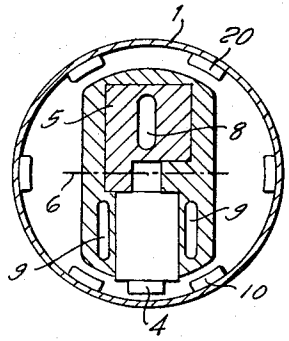
March 21, 1967 F. UNGERER 3,310,155

MAGNETIC CONVEYOR ROLLERS

Filed Oct. 2, 1964

FIG. 1



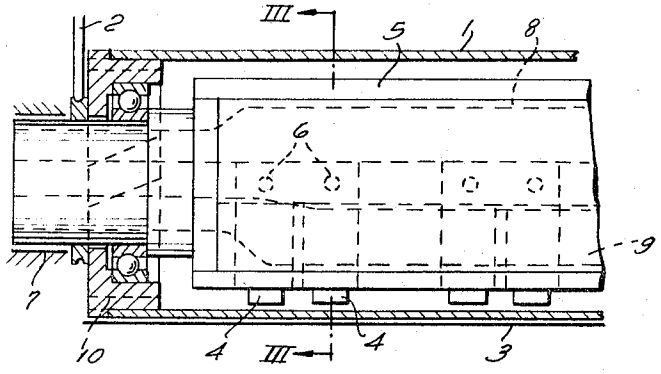


FIG. 2

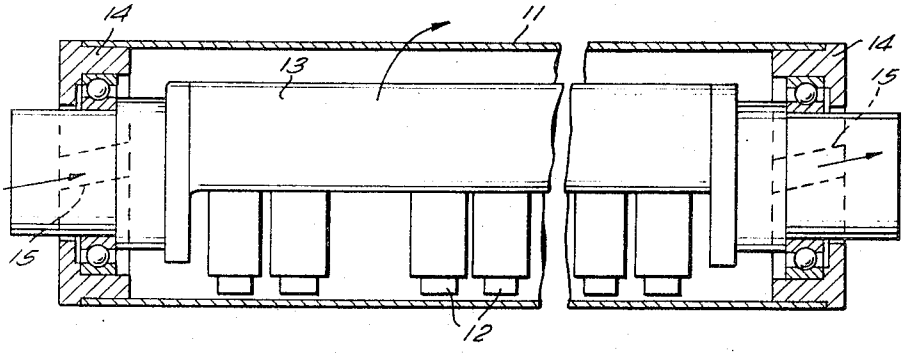


FIG. 3

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MAGNETIC CONVEYOR ROLLERS

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This invention relates to magnetic conveyor rollers for sheet metal, which rollers comprise a magnet carrier, electromagnets suspended from said carrier, and a rotatable roller barrel.

Such magnetic conveyor rollers are known for use in conveying and stacking sheet metal elements and plates. As the voltage applied to the magnet coils increases, the tensile force increases more than proportionally. An increased voltage, however, results also in a higher temperature rise. The permissible temperature rise is limited by the insulation, and the temperature rise results in the formation of water of condensation in the magnetic rollers. This water of condensation attacks the coils and cores. In conveyor or electric rollers comprising electric motors with a surrounding roller barrel, it is known to provide air circulation systems with fans. Compressed air cooling systems are known in conveyor rollers for continuous furnaces.

In contrast to the above, a much more effective cooling is obtained according to the invention in magnetic conveyor rollers for sheet metal, which rollers comprise a magnet carrier, electromagnets suspended from said carrier, and a rotatable roller barrel, in that the magnet carrier is in heat-conducting connection with the magnet cores and is embedded in a common matrix with said cores, and cooling ducts are formed in the magnet carrier and in the matrix laterally of the windings. As a result, these conveyor rollers may be used in the previously employed sizes without need for water or oil cooling and by a simple connection to a coolant circulation system can be used for much higher duties without need for a modification of the rollers themselves. More specifically, the magnet carrier having a central longitudinal duct may consist of two sections, which are welded together and have milled grooves combining to form the duct.

According to a further feature of the invention, openings may be provided in the end members closing both ends of the roller barrel, and these openings may be inclined and may carry vanes, which extend in or opposite to the direction of rotation. This results in the formation of an air stream through the roller to oppose a formation of water of condensation. When clean sheet metal elements are being handled, the roller barrel may be provided with additional openings.

Illustrative embodiments of the invention are shown on the drawing, in which

FIGS. 1 and 2 are transverse and central longitudinal sectional views showing a first embodiment and

FIG. 3 is a central longtitudinal sectional view showing a second embodiment.

In the first embodiment shown in FIGS. 1 and 2, the conveyor roller **1** is driven by a drive means **2** and retains and conveys or stacks the sheet metal element or plates **3** by means of electromagnets **4**, which can be energized and deenergized for this purpose. These electromagnets **4** are secured at **6** to a carrier **5** by a metallic, heat-conducting connection. The bearing for the carrier is indicated at **7**. In the present case, the magnet carrier **5** consists of two sections, which are welded together, and is provided with a central cooling duct **8**. The matrix is formed with cooling ducts **9**, which surround the magnet coils. This affords a highly intensive cooling effect. In addition, air inlet and outlet ports **10** are provided,

which serve for a circulation of air and for a discharge of any water of condensation.

In the second embodiment, shown in FIG. 3, the conveyor roller **11** comprises electromagnets **12** and a magnet carrier **13**. The openings **15** provided in the end members **14** at both ends of the roller barrel are inclined for a good circulation of air. Air vanes may also be provided in this case, which are not shown here. For handling clean sheet metal, the roller barrel may also be provided with openings, which are not shown here.

What is claimed is:

1. A conveyor roller for magnetically attractable articles comprising, in combination, a rotatable roller barrel; carrier means extending longitudinally into the interior of said roller barrel and formed therein with a substantially radially extending cavity and a pair of longitudinally extending cooling ducts in close proximity to and on opposite sides of said cavity, said cooling ducts being adapted to convey a cooling fluid therethrough and having intake and outlet ends respectively provided in said carrier means exteriorly of said roller barrel; and electromagnet means including core means received in the cavity of said carrier means and connected to the latter in good heat transfer relationship therewith, and coil means surrounding said core means and extending into close proximity of said sides of said cavity whereby heat generated by said electromagnet means will be rapidly transferred to the cooling fluid in said ducts.

2. A conveyor roller according to claim **1**, wherein said carrier means is provided with an additional longitudinally extending cooling duct, said additional cooling duct extending in close proximity to the bottom wall of said cavity and said core means being in good heat transfer contact with said bottom wall.

3. A conveyor roller according to claim **2**, wherein said carrier means comprises a first elongated portion forming said bottom wall of said cavity and to which first elongated portion said core means is connected, said additional cooling duct being provided in said first elongated portion, and a second channel-shaped elongated portion substantially enveloping said first elongated portion and embracing said electromagnet means, said channel-shaped portion forming the sides of said cavity and including therein said pair of longitudinally extending cooling ducts.

4. A conveyor roller for magnetically attractable articles comprising, in combination, a rotatable roller barrel; carrier means extending longitudinally of and in the interior of said roller barrel and formed therein with a cavity having a substantially longitudinally extending bottom wall portion and a pair of opposite substantially radially extending side wall portions, said carrier means being provided with longitudinally extending cooling duct means having portions in close proximity with at least two of said wall portions of said cavity, said cooling duct means being adapted to convey a cooling fluid therethrough and having intake and outlet ends respectively provided exteriorly of said roller barrel and at opposite ends thereof; and electromagnet means including core means received in the cavity of said carrier means and connected to the latter in good heat transfer relationship with said bottom wall thereof, said core means extending substantially radially with respect to said roller barrel, and coil means surrounding said core means and extending into close proximity of one of said portions of said duct means whereby heat generated by said electromagnet means will be rapidly transferred to the fluid in said duct means.

5. A conveyor roller for magnetically attractable articles comprising, in combination, a rotatable roller barrel; elongated channel-shaped carrier means extending through said roller barrel in longitudinal direction and formed with a plurality of cooling ducts extending along

the length thereof, one of said cooling ducts being located in the transverse portion of said channel-shaped carrier means and another of said cooling ducts being located in at least one of the leg portions of said channel-shaped carrier means; a plurality of electromagnets each having a core and a coil surrounding said core, said electromagnets being spaced along the length of said carrier means within the cavity defined by said leg and transverse wall portions thereof; and connecting means connecting each of said cores at one end thereof to said transverse wall portion in good heat transfer contact therewith, and said coils being in good heat transfer relationship with said leg portions of said carrier means, whereby both the cores and the coils of the electromagnets are simultaneously cooled.

6. A conveyor roller for magnetically attachable articles comprising, in combination, a rotatable roller barrel; elongated channel-shaped carrier means extending through said roller barrel in longitudinal direction and defining an elongated cavity in said carrier means, said carrier means formed with a plurality of cooling ducts extending within said carrier means along the length thereof and in the vicinity of said elongated cavity; a plurality of electromagnets located in said elongated cavity spaced from each other along the length of said carrier means; and mounting means mounting each of said electromagnets in said cavity in heat transfer relationship with at least those portions of the surface of said cavity in the vicinity of which said cooling ducts are located in said carrier means,

whereby said electromagnets are cooled by fluid passing through said cooling ducts.

7. A conveyor roller according to claim 6, said channel-shaped carrier means including a central wall portion and a pair of opposite side wall portions depending from said central wall portion and having inner surfaces defining said elongated cavity, and each of said electromagnets including a core and a coil surrounding said core, said mounting means mounting said cores on said central wall portion of said carrier means in good heat transfer relationship therewith.

8. In a conveyor roller according to claim 7, wherein one of said cooling ducts is located in said central wall portion of said carrier means and another of said cooling ducts is located in one of said side wall portions, said coils of said electromagnets extending into heat transfer relationship with at least said one side wall portion of said carrier means.

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