Oct. 3, 1961 R. J. GAWNE 3,002,210

APPARATUS FOR WIPING A MOVING STRIP

Filed Dec. 10, 1959 2 Sheets-Sheet 1

FIG. 1

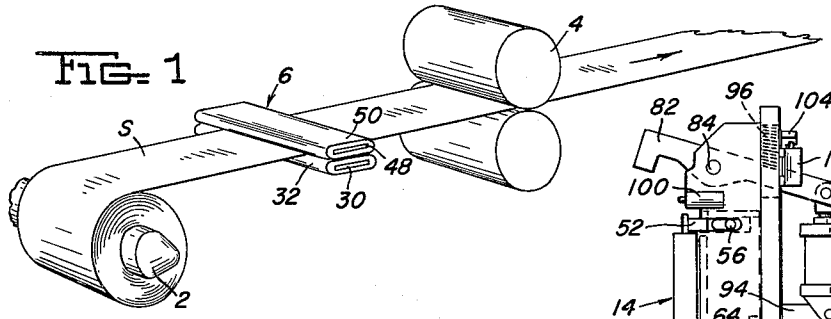


FIG. 2

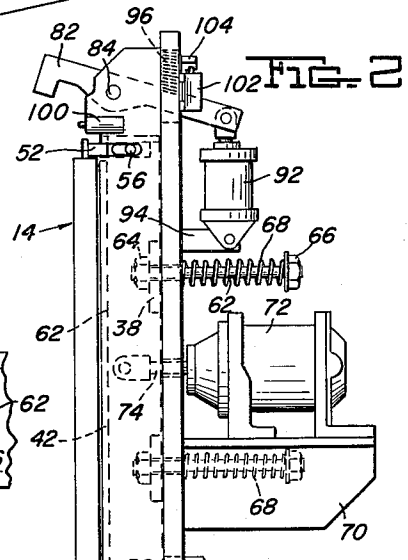
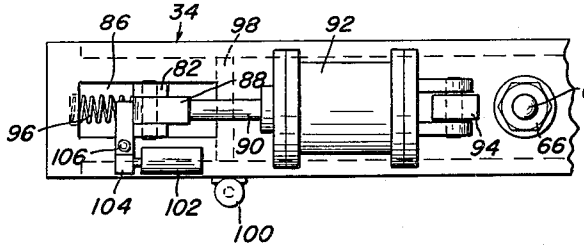


FIG. 5



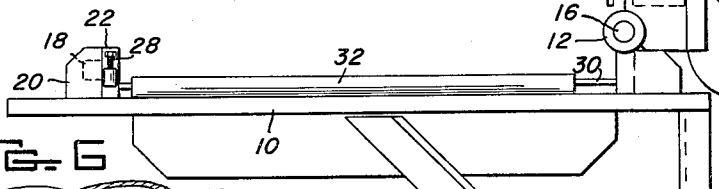


FIG. 6

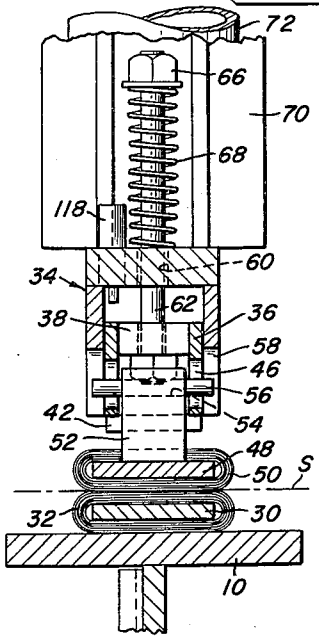
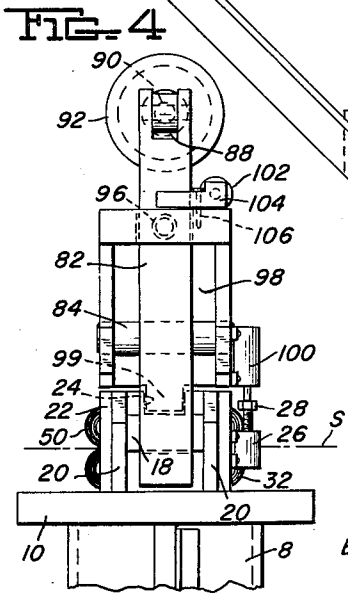
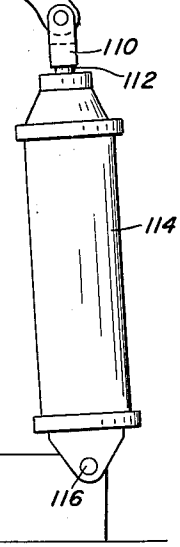


FIG. 4





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FIG. 3

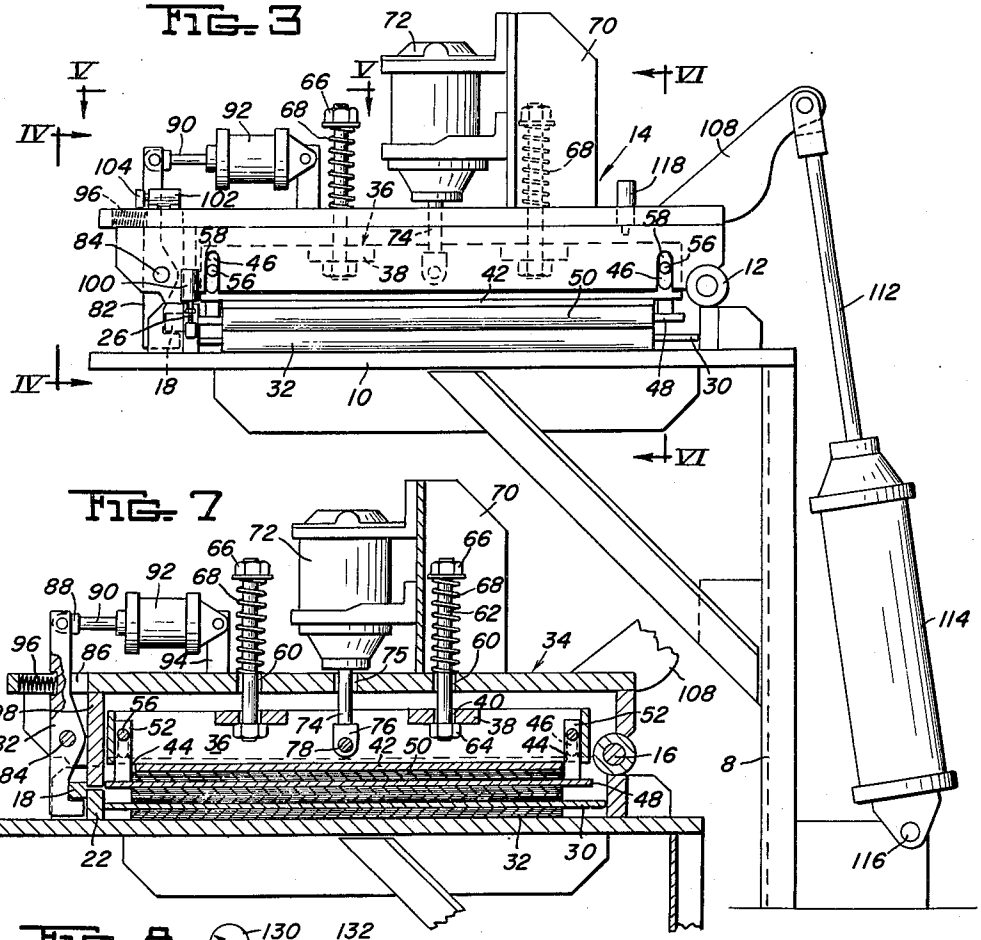
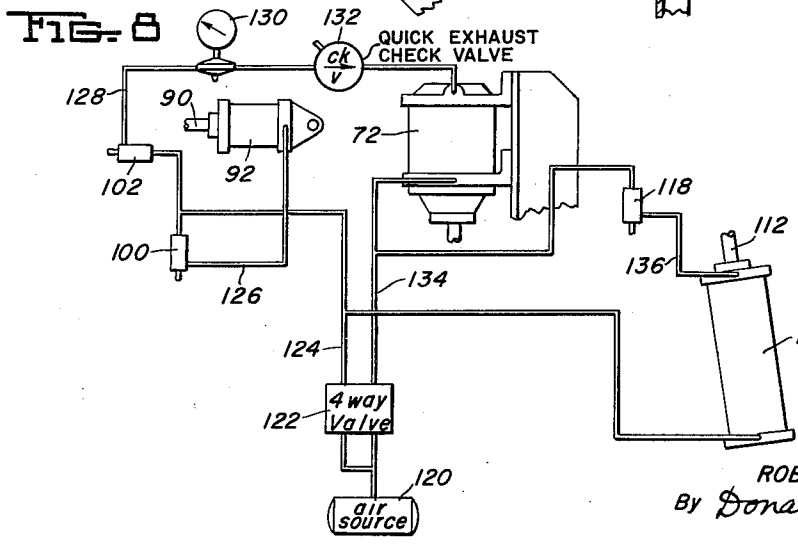


FIG. 7

FIG. 8



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3,002,210

APPARATUS FOR WIPING A MOVING STRIP

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Filed Dec. 10, 1959, Ser. No. 858,618
6 Claims. (Cl. 15—102)

This invention relates to apparatus for wiping and tensioning a moving strip and more particularly to such apparatus for use with steel strip passing to or from rolls. Such apparatus is generally old but those of which I have knowledge have various disadvantages. In most instances it is necessary to release the wipes when a new coil of strip is being threaded through the rolls or machine. With prior apparatus this was a difficult and slow operation so that the equipment was down an undue length of time. When used in conjunction with a take-up reel, the pressure of the wipe on the strip must be synchronized with the pull of the take-up reel to prevent winding the coil too tightly or too loosely. If wound too tightly and the coil is subsequently annealed, the strip will not be able to expand properly so that the convolutions of the strip will stick together. If wound too loosely, the surface of the strip becomes scratched because of excessive movement between the individual convolutions.

It is therefore an object of my invention to provide a wipe which can be easily and rapidly moved between operative and non-operative positions.

Another object is to provide such a wipe in which the pressure exerted by the wipe can be readily controlled.

These and other objects will be more apparent after referring to the following specification and attached drawings in which:

FIGURE 1 is a schematic perspective view showing my invention in conjunction with a rolling mill;

FIGURE 2 is an elevation showing the wipe of my invention in inoperative position;

FIGURE 3 is a view, similar to FIGURE 2, showing the wipe in operative position;

FIGURE 4 is an enlarged view taken on a line IV—IV of FIGURE 3;

FIGURE 5 is an enlarged view taken on the line V—V of FIGURE 3;

FIGURE 6 is an enlarged view taken on the line VI—VI of FIGURE 3;

FIGURE 7 is a vertical sectional view through the wipe in operative position; and

FIGURE 8 is a schematic view of the pneumatic system of the wipe.

Referring more particularly to the drawings reference numeral 2 indicates means for supporting a coil of strip S. Located some distance from the coil supporting means is a pair of rolls 4. Wipe 6 of my invention is located between the coil 2 and the rolls 4. The strip S passes from the coil support 2 through the wipe 6 to the rolls 4. It will be understood that the coil support 2 may be a coiler rather than an uncoiler and that other processing equipment, such as a slitter, may be substituted for the rolls 4. The wipe 6 is mounted on a frame 8 and includes a fixed frame assembly 10 having a hinge bracket 12 at one end on which is supported an upper frame assembly 14 by means of a pin 16. A latch bar 18 extends between and is welded to a pair of vertical plates 20 which are welded to the top of lower frame 10. A vertical lock plate 22 is welded to the top of frame 10 adjacent the latch bar 18 and has a slot 24 in its upper surface. A valve actuator 26 is attached to the frame assembly 10 adjacent the lock plate 22 and includes a bolt 28 which provides for vertical adjustment. A plate 30 with suitable wipe fabric 32 wrapped therearound rests on top of the assembly 10. The upper frame assembly 14 includes a box frame member 34 which is open at its lower end for receiving a platen 36. The platen 36 is also a box-shaped member having spaced cross plates 38 extending across the top thereof with a vertical hole 40 in each plate 38. A plate 42 is on the bottom of platen 36 and extends the full length thereof except for a short distance at each end so that an opening 44 is provided at each end thereof. Vertical slots 46 are provided in the side of the platen 36 adjacent each end thereof. A wipe plate 48 with suitable wipe fabric 50 wrapped therearound is supported from the platen 36. For this purpose it is provided with upwardly extending plates 52 which are spaced apart the same distance as slots 46. A hole 54 is provided in each plate 52. The plates 52 of the wipe plate 48 are passed through the openings 44 and pins 56 are passed through the slots 46 and holes 54. Vertical slots 58 are provided in the upper frame 34 at the same spacing as slots 46 so as to permit the wipe plate 48 to move vertically with respect to the platen 36. Vertical holes 60 are provided through the top of upper frame 34 at the same spacing as holes 40. A threaded rod 62 passes through aligned holes 40 and 60 with a nut 64 being threaded to the bottom thereof below plate 38 and a nut 66 being threaded to the top thereof. A compression spring 68 surrounds the threaded rod 62 between the top of frame 34 and the bottom of nut 66. The upward force exerted by springs 68 can be adjusted by nuts 66. A bracket 70 is welded to the top of box member 34 and supports a cylinder 72 having a vertical piston rod 74 extending downwardly therefrom through a hole 75 in the top of box member 34. The piston rod 74 is connected to the platen 36 by means of a clevis 76 and a pin 78 passing through aligned holes in the sides of platen 36. A latch arm 82 is pivoted intermediate its ends to upper frame 14 by means of a pin 84 extending between the side walls of box member 34. The latch arm 82 extends upwardly through an opening 86 in the top of box member 34. The upper part of arm 82 is connected by means of a clevis 88 to piston rod 90 of a cylinder 92. The cylinder 92 is pivotally mounted on bracket 94 which is welded to the top of box member 34. A spring 96 is located in the opening 86 with one end being seated in the wall of opening 86 and the other end being seated in the arm 82 so as to bias the arm in a clockwise direction as shown in FIGURE 7 when pressure is removed from cylinder 92. An upper lock plate 98 is attached to box member 34 and has a tongue 99 which is shaped to be received in slot 24 of lower lock plate 22.

A sequence valve 100 is attached to the side portion of frame 14 in alignment with the bolt 28. A sequence valve 102 is attached to the top of frame 14 and is adapted to be actuated by an L-shaped lever 104 pivotally mounted on top of box member 34 by means of a pin 106. An arm 108 is welded to the top of box member 34 above the bracket 12. The free end of the arm 108 is connected by means of a clevis 110 to a piston rod 112 of cylinder 114 which is pivotally mounted at its lower end by means of pin 116 to the support 8. A valve 118 is mounted on the top of box member 34 with its actuating bar extending downwardly so as to be operable by the platen 36. In the pneumatic system shown in FIGURE 8 air from air source 120 is delivered to a four-way two position valve 122. A conduit 124 leads from the valve 122 to the lower end of cylinder 114 and to valves 100 and 102. A conduit 126 leads from valve 100 to the blind end of cylinder 92. A conduit 128 leads from valve 102 through pres-

sure regulator 130 and check valve 132 to the upper end of cylinder 72. The valve may be any type of quick exhaust check valve having an exhaust vent to atmosphere. One such type is shown on pages *x*–8, *x*–9 and *x*–*d* of Catalogue No. 58 of Ross Operating Valve Co., Detroit, Michigan (copyright 1957). A conduit 134 leads from valve 122 to the lower end of cylinder 72 and to valve 118. A conduit 136 leads from valve 118 to the top of cylinder 114.

The operation of my device is as follows: With the wipe in open position and strip S resting on the lower frame assembly 10 the valve 122 is manually positioned so that air from air source 120 will pass through conduit 124. When this occurs air enters the lower portion of cylinder 114, thus moving the piston rod 112 upwardly and causing the upper frame assembly 14 to pivot about pin 16 to closed position. As this occurs upper lock plate 98 enters slot 24 so as to positively lock the upper and lower frame assemblies from movement in the direction of strip movement. As the two frame assemblies approach each other the actuating bar of valve 100 contacts bolt 28 to open valve 100 so that air will flow through valve 100 and conduit 126 to cylinder 92. This will cause the latch arm 82 to move in a counter clockwise direction as shown in FIGURE 7 against the pressure of spring 96 and lock it to latch bar 18. Movement of the latch arm 82 causes L-shaped lever 104 to pivot around its pin 106 so as to actuate valve 102 to open position. This permits air to flow through valve 102, conduit 128, pressure regulator 130 and check valve 132 to the top of cylinder 72. This causes the upper wipe plate 48 to be forced downwardly through its connection with platen 36 so that it will bear against the top of the strip S. The amount of pressure applied is controlled by regulator 130. As the strip passes through the wipe 6 on its way to the rolling mill the wipe applies back tension and removes dirt or any foreign material from the strip surface prior to entering the rolls. When the strip in the coil is depleted and a new coil is placed in position the upper frame assembly 14 is raised to permit threading of the new strip through the rolling mill. This is done by actuating the valve 122 to permit air from air source 120 to flow through conduit 134 and air from conduit 124 to be exhausted to atmosphere. The air from conduit 134 is delivered to the lower end of cylinder 72 with the air being exhausted from the top of the cylinder through the vent in valve 132. The pressure of the air in cylinder 92 is released through valve 100 and conduit 124 so that the pressure of spring 96 will cause latch arm 82 to rotate in a clockwise direction as seen in FIGURE 7, thus releasing the latch and closing valve 102. Upward movement of piston rod 74 raises the platen 36 causing it to contact the actuating bar of valve 118 to open it. This permits air from conduit 134 to flow to the upper part of cylinder 114 through conduit 136, thus raising the upper frame assembly 14 around pin 16. After the strip from the new coil is threaded into the rolls 4 and the rolling mill is ready for operation, the wipe is again placed in closed position in the manner set forth above. When used in conjunction with a take-up reel the wipe furnishes a more accurate control of the tension applied to the strip as it is wound on the take-up reel. Proper synchronization prevents winding a coil too tightly or too loosely so that the coil of strip can be processed properly without scratching of the strip.

While one embodiment of my invention has been shown and described, it will be apparent that other adaptations and modifications may be made without departing from the scope of the following claims.

I claim:

1. Apparatus for wiping a moving strip comprising a fixed frame assembly including a wipe material over which the strip passes, an upper frame assembly mounted on said fixed frame assembly for pivotal movement about an axis generally parallel to and at one side of the path of movement of said strip, said upper frame assembly including a box-shaped member open at its lower end, a platen within said box-shaped member, means biasing said platen upwardly within said box-shaped member, a fluid cylinder mounted on said box-shaped member, a connection between said fluid cylinder and said platen to move it downwardly against said biasing means, a wipe material supported by said platen, a latch bar mounted on one of said frame assemblies, a latch arm mounted on the other of said frame assemblies, means for moving said upper frame assembly about its pivot, means operable by movement of said upper frame assembly to closed position to move said latch arm to locked position and to move said platen downwardly, and means for releasing said latch arm and raising said upper frame assembly to inoperative position.

2. Apparatus for wiping a moving strip comprising a fixed frame assembly including a wipe material over which the strip passes, an upper frame assembly mounted on said fixed frame assembly for pivotal movement about an axis generally parallel to and at one side of the path of movement of said strip, said upper frame assembly including a box-shaped member open at its lower end, a platen within said box-shaped member, means biasing said platen upwardly within said box-shaped member, a fluid cylinder mounted on said box-shaped member, a connection between said fluid cylinder and said platen to move it downwardly against said biasing means, a wipe material supported by said platen, a latch bar mounted on one of said frame assemblies, a latch arm mounted on the other of said frame assemblies, means for moving said upper frame assembly about its pivot, means operable by movement of said upper frame assembly to closed position to move said latch arm to locked position and to move said platen downwardly, means for releasing said latch arm and the pressure in said cylinder to permit raising of said platen, and means operable by raising of said platen for raising said upper frame assembly to inoperative position.

3. Apparatus for wiping a moving strip comprising a fixed frame assembly including a wipe material over which the strip passes, an upper frame assembly mounted on said fixed frame assembly for pivotal movement about an axis generally parallel to and at one side of the path of movement of said strip, said upper frame assembly including a box-shaped member open at its lower end, a platen within said box-shaped member, means biasing said platen upwardly within said box-shaped member, a fluid cylinder mounted on said box-shaped member, a connection between said fluid cylinder and said platen to move it downwardly against said biasing means, a wipe material supported by said platen, a latch bar mounted on said fixed frame assembly on the side remote from said pivot, a latch arm pivotally mounted on said box-shaped member below the top thereof, said box-shaped member having an opening in the top thereof through which the latch arm passes, means biasing said latch arm to unlocked position, means for moving said upper frame assembly about its pivot, means operable by movement of said upper frame assembly to closed position to move said latch arm to locked position and to move said platen downwardly, and means for releasing said latch arm and raising said upper frame assembly to inoperative position.

4. Apparatus for wiping a moving strip comprising a fixed frame assembly including a wipe material over which the strip passes, an upper frame assembly mounted on said fixed frame assembly for pivotal movement about an axis generally parallel to and at one side of the path of movement of said strip, said upper frame assembly including a box-shaped member open at its lower end, a platen within said box-shaped member, means biasing said platen upwardly within said box-shaped member,

a fluid cylinder mounted on said box-shaped member, a connection between said fluid cylinder and said platen to move it downwardly against said biasing means, a wipe plate supported by said platen, a wipe material supported by said wipe plate, a latch bar mounted on said fixed frame assembly on the side opposite said pivot, a latch arm pivotally mounted on said box-shaped member below the top thereof, said box-shaped member having an opening in the top thereof through which the latch arm passes, means biasing said latch arm to unlocked position, means for moving said upper frame assembly about its pivot, means operable by movement of said upper frame assembly to closed position to move said latch arm to locked position and to move said platen downwardly, and means for releasing said latch arm and raising said upper frame assembly to inoperative position.

5. Apparatus for wiping a moving strip comprising a fixed frame assembly including a wipe material over which the strip passes, an upper frame assembly mounted on said fixed frame assembly for pivotal movement about an axis generally parallel to and at one side of the path of movement of said strip, said upper frame assembly including a box-shaped member open at its lower end, a platen within said box-shaped member, means biasing said platen upwardly within said box-shaped member, a fluid cylinder mounted on said box-shaped member, a connection between said fluid cylinder and said platen to move it downwardly against said biasing means, a wipe material supported by said platen, a latch bar mounted on said fixed frame assembly on the side remote from said pivot, a latch arm pivotally mounted on said box-shaped member below the top thereof, said box-shaped member having an opening in the top thereof through which the latch arm passes, means biasing said latch arm to unlocked position, a second fluid cylinder mounted on said box-shaped member, a connection between said second fluid cylinder and said latch arm to move it to latched position against said last named biasing means, a third fluid cylinder, a connection between said third fluid cylinder and said box-shaped member to move said upper frame assembly about its pivot, a manually operable valve to direct fluid into opposite ends of said third fluid cylinder to move said upper frame assembly between non-operative and operative positions, a second valve mounted on one of said frame assemblies, means for operating said second valve mounted on the other of said frame assemblies, a third valve, means actuated by said latch arm for operating said third valve, a fourth valve mounted on said box-shaped member and operable by said platen, movement of the upper frame assembly to operative position actuating said second valve to operate said second cylinder to move said latch arm to latched position, movement of said latch arm to latched position actuating said third valve to operate said first cylinder to move said platen and upper wipe plate downwardly, said first valve being movable to direct fluid into the opposite end of said first cylinder and release fluid in said second cylinder to unlatch the frame assemblies and move the platen upwardly, upward movement of said platen actuating said fourth valve to cause said third cylinder to move said upper frame assembly to open position.

6. Apparatus for wiping a moving strip comprising a fixed frame assembly including a wipe material over which the strip passes, an upper frame assembly mounted on said fixed frame assembly for pivotal movement about an axis generally parallel to and at one side of the path of movement of said strip, said upper frame assembly including a box-shaped member open at its lower end, a platen within said box-shaped member, means biasing said platen upwardly within said box-shaped member, a fluid cylinder mounted on said box-shaped member, a connection between said fluid cylinder and said platen to move it downwardly against said biasing means, a wipe plate supported by said platen, a wipe material supported by said wipe plate, a latch bar mounted on said fixed frame assembly on the side remote from said pivot, a latch arm pivotally mounted on said box-shaped member below the top thereof, said box-shaped member having an opening in the top thereof through which the latch arm passes, means biasing said latch arm to unlocked position, a second fluid cylinder mounted on said box-shaped member, a connection between said second fluid cylinder and said latch arm to move it to latched position against said last named biasing means, a third fluid cylinder, a connection between said third fluid cylinder and said box-shaped member to move said upper frame assembly about its pivot, a manually operable valve to direct fluid into opposite ends of said third fluid cylinder to move said upper frame assembly between non-operative and operative positions, a second valve mounted on one of said frame assemblies, means for operating said second valve mounted on the other of said frame assemblies, a third valve, means actuated by said latch arm for operating said third valve, a fourth valve mounted on said box-shaped member and operable by said platen, and interlocking lock plates mounted on said frame assemblies to positively lock them from movement in the direction of strip travel, movement of the upper frame assembly to operative position actuating said second valve to operate said second cylinder to move said latch arm to latched position, movement of said latch arm to latched position actuating said third valve to operate said first cylinder to move said platen and upper wipe plate downwardly, said first valve being movable to direct fluid into the opposite end of said first cylinder and release fluid in said second cylinder to unlatch the frame assemblies and move the platen upwardly, upward movement of said fourth valve to cause said third cylinder to move said upper frame assembly to open position.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,002,210 October 3, 1961

Robert J. Gawne

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the grant, lines 1 to 3, for "Robert J. Gawne, of Cuyahoga Heights Village, Ohio, assignor to United States Steel Corporation, a corporation of New Jersey," read -- Robert J. Gawne, of Cuyahoga Heights Village, Ohio, --; line 12, for "United States Steel Corporation, its successors" read -- Robert J. Gawne, his heirs --; in the heading to the printed specification, lines 3 to 5, for "Robert J. Gawne, Cuyahoga Heights Village, Ohio, assignor to United States Steel Corporation, a corporation of New Jersey" read -- Robert J. Gawne, Cuyahoga Heights Village, Ohio (4749 East 71st St., Cleveland 5, Ohio) --.

Signed and sealed this 3rd day of April 1962.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents