

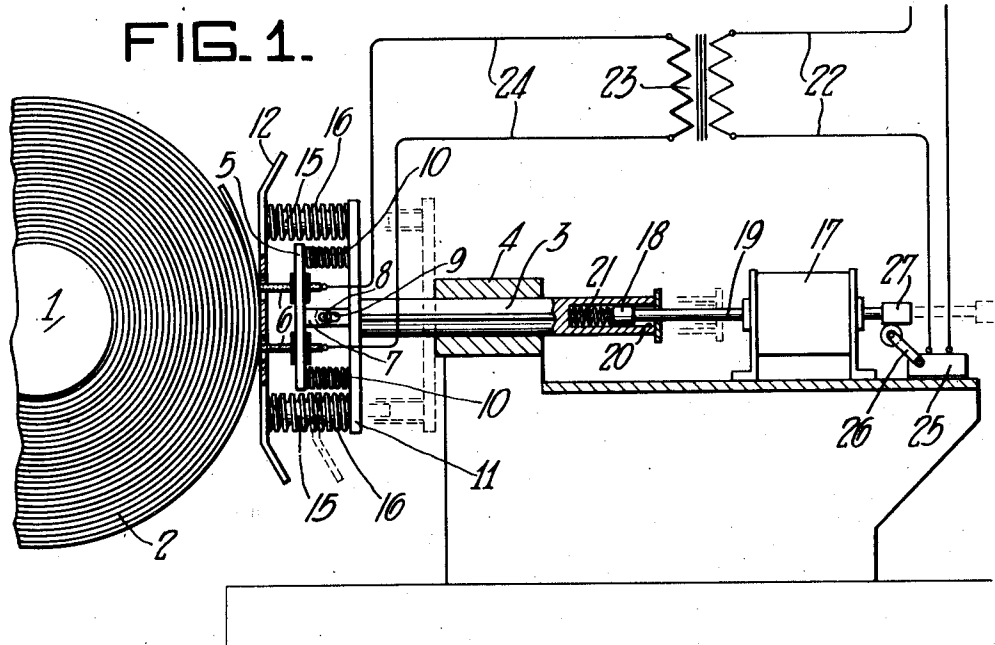
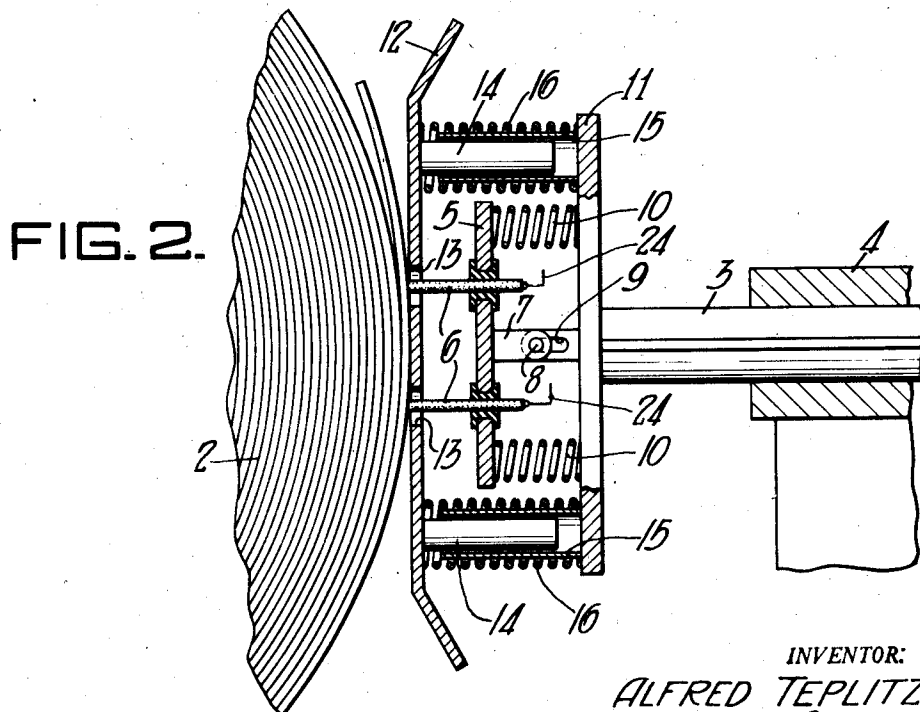
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METAL STRIP COIL WELDING MACHINE

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METAL STRIP COIL WELDING MACHINE

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3 Claims. (Cl. 219—4)

This invention is concerned with the problem of fastening the outer convolution of a coil of weldable strip metal to the next convolution to prevent uncoiling of the coil during its handling. For instance, as strip steel leaves a cold rolling mill it is coiled on a collapsing spindle and after all the strip is rolled the spindle is collapsed so that the strip may be removed. Unless something is done the strip uncoils during its subsequent handling and it is common to prevent this by banding the coil with steel box band strapping or to manually spot weld the outer convolution to the next convolution adjacent the strip end, both expedients being time consuming and somewhat dangerous.

With the above in mind, the present invention is a machine adapted to be used in conjunction with whatever means is used for positioning the coil and which works to automatically spot weld the outer strip convolution to the next convolution, the machine having the advantages that it is simple, sturdy, works very quickly and does not involve any danger. It may be used with any metal strip coil when the metal strip is capable of being spot welded, although it is particularly designed for use in conjunction with steel strip being coiled on the spindle at the end of a cold rolling mill.

A specific example of the invention is schematically illustrated by the accompanying drawing, in which:

Figure 1 is a side view; and

Figure 2 is a partly sectioned enlargement from Figure 1.

More specifically, this drawing indicates the spindle 1 and a coil of steel strip 2 which this spindle 1 has built upon itself by rotating. This spindle 1 may be a spindle at the end of a cold rolling continuous steel strip mill, but in any event it functions as a means for holding a coil of steel strip. A carrier, in the form of a rod 3, is nonrotatively and slidably mounted by a bearing 4 so that it functions as a carrier reciprocating radially of the coil 2 held by the spindle 1. A mount 5 mounting spot welding electrodes 6 spaced circumferentially of the coil 2 is pivoted transversely to the carrier or rod 3 intermediate the electrodes 6, the latter projecting toward the coil 2. This mount 5 is in the form of a rocker plate carried transversely by the rod 3 through a clevis 7 having its pivot 8 working in a longitudinal slot 9 in the end of the rod 3. Compression springs 10 provide a means for biasing the mount 5 with the projecting ends of

the electrode 6 aligned at right angles to the reciprocation of the carrier or rod 3.

These compression springs 10 work against a mount 11 rigidly carried by the carrier or rod 3 and which is also in the form of a plate, this plate constituting the mount 11 being rigidly carried transversely by the rod 3 and at right angles to it. In addition to providing the reaction for the compression springs 10, this mount 11 also mounts a shield 12 at right angles to the reciprocation of the carrier or rod 3 and in front of the projecting ends of the electrodes 6, this shield having holes 13 for passage of the end portions of the electrodes 6. This shield 12 is mounted by the mount 11 for reciprocation relative and parallel thereto, by posts 14 rigidly fixed to the shield and sliding in bores formed in standards 15 rigidly fixed to the mount 11, compression springs 16 functioning to bias the shield 12 toward the coil 2 and away from the mount 11.

Means is provided for reciprocating the carrier or rod 3, this means taking the form of a double acting reciprocating motor 17, which may be exemplified by either a hydraulic motor or electric thruster motor. This motor 17 works the rod 3 by connecting therewith through relatively reciprocating parts working against a bias during forward motion of the carrier, by which is meant movement toward the coil 2. These parts are provided by a plunger 18 on the end of the working shaft 19 of the motor 17, and which plunger 18 works in a bore 20 formed in the rear end of the rod or carrier 3, the described bias being effected by a compression spring 21 positioned between the end of the bore 20 and the end of the plunger 18.

The electrodes 6 are provided with an electric powering circuit in the form of high voltage electrically powered lines 22, a welding transformer 23 and low voltage lines 24 which go to the electrodes 6, it being understood that the latter are insulated from each other by any conventional arrangement and that the lines 22 are powered by A. C. current. The lines 22 are controlled by a limit switch 25 of the type having an operating lever 26, the latter being thrown so it works the switch 25 to circuit establishing positions, by a cam 27 fixed to the shaft 19, the arrangement being such that until there is an appreciable amount of reciprocation between the relatively reciprocating parts provided by the plunger 18 working in the bore 20 of the rod or carrier 3 against the bias of the spring 21, the switch does not close, and so that relative reciprocation of

these parts results in throwing of the lever 26, by the cam 27, so it works the switch 25 automatically and establishes the spot welding current through the circuit formed by the lines 22, the transformer 23 and the lines 24.

In operation, as the last of the strip feeds onto the rotating spindle 1 in the final building of the coil 2, the end of the strip tends to thrash around before rotation of the spindle 1 can be stopped. During this time the rod or carrier 3 is in its retracted position, and the shield 12 is pushed well forward of the ends of the welding electrodes 6 by the action of the compression springs 16 so that the welding electrodes 6 are adequately protected against damage by the thrashing end of the strip. This protection also is of value if the strip breaks during rolling. When the spindle 1 is stopped the motor 17 is worked to move the carrier 3 toward the coil 2, this first bringing the shield 12 into contact with the outer convolution of the coil so it no longer moves and, as the motion continues, causing relative reciprocation of the plunger 18 and the rod 3, with consequent establishment of the welding circuit for reasons already explained, and, against the bias of the springs 10 and 16, continuing to move the mounts 5 and 11 forwardly toward the coil 2 so that the spot welding electrodes 6 are pressed firmly against the outer coil convolution, the mount 5 rocking as required against the bias of the springs 10 while the clevis pin 8 rides back in the slot 9 in the end of the rod 3, this effecting leveling of the electrodes 6 so that they both firmly contact the outer strip convolution and effect positive spot welding of this convolution to the next convolution inside. The spindle 1 is preferably stopped at a position causing the spot welding to occur relatively close to the end of the strip. After the spot welding operation the motor 17 is again operated to move the carrier or rod 3 away from the coil 2, the switch 25 being then automatically worked to break the welding current and the springs returning all the parts they bias to their original positions.

I claim:

1. A machine including the combination of means for holding a coil of metal strip, a carrier reciprocating radially of a coil held by said means, a mount mounting spot welding electrodes spaced circumferentially of said coil and which is pivoted transversely to said carrier intermediate said electrodes with the latter projecting toward

said coil, means for biasing said mount with the projecting ends of said electrodes aligned at right angles to the reciprocation of said carrier, and means for reciprocating said carrier.

2. A machine including the combination of means for holding a coil of metal strip, a carrier reciprocating radially of a coil held by said means, a mount mounting spot welding electrodes spaced circumferentially of said coil and which is pivoted transversely to said carrier intermediate said electrodes with the latter projecting toward said coil, means for biasing said mount with the projecting ends of said electrodes aligned at right angles to the reciprocation of said carrier, a mount rigidly carried by said carrier and mounting a shield at a right angle to the reciprocation of said carrier and in front of the projecting ends of said electrodes with holes for passage of the latter, this rigidly carried mount mounting said shield for reciprocation parallel the reciprocation of said carrier and relative thereto and said shield being biased toward said coil, and means for reciprocating said carrier.

3. A machine including the combination of means for holding a coil of metal strip, a carrier reciprocating radially of a coil held by said means, a mount mounting spot welding electrodes spaced circumferentially of said coil and which is pivoted transversely to said carrier intermediate said electrodes with the latter projecting toward said coil, means for biasing said mount with the projecting ends of said electrodes aligned at right angles to the reciprocation of said carrier, a mount rigidly carried by said carrier and mounting a shield at a right angle to the reciprocation of said carrier and in front of the projecting ends of said electrodes with holes for passage of the latter, this rigidly carried mount mounting said shield for reciprocation parallel the reciprocation of said carrier and relative thereto and said shield being biased toward said coil, means for reciprocating said carrier including a connection with the latter through relatively reciprocating parts working against a bias during forward motion of said carrier, an electric powering circuit for said electrodes and a switch for controlling said circuit and worked to circuit establishing position by said reciprocating means automatically upon relative reciprocation of said parts.

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