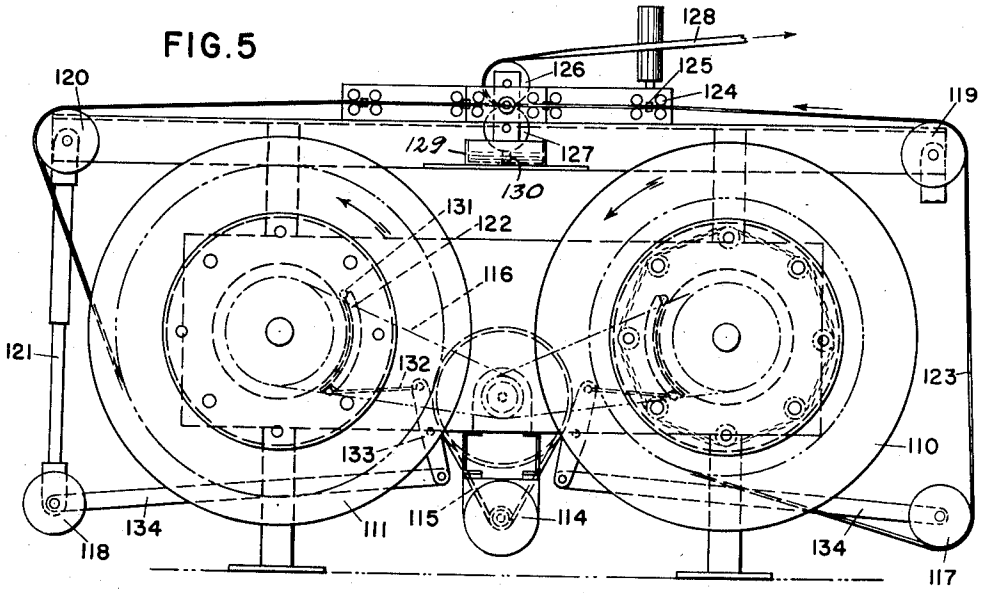


FIG. 7

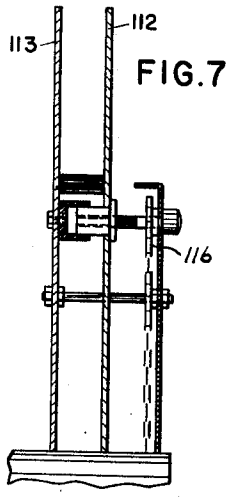
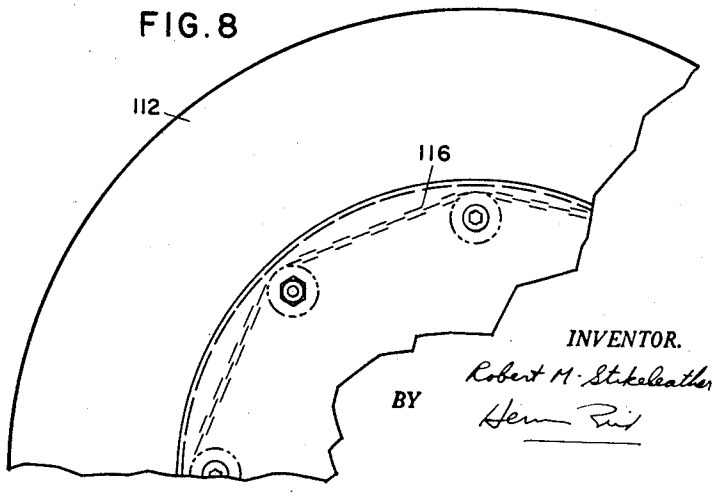


FIG. 8



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United States Patent Office

2,696,882

Patented Dec. 14, 1954

2,696,882

APPARATUS FOR SEVERING A RIBBON FROM SHEET METAL STOCK

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Application October 12, 1950, Serial No. 189,853

19 Claims. (Cl. 164—61)

This invention relates to slitting apparatus and more particularly to apparatus for severing a ribbon from wide sheet metal stock, thereby providing great savings in cost of stock since wide stock can be procured from a manufacturer at greatly decreased cost over an equivalent amount of stock in the form of narrow strips or ribbons.

The chief object of the present invention is to provide a device for severing a ribbon from an edge of a coil or roll of sheet metal stock during its passage from a rotatable supporting disk to a second rotatable supporting disk.

An object of the present invention is to provide a device for severing a ribbon from an edge of sheet metal stock which includes mechanism for guiding the stock into the nip of the cutting rolls and means for varying the speed of ribbon formation.

A further object is to provide a device for severing a ribbon from sheet metal stock including two rotatable disks, the sheet stock being moved from one disk to the other, a ribbon being severed from the edge of the stock during its passage from one disk to the other, and in which means are provided to drive the disks alternately to pass the stock from one to the other.

A still further object is to provide ribbon severing mechanism including braking mechanism to discontinue substantially simultaneously rotation of a driven disk when rotation of a driving disk is discontinued.

A still further object is to provide metal ribbon severing mechanism including loop mechanism for feeding the severed ribbon to a place of use, the length of the loop regulating the speed of rotation of the driving disk. Other objects of my invention will be readily perceived from the following description.

This invention relates to apparatus for severing a ribbon from sheet metal stock comprising, in combination, a rotatable member for supporting sheet stock, a second rotatable member for supporting sheet stock, means for passing the stock from one member to the other member, cooperating cutting rolls to sever a ribbon from the stock during its passage from one member to the other member and guides for directing the sheet stock into the nip of the cutting rolls. Preferably, when ribbon has been severed from the length of the sheet stock and the stock wound upon the second rotatable member, the direction of movement of stock through the cutting rolls is reversed to again wind or coil the stock upon the first rotatable member while continuing to sever ribbon from the edge of the stock. The ribbon is severed from the same edge of the sheet stock regardless of the direction of movement of the sheet. Suitable braking mechanism may be provided to discontinue operation of the driven rotatable member substantially simultaneously when rotation of the driving rotatable member is discontinued.

The attached drawings illustrate preferred embodiments of the invention, in which

Figure 1 is a view in elevation of a device for severing a ribbon from sheet metal stock;

Figure 2 is a plan view of the device shown in Figure 1;

Figure 3 is a view in elevation of the cutting mechanism;

Figure 4 is a view in elevation illustrating passage of stock through the cutting rolls;

Figure 5 is a view in elevation illustrating a modification of the invention;

Figure 6 is a plan view of the machine shown in Figure 5;

Figure 7 is a fragmentary sectional view of the disk adjusting mechanism; and

Figure 8 is a fragmentary view in elevation of the mechanism shown in Figure 7.

Referring to the attached drawings, there is shown a device for severing a ribbon **2** from sheet metal stock **3**. The sheet metal stock is in the form of a coil or roll and is supported on a rotatable disk as hereinafter described.

The device includes a horizontally disposed rotatable disk **4** placed above a second horizontally disposed rotatable disk **5**, the disks serving to support the coil of sheet stock as hereinafter described. Cores **6** are held on the surfaces of the disks to assure accurate placement of the sheet stock. Disks **4** and **5** are supported by a table **7**, serving as a portion of the framework of the device, which in turn rests upon and is supported by base **8**.

Rotatable shaft **9** extends vertically and is connected by suitable bevel gears (not shown) to shaft **10**. Clutch **11** is provided to connect shaft **10** to a prime mover **12** by means of belt **13**. The prime mover **12** may be a suitable electrical motor which is connected to a desired source of electrical current. Thus shaft **9** is rotated by means of motor **12**.

Disk **4** includes a hub **14** having a plurality of teeth **15** formed therein. Disk **5** includes a hub **16** having a plurality of teeth **17** disposed therein. A rod **18** extends through shaft **9** and carries a key **19**. An opening **20** is provided in shaft **9** through which the key extends. When rod **18** is raised to an upper position, key **19** fits in the openings between teeth **15** of hub **14**, thereby connecting disk **4** to shaft **9** to rotate the disk. When rod **18** is moved to a lower position, key **19** fits within the openings between teeth **17**, thereby connecting disk **5** to shaft **9** to rotate disk **5**. When rod **18** is in an intermediate position, the disks **4**, **5** are not connected to the driving mechanism.

Cooperating adjustable cutting rolls **21** and **22** are supported by the framework at one side of the device in a plane intermediate the planes of disks **4**, **5** and serve to sever ribbon **2** from sheet stock **3** passing from disk **4** to disk **5** or vice versa. Rolls **21**, **22**, preferably, are disposed at an angle to assure that stock **3**, passing from one disk to the other, is fed accurately into the nip of the rolls. Sheet stock **3** is passed from disk **4** through cutting rolls **21**, **22** in a vertical plane and is wound on disk **5**. When the sheet stock has been wound completely on disk **5**, the direction of movement of the stock may be reversed by raising rod **18** thereby connecting disk **4** to the prime mover **8**, threading the stock through the cutting rolls in the reverse direction and actuating disk **4** to pass the stock in the reverse direction from disk **5** through the cutting rolls **21**, **22** to disk **4**.

Sheet metal stock **3** passes from disk **4** about the periphery of a guide roll **23**, through guide **24**, over the periphery of a guide roll **25** similar to guide **23**, then through the nip of vertically extending guide rolls **26**. The sheet stock then passes through edge rolls **27** and **28**, roll **27** being at the upper edge of the stock and roll **28** being at the lower edge of the stock, through another set of vertically extending guide rolls **29** and into the nip of cutting rolls **21**, **22**. If desired, an edge guide roll **30** may be placed at the upper edge of the sheet stock at the nip of the cutting rolls to aid in holding the stock in desired position during the severing operation. Guide roll **31** is provided below the lower edge of the stock to guide it into the nip of the rolls, and guide roll **32** supports the sheet stock as it passes through the cutting rolls. Thereafter, the ribbon **2** severed by the cutting rolls **20**, **21** passes to loop mechanism **35** hereinafter described, while the remaining sheet stock passes over guide roll **33** similar to roll **25** to disk **5** and is wound about core **6** thereon.

When the direction of movement of the stock is reversed, the stock passes from disk **5** about the periphery of guide roll **23'**, over the periphery of guide roll **33'**, through vertically extending rolls **26'**, upper and lower guide rolls **27'**, **28'**, vertically extending rolls **29'**, guide roll **30'**, guide roll **34** similar to roll **31**, guide roll **32**, over guide **25** and is wrapped about a core **6** placed on disk **4**.

Loop mechanism 35 is provided to assure that the ribbon is not torn during its supply to a place of use since the severing device and a finning device for example, to which the ribbon may be supplied operate at different speeds when the respective devices are placed in operation. Loop mechanism 35 comprises a plurality of upper and lower pulleys 36 about which the ribbon is looped. Pulley 36 is a floating pulley. When the speed of the machine utilizing the ribbon is more rapid than the speed of the severing device, the loops rapidly decrease in length. It is desirable, accordingly, that the speed of the severing device be increased to supply ribbon more rapidly. If, for example, the severing device is operating at a speed greater than the speed of the ribbon utilizing machine, it is desirable to decrease its speed to prevent formation of more ribbon than is required and the consequent slack therein.

For this purpose, clutch 11 is connected to a lever 40 pivoted as shown at 41. The opposite end of lever 40 is connected to a link 42 secured to an arm 43 attached to a shaft 44 mounted on the framework of the machine. Shaft 44 is secured to a link 45 which carries a pulley 46 at its opposite end. A wire or cord 47 passes under pulley 46 and has its end attached to the framework of the machine. Wire 47 then passes over pulley 48, under pulley 49, over pulley 50 mounted on the loop mechanism 35, and is connected to a weight 51 riding on a rod 52. Movement of weight 51 upward or downward on rod 52 as the loops decrease or increase loosens or tightens wire 47 to raise or lower link 45 thereby rotating shaft 44, and moving arm 43 to actuate lever 40 to move clutch 11 toward open or closed positions thus increasing or decreasing the speed of the driving disk. Thus the length of the loops determine the speed of the disks 4 or 5 and varies the speed thereof in accordance with the demand for ribbon.

During operation of the device when operation of the driving disk is discontinued, inertia of the driven disk is such that its rotation may continue for some slight time thereafter. This is undesirable since it permits sheet stock wound on the disk to unwind or slip. To eliminate this disadvantage, suitable braking mechanism is provided placed adjacent disks 4 and 5.

It will be appreciated similar braking mechanism is provided adjacent each disk. Braking mechanism comprises plates 56, 57 placed above and below disk 4 and extending in part over the surfaces of the disk. Friction material 58 is attached to the side of each plate adjacent the disk. Rod members 59, 60 extend through the plates beyond the periphery of the disk. Springs 61 and 62 surround rods 59 and 60, and are held in place by collars 63 on the shafts. Springs 61 and 62 urge plates 56 and 57 toward each other. Plates 56 and 57 are supported in position by arms 64 fastened to the frame of the device. Arms 64 carry wheels 65 and 66 to eliminate friction as hereinafter described.

A link 67 supports guide roll 23 and is pivoted at its opposite end as shown at 68. Link 67 carries a wedge 69 adapted to be forced between plates 56, 57 to urge the plates apart, moving friction material 58 from the surfaces of the disk 4, and permitting free rotation of the disk. Guide roll 23 is held in desired position by means of spring 70 attached to the frame of the device. As pointed out above, sheet stock passes around guide roll 23, through the cutting mechanism to the driving disk, assuming the lower disk 5 is the driving disk. The passage of sheet stock about guide roll 23 moves guide roll 23 toward the periphery of disk 4 against the resistance of spring 70 thereby pivoting link 67 about pivot point 68 and forcing wedge 69 between plates 56, 57 to urge such plates apart. Disk 4 is thereby permitted to rotate freely. When rotation of the driving disk is discontinued, forces are no longer applied to the sheet stock being pulled from disk 4 so that spring 70 retracts roll 23 from the periphery of disk 4, again pivoting link 67 and removing wedge 69 from its position between the plates. The springs 61 and 62 immediately urge the plates toward each other forcing friction material 58 against the surfaces of disk 4 so that its rotation is discontinued substantially simultaneously with the cessation of rotation of disk 5. The braking mechanism adjacent disk 5 is similar except that link 67 carries guide roll 23'.

Considering the operation of the ribbon severing device, assuming disk 5 is connected to the prime mover 12 and hence is the driving disk, the roll or coil of sheet stock being supported on disk 4, rotation of disk 5 pulls sheet stock from disk 4 around guide roll 23, through guide 24, about roll 25 and through guides 26, 27, 28, 29, 30, 31 and through cutting rolls 21, 22, the sheet stock then passing over roll 33 to the driving disk 5 and being wound upon the core 6 thereon. The ribbon, as it is severed, passes to loop mechanism 35 and from the loop mechanism to its place of use, which may be for example, a finning machine. Since the speeds of the finning machine and the severing device may be different, the length of the loops is larger or smaller in accordance with the respective speeds. Assuming the speed of the finning machine is greater than the speed of the severing device, the loop decreases in length. Upon a decrease in length, weight 51 is raised, thereby through intervening mechanism moving clutch 11 toward a closed position to increase the speed of the driving disk. This is particularly desirable when the severing device is placed in operation. Assuming the speed of the severing device is greater than the speed of the finning machine, the loops increase in length and weight 51 is lowered, thereby through the intervening mechanism moving the clutch toward an open position, thus decreasing the speed of the driving disk.

The operation is similar when the sheet stock is fed from disk 5 to disk 4 except that the direction of movement of the stock is reversed. As described above, braking mechanism 35 permits the driven disk to be stopped substantially simultaneously when rotation of the driving disk is discontinued.

Considering operation of the machine when the end of a coil of stock is reached, the stock unwinds completely from one disk and passes through the cutting rolls. Immediately, the operator stops the machine and disconnects the driven disk from the power source. The operator then leads the stock in the reverse direction through the cutting rolls to the second disk and winds several turns of the stock about the core on the second disk. The second disk is then connected to the power source. When the second disk is driven, it pulls the stock through the cutting rolls from the disk on which it had been wound and winds the stock after its passage through the cutting rolls on the driven disk. Since the length of the stock passes completely through the cutting rolls, in all cases the ribbon is severed from the stock.

In Figures 5–8 inclusive, a modification of the invention is illustrated. This modified device is generally similar to the device described except that the disks are placed in vertical rather than in horizontal position. Referring to Figures 5 and 7, there are shown vertically extending stock or roll carriers 110, 111 each consisting of spaced disks 112, 113. The disks 112, 113 are adjustable, disk 112 being movable toward or from disk 113 as shown in Figure 7 to vary the space therebetween to accommodate different widths of stock. Carriers 110, 111 are driven alternately by motor 114 through chains 115 and 116.

Similar guide rolls 117, 118 and 119, 120 are provided adjacent carriers 110, 111. Preferably, rolls 118, 120 and 117, 119 may be connected by rods 121 to hold rolls 118, 117 in a position to avoid application of brake 122 to the drum of its disk when such disk is driven by motor 114, as hereinafter explained.

The stock 123 passes, as shown in Figure 5, from carrier 110 about roll 117, roll 119, and through horizontal guide rolls 124 and vertical guide rolls 125 to the nip of the cutting rolls 126, 127 which sever ribbon 128 from stock 123. Ribbon 128 is supplied to the place of use by means of loop mechanism as previously described. After passage through cutting rolls 126, 127, the stock passes about guide roll 120 and is wound on carrier 111. Similar guide rolls are provided when the stock is moved in the reverse direction through the cutting rolls. The loop mechanism may be employed as previously described to vary the speed of the severing device. If desired, lubricant may be applied to the stock by means of sump 129 and wick 130 which applies the lubricant to roll 127, which in turn applies the lubricant to the stock.

Braking mechanism is provided to assure immediate stoppage of the driven disk. Brake 122 is pivoted at 131 and is connected by rod 132 to a link 133 attached to arm 134 which carries guide roll 117 or 118 as the case may be. The passage of stock about the guide roll moves the roll upward thereby releasing brake 122 through the connecting mechanism and permitting the carrier to rotate freely. In other words, arm 134 is fastened to link 133 which is pivoted at a central point. Since arm 134 is

attached to link 133 movement of arm 134 upward or downward pivots link 133 about its pivot point. If arm 134 is raised, it will pull the lower portion of link 133 toward the lift (referring to the braking mechanism shown in the left-hand portion of Figure 5). Movement of the lower portion of link 133 toward the left moves the upper portion of link 133 toward the right, pulling rod 132 toward the right thereby rotating brake 122 in a counterclockwise direction about its pivot 131 and removing the brake surface from contact with the hub of the carrier.

As explained previously, the carriers are driven alternately to wind the stock from one carrier on the other carrier after its passage through the cutting rolls and vice versa. Generally speaking, the operation of the modified device is the same as the operation of the device shown in Figures 1–4 inclusive.

The present invention provides a simple and inexpensive machine for severing a ribbon from sheet metal stock for direct supply to a utilizing machine. The device is particularly advantageous in that sheet metal stock is supplied to the cutting rolls in such manner that only minimum tolerances are required, thus increasing the amount of ribbon obtained from the sheet stock and preventing waste of sheet stock. The device is designed to operate on various widths of sheet stock and to sever desired widths of ribbon. The device may be employed to sever the ribbon from one or the other edge of the sheet stock as desired. The costs of operation of the device are inexpensive since the prime mover required is small in size. The device is of particular value in connection with finning machines since it severs the ribbon and supplies the ribbon to the finning machine as it is required, thus eliminating the expense and care required to stock coils of thin, weak metal such as copper or aluminum. In addition, the stock may be purchased at much lower cost than preformed ribbon so that the present machine pays for itself quickly. Another advantage resides in the simplification of stock storage; ribbons or strips of desired width may be severed from the same stock, permitting one size of stock to be carried in storage.

While I have described a preferred embodiment of my invention it will be understood my invention is not limited thereto since it may be otherwise embodied within the scope of the following claims.

I claim:

1. In apparatus for severing a ribbon from sheet stock, the combination of a rotatable disk-like member for supporting metal sheet stock, a second rotatable disk-like member for supporting metal sheet stock, cutters, means for passing the stock from the first member to the second member in a predetermined direction through the cutters and for passing the stock wound on the second member in a reverse direction through the cutters to the first member, said cutters serving to sever a ribbon from the stock during its passage from one of said members to the other member, and guide members for directing the sheet stock into the nip of the cutters.

2. Apparatus, according to claim 1, which includes a movable roll member adapted to receive the stock from the first rotatable member, a second rotatable roll member adapted to receive the stock from the first roll member, vertically extending roll guides through which the stock passes to the cutters, guide rolls contacting the edge of the stock to feed the same to the cutters, and a third guide roll to direct the stock to the second supporting member.

3. In apparatus for severing a ribbon from sheet stock, the combination of a rotatable member for supporting sheet stock, a second rotatable member for supporting sheet stock, stock passing from one member to the other member, cooperating cutting rolls to sever a ribbon from the stock during its passage from one member to the other member, guide members for directing the sheet stock into the nip of the cutting rolls, means for driving the supporting members, and means for alternately connecting the driving means to said supporting members to wind the stock on one member and then on the other member.

4. Apparatus according to claim 3 in which said driving means reverse the direction of movement of the stock through the cutting rolls, dependent upon whether the first supporting member or the second supporting member is driven.

5. Apparatus according to claim 3 in which loop mechanism is provided to receive ribbon severed by the cutting rolls and to supply such ribbon to a place of use, and means are provided actuated by the loop mechanism to vary the speed of the driving rotatable member.

6. In apparatus for severing a ribbon from sheet stock, the combination of a rotatable disk like member for supporting sheet stock, a second rotatable disk like member for supporting sheet stock, means for driving the supporting members alternately to pass stock from one member to the other, cooperating cutting rolls to sever a ribbon from the stock during its passage from one member to the other member, guide members for directing the sheet stock into the nip of the cutting rolls, and braking mechanism for automatically discontinuing rotation of the driven support member substantially instantaneously when rotation of the driving support member is discontinued.

7. Apparatus according to claim 6 in which the braking mechanism includes plates disposed above and below the rotatable member, friction material carried on the surfaces of the plate adjacent the rotatable member, and means to move the plates toward the rotatable member when rotation of the driving member is discontinued.

8. Apparatus according to claim 7 in which the braking mechanism includes a resilient member urging the plates toward one another, a lever, a wedge member carried on the lever, the lever being pivoted at one end to permit the wedge to be moved to a first position to force the plates apart, the lever carrying one of the guide members and a second resilient member urging the guide member away from the rotatable member whereby passage of stock under driving forces about the guide member pivots the lever to move the wedge member to a first position between the plates to force them apart while release of the stock from driving forces permits the second resilient member to again pivot the lever to move the wedge member to a second position permitting the first resilient member to urge the plates toward the rotatable member to apply braking forces to the rotatable member.

9. In apparatus for severing a ribbon from sheet stock, the combination of a rotatable member for supporting sheet stock, a second rotatable member for supporting sheet stock, stock passing from one member to the other member, cooperating cutting rolls to sever a ribbon from the stock during its passage from one member to the other member, guide members for directing the sheet stock into th nip of the cutting rolls, means for driving the supporting members alternately to wind the stock on one member and then on the other member, and loop mechanism to receive ribbon severed by the cutting rolls and to supply such ribbon to a place of use, and means actuated by the loop mechanism to vary the speed of the driving rotatable member, said means for varying the speed of the driving member comprising a clutch, an arm connected to the clutch to move the same toward closed or open positions, a link connected to the arm, and means connecting the loop mechanism with the link whereby an increase or decrease in the length of the loops of ribbon actuates the arm to move the clutch toward closed or open positions.

10. In apparatus for severing a ribbon from a roll of sheet metal stock, the combination of a horizontally extending rotatable disk member, a second horizontally extending rotatable disk member placed below the first member, a prime mover, means alternately connecting the prime mover to the disks to pass stock from one disk to the other disk, cooperating cutting rolls to sever a ribbon from the stock during its passage from one disk to the other, and guide members for directing the sheet stock into the nip of the cutting rolls.

11. Apparatus according to claim 10 which includes an idler roll adapted to receive stock from the first disk, a second idler roll placed adjacent the first disk over which the stock passes, vertically extending guide rolls to receive stock from the second idler roll to supply the stock to the cutting rolls, and guide rolls adjacent the cutting rolls in contact with the lower edge of stock during its passage into and through the nip of the cutting rolls.

12. Apparatus according to claim 11 including braking mechanism for automatically discontinuing substantially instantaneously rotation of the driven disk when rotation of the driving disk is discontinued.

13. Apparatus according to claim 12 in which the braking mechanism is provided adjacent each disk, the braking mechanism comprising plate members disposed above and below each disk, friction material carried by said plates adjacent the surfaces of the disk, and means automatically operable to move the friction material to-

ward the surfaces of the driven disk when operation of the driving disk is discontinued.

14. Apparatus according to claim 13 in which loop mechanism is provided to supply the severed ribbon to a place of use, and means are provided operated automatically in response to the length of the loop to vary the speed of the driving disk.

15. In apparatus for severing a ribbon from a roll of sheet metal stock, the combination of a vertically extending rotatable stock carrier, a second vertically extending rotatable stock carrier placed adjacent the first carrier, a prime mover, means connecting the prime mover to the carriers to drive one or the other carrier alternately to pass the stock from one to the other, cooperating cutting rolls to sever a ribbon from the stock during its passage from one carrier to the other, and guide members for directing the sheet stock into the nip of the cutting rolls.

16. Apparatus according to claim 15 in which braking mechanism is provided for discontinuing rotation of the driven carrier substantially instantaneously when rotation of the driving carrier is discontinued.

17. In apparatus for severing a ribbon from sheet stock, the combination of a rotatable disk like member for supporting sheet stock, a second rotatable disk like member for supporting metal sheet stock, means for passing the stock from the first member to the second member, or from the second member to the first member, cooperating cutting rolls to sever a ribbon from the stock during its passage from one of said members to the other member, guide members for directing the sheet stock into the nip of the cutting rolls, loop mechanism to receive ribbon severed by the cutting rolls and to supply such ribbon to a place of use, and means actuated by the loop mechanism to vary the speed of passage of the stock from one member to the other member.

18. In apparatus for severing a ribbon from sheet stock, the combination of a rotatable member for supporting sheet stock, a second rotatable member for supporting sheet stock, stock passing from one member to the other member, cooperating cutters to sever a ribbon from the stock during its passage from one member to the other member, guide members for directing the sheet stock to the cutters, and means for driving the supporting members, and means for alternately connecting the driving means to said supporting members to wind the stock on one member and then on the other member.

19. In apparatus for severing a ribbon from a roll of sheet metal stock, the combination of a vertically extending rotatable disk member, a second vertically extending rotatable disk member placed adjacent the first member, a prime mover, means alternately connecting the prime mover to the disks to pass stock from one disk to the other disk, cooperating cutters to sever a ribbon from the stock during its passage from one disk to the other, and guide members for directing the sheet stock into the nip of the cutters.

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