APPARATUS FOR SELECTIVELY MARKING MOVING STRIP
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This invention relates to apparatus for applying an identification stamp and brand marking to metal strip at regular intervals as it is being coiled at high speed.

In the manufacture of steel sheets, it is customary to stamp each sheet to provide brand marking as well as identification as to grade of steel, lift number, the plant where made, etc. The stamp can be applied to sheets manually during inspection or filing. Some users, however, buy sheet steel in the form of coils of strip. Continuous rotary printing devices have been used for marking the strip at intervals, usually during high speed temper rolling. Where large coils are involved, made from lengths of strip rolled from different slabs and welded together for economical processing, it is desirable to identify individually the portions thereof rolled from different slabs. This requires a change in the marking stamp each time a welded joint passes the marking point. Such a change in the continuous printing devices known prior to our invention necessitated that the temper mill be slowed down or stopped since otherwise a considerable length of strip is not stamped, because of the time required to make the change. Both alternatives are objectionable, the former particularly because of the loss of production in the case of modern mills operating at high speed.

We have invented an improved rotary printing device having separate stamp holders individually movable from retracted to printing position during operation of the device so that a change in the identifying stamp may be made without slowing down the temper mill, thus permitting the portions of a coil rolled from different slabs to be designated accordingly, without missing any considerable length of such portions. In a preferred embodiment, we provide a rotatable cylinder adapted to carry a printing plate. In addition to the plate, the cylinder has a plurality of circumferentially spaced radial stamp holders reciprocable from retracted position to printing position. Each holder carries a stamp for identifying one of the slabs in a coil. The cylinder is mounted on a shaft rotating therewith. The shaft is slidable axially of the cylinder and is provided with cams or wedges spaced circumferentially and axially thereof for selectively actuating the radially movable stamp holders from retracted to printing position. The entire device is mounted on a wheeled carriage movable from an out-of-the-way position to a position in which the printing cylinder cooperates with a coil of strip building up on a reel such as that installed at the exit side of a temper mill.

A complete understanding of the invention may be obtained from the following detailed description and explanation which refer to the accompanying drawings illustrating the present preferred embodiment. In the drawings,

Figure 1 is a plan view of the apparatus as a whole;
Figure 2 is a side elevation;
Figure 3 is an end elevation;
Figure 4 is a transverse section taken on the plane of line IV—IV of Figure 2 and considerably enlarged; and
Figure 5 is a section through the cylinder taken on the plane of line V—V of Figure 4.

Referring now in detail to the drawings and, for the present, to Figures 1 through 3, the apparatus of our invention includes a supporting frame fabricated from structural members and plate. The frame is composed of legs 11, longitudinal members 12 and cross members 13. Each longitudinal member includes a beam 14 and a channel 15 resting thereon. A carriage 16 is composed of longitudinal members 17 and cross members 18 and 19 and is provided with wheels 20 traveling between upper and lower rails 21 secured to the channels 15 of the frame 10. A pneumatic cylinder and piston 22 mounted on cross members 23 extending between beams 14 has its piston rod 24 pivoted to a bracket secured to cross member 19 of carriage 16. By this means, the carriage may be advanced from a retracted position to the position shown in solid lines in Figures 1 and 2 in which printing mechanism mounted on the carriage (to be described in detail shortly) is adapted to cooperate with a coil of strip being built up on a coiling reel indicated at 25. A four-way valve 26 on the frame 10 controls the supply of compressed air to opposite ends of the cylinder 22 through suitable piping, not shown. A locking bar 27 is slidable transversely on one of the longitudinal members 12 of the frame 10 for securing the carriage in retracted position.

A printing cylinder 28 is journaled in bearings 29 mounted on the longitudinal members 17 of the carriage at the forward end thereof. An ink-feeding roller 30 mounted on a shaft 31 also journaled in the members 17, applies ink to the printing surfaces on the cylinder. The construction of the cylinder is clearly shown in Figures 4 and 5. As there shown, the cylinder comprises a cup-shaped body portion 32 and a flanged end plate 33 removably secured thereto by screws 34. The body portion 32 has a trunnion 35 journaled in one of the bearings 29, while the end plate 33 has a similar trunnion 36 journaled in the other bearing.
have friction tires thereon of rubber or like material adapted to engage the periphery of the coil on reel 25, whereby rotation of the coil causes the cylinder to turn on its axis. At each revolution, a printing plate 38 on the cylinder makes an impression on the strip being coiled on the reel, after receiving ink from roller 30. This plate may be used for applying the manufacturer's trade-mark as well as any other identification data as desired.

A plurality of guide blocks 39 are set in slots spaced circumferentially of the edge of the body portion 32 of the cylinder 28 and are held in place by the end plate 33. A marking device in the form of a radial plunger 40 is reciprocable in each guide block and is provided at its outer end with a stamp holder 41 having a stamp 42 therein and at its inner end with a clevis 43 in which is journaled a roller 44. Each plunger has a compression spring 45 thereon between the clevis and the guide block 39 whereby the plunger is constantly urged inwardly. The stamps 42 serve to apply marks designating the different slabs from which the several portions of a large coil were rolled. Any suitable series of letters or numbers may be employed for this purpose. Any desired part of the particular one of the stamps to be applied to a given portion of the coil, we provide a shaft 46 slidably through trunnions 35 and 36 in sleeve bearings 41 therein. The shaft is spun by trunnion 35 by a key 40 and thus turns with cylinder 28. The shaft has a series of radial cams or wedges 48 spaced circumferentially and longitudinally intermediate the ends thereof so that by properly positioning the shaft axially relative to the cylinder 28, any one of the plungers 40 may be projected to its marking or printing position as shown in Figure 4, leaving all of the other plungers in retracted position where they clear the strip.

In order to permit a quick change in the selection of the radially shiftable plungers while the cylinder is rotating at high speed, we mount a gear 50 on the carriage 41. The motor drives a gear 51 journaled in bearings 52. The bore of the gear is tapped and a screw 53 is threaded therethrough. The end of the screw remote from the gear is square and slides in a bearing 54 of similar shape. The screw being thus held against rotation moves axially when the gear is driven. A lever or rock shaft 55 is pivoted 'on brackets 56 mounted on one of the members 17 of the carriage and extending laterally therefrom. One arm 55a of the lever is pivoted at the end of screw 53 remote from the gear 51. The other arm 55b of the lever is pivoted to a swivel thrust bearing 57 on the end of shaft 46. By the aid of the motorized screw and mechanism just described, the shaft 46 may be shifted axially as necessary to move the cams or wedges 48 relative to the rollers 44 so as to shift any selected one of the plungers 40 outwardly to printing position. In order to facilitate control of the motor 50, we provide a limit switch 58 and a stop bar 59 cooperating therewith secured to screw 53. The back of said studs 56 spaced therealong, one for each of the wedges 48. These studs serve to operate the switch 58 to stop the motor 50 when the shaft 46 has been moved to bring the next wedge into position for shifting its printing plunger. The switch 58 preferably controls the relays and contactors of the control panel for the motor 50 in the known manner to cause the motor to stop at the proper time. A push-button switch for starting the motor may be connected in parallel with the switch 58 and held closed until the spin in engagement with the latter has moved away sufficiently to permit the switch to be restored to normal position. Thereafter, the push-button may be released and the operation of the motor continues until the next stud 50 trips the switch. The manufacturer's invention has been positioned for operation as shown in Figure 2, it is only necessary for the operator to start the motor 50 by means of the push-button and set the shaft and wedges 48 each time a welded joint at adjacent portions of the coil arrives at the reel 25. The resulting operation of motor 50 takes but a few seconds so that marking of the strip, not only with the trade mark and other data which are applied uniformly to the whole coil by plate 38 but also with the slab designation made by one of the stamps 42, results practically without interruption and at regular intervals throughout the full length of the coil. The stamp-changing operation is repeated as required until the entire coil has been wound for the purpose.

As the coil builds up on the reel 25, the carriage 16 is retracted against the pressure of the air in the cylinder 22. When the end of the coil is reached, the carriage is fully retracted by manipulation of valve 26 and locked in that position by bar 27 while the next coil is being started on the coil. When the carriage has been retracted as described, the motor 50 is reversed to restore the shaft 48 to starting position.

We claim:

1. Apparatus for marking repeatedly a traveling strip, comprising a printing cylinder having trunnions at its ends journaled in spaced bearings, a shaft extending axially into the cylinder through one of said bearings and mounted for axial movement relative thereto, a plurality of plungers spaced circumferentially of said cylinder and mounted for radial movement therein to and from printing position, wedges on the shaft within the cylinder spaced apart axially and circumferentially of the shaft, each positioned to actuate one of said plungers selectively to printing position on axial movement of the shaft to a predetermined position, and means for moving the shaft axially.

2. The apparatus defined by claim 1 characterized by a reciprocable carriage on which said bearings are mounted and means for advancing and retracting the carriage and for西南条

3. The apparatus defined by claim 1 characterized by said last-mentioned means being swiveled to said shaft.

4. The apparatus defined by claim 1 characterized by said last-mentioned means including a motorized screw.

5. The apparatus defined by claim 1 characterized by said shaft being swiveled to said cylinder.

6. Apparatus for selectively marking moving strip comprising a cylinder, trunnions extending from the ends of the cylinder, spaced bearings in which said trunnions are journaled, outwardly opening guide blocks spaced circumferentially of said drum, a stamp holder reciprocable radially in each block, means constantly urging said holders inwardly, a shaft slidably through said trunnions, wedges spaced longitudinally and circumferentially of said stamp, and a push said holders outwardly one at a time on sliding move-
5. In a rotatable printing cylinder including a plurality of reciprocable plungers disposed radially thereof adapted to carry printing means and springs normally holding said plungers retracted, the combination therewith of a shaft slidable through the cylinder and rotating therewith, 10 wedges on the shaft spaced axially and circumferentially thereof adapted to force said plungers singly outward to printing position, said wedges being substantially in radial alignment with said plungers, and means for causing predetermined axial movement of said shaft.

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