June 23, 1925. 1,543,534

G. ULLRICH

PROCESS OF WET MAGNETIC SEPARATION ON ROLLER SEPARATORS

Filed Oct. 18, 1923

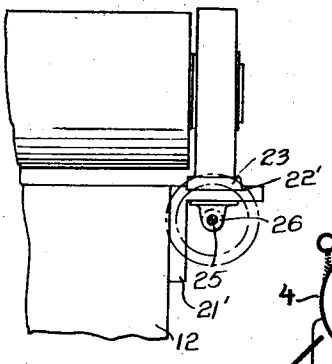


Fig. 4

Fig. 1

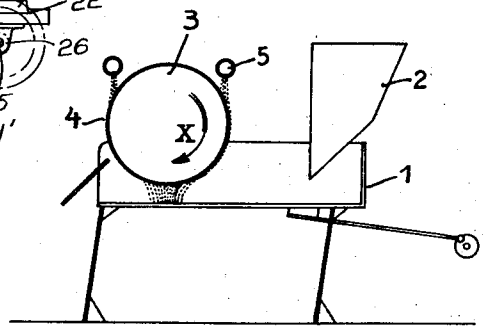
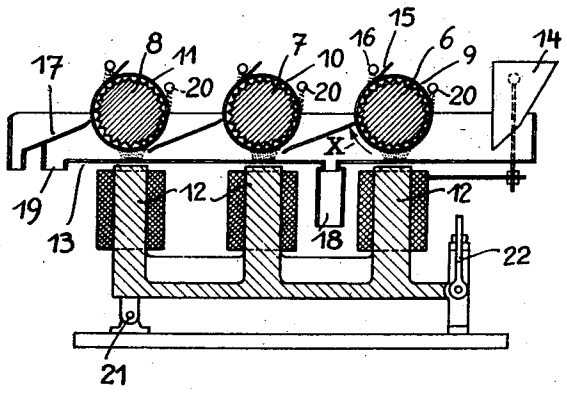


Fig. 2



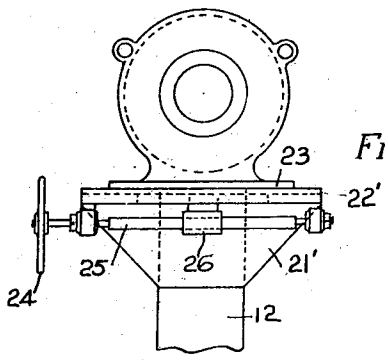


Fig. 3.

Inventor:
Georg Ullrich
By: Kurt Kleiner

Patented June 23, 1925. 1,543,534

UNITED STATES PATENT OFFICE.

GEORG ULLRICH, OF MAGDEBURG, GERMANY, ASSIGNOR TO THE FIRM FRIED. KRUPP GRUSONWERK AKTIENGESELLSCHAFT, OF MAGDEBURG-BUCKAU, GERMANY.

PROCESS OF WET MAGNETIC SEPARATION ON ROLLER SEPARATORS.

Application filed October 18, 1923. Serial No. 669,412.

To all whom it may concern:

Be it known that I, GEORG ULLRICH, engineer, citizen of the German Empire, residing at Nr. 2 Winterfeldstrasse, Magdeburg, Germany, have invented certain new and useful Improvements in Processes of Wet Magnetic Separation on Roller Separators, of which the following is a specification.

The present invention relates to a process of wet magnetic separation as applied to roller separators. It has been known hitherto to provide a liquid film or wall in which the magnetic material is drawn to the magnetic surface. This system has been used in ring separators in which water is supplied to the ring edges from above, the material to be separated being passed into the liquid wall thus formed. It has also been attempted to use this method in roller separators but with the modification that the liquid wall is built up from below, that is to say the material is passed beneath the roll in a liquid current which contacts with the lower surface of the roll. Unless a very deep current is used in such a system, however, only a very narrow magnetic field is made possible so that coarse material cannot be separated. When using a deep current on the other hand a considerable portion of magnetic particles are carried away resulting in considerable loss. The object of the present invention is to form the liquid wall in such a manner that these disadvantages will be overcome.

When magnetic material is attracted to the roller surface from a current passing beneath same only a portion of the roll surface is utilized, that is to say the magnetic material attaches to the roll at its base and is then carried a short distance upward thereby before being removed. The same of course applies to the drum surface when the magnetic roller is surrounded by a drum. The descending surface of the roll is thus always free of material, and it is the object of the present invention to utilize this surface in forming the liquid wall as will be explained fully hereinafter. This is accomplished by feeding water to the descending lateral surface so that it flows downward, thus forming a liquid film between the base of the roll and the current passing beneath the roll and containing the magnetic materials.

When using this process in a tiltable plant which is provided with counter poles situated below the feed table it is obvious that the liquid wall will stand in a different relation to the magnetic field when the plant is tilted than when it is in a horizontal position. In order to keep the liquid wall in correct relation to the magnetic field therefore the present invention contemplates means for adjusting the rolls laterally and relative to their respective counter poles. Such an adjustment may also be useful in separator plants having a fixed inclination in order to make possible the exact positioning of the liquid wall.

The drawing shows two examples dealing with the execution of the process relating to this invention, viz.

Fig. 1 a single roller-separator without counter-poles.

Fig. 2 a multiple roller-separator including counter-poles.

Figure 3 shows an end view of a roll as provided with lateral adjusting means; and

Figure 4 is a view at right angles to Figure 3.

According to Fig. 1 the magnetic roll 3 rotates over the feed chute 1, on to which pulp flows from hopper 2 in the direction x of the arrow. The magnetic material attracted by the roll out of the pulp is carried along by said roll on part of its runway which is pointing upward in order to be discarded or sprayed off at 4. On the downward part of its path the roll is free of material. Nozzle 5 squirts the film-liquid here on to the roll, and said liquid runs down at the lower part of the path and forms a film between the separating surface and the current of pulp.

According to Fig. 2 three rolls 6, 7 and 8 are provided which rotate in the fixed drums 9, 10 and 11. Under each roll a pole 12 is placed. The pulp is discharged from hopper 14 onto feed table 13 which extends beneath all the rolls. The magnetic material attracted to drum 9 at the first spot of separation wanders upwards on same, in the direction x of the arrow, under the influence of the rotating roll 6. Said material is discarded by the aid of the deflecting contrivance 15 and the squirt 16 and is then brought forward to drum 10 for further separation. The cleaned magnetic

material is treated once more at the third spot of separation in order to be carried off finally over the chute 17. The residues from the first spot of separation are carried off at 18 while those from the second spot of separation are treated again at the third spot of separation and carried off at 19. The above are only examples. Magnetic materials and residues can be carried off ad lib. between the particular spots of separation or can be passed through two or through one spot of separation. At each of the 3 separating spots a film is formed, in order to feed liquid at the nozzles 20 to that side of the drum where the roller surface moves downwards. The liquid flows off at the drum and drops below into the pulp-current. As explained, the separator plant is tiltable around the separating axle 21 and can be adjusted by means of the adjusting mechanism 22 at various stages. If the inclination were altered the film-liquid would strike the current of pulp at a spot which possibly might not be located within the effective field. In order to avoid this, one renders the roll adjustable laterally, viz, vertically to its axis. One is therefore in a position to adjust each roll in such a way, that the film-current meets the desired spot of the pulp-current, as for instance in the most powerful zone of separation.

Figs. 3 and 4 show means for obtaining this roll adjustment. Referring to these figures, 21′ represents a pedestal of non-magnetic material, for instance brass attached at the side of the pole 12. A foot 23 of the roller bearing is displaceable in a slot 22′, in each of the pedestals 21. The foot 23 is provided with a threaded nut 26, which cooperates with the screw spindle 25, this latter being rotatable by means of a hand wheel 24. It is to be understood that this mechanism is provided at each end of the roll and in this manner the latter is adapted to be displaced in a radial sense, in order to properly position the liquid wall when the apparatus is tilted.

Claims:

1. A wet magnetic process for separating material consisting in supplying a liquid to the descending lateral surface of a magnetic roll whereby a downwardly flowing liquid wall is formed at the base of said roll, delivering the material to said wall in a liquid current traveling in the direction of rotation of said roll, raising the magnetizable particles of said material in said liquid wall, conveying them out of said wall and depositing them.

2. A wet magnetic process for separating material consisting in supplying a liquid to the descending lateral surface of a magnetic roll whereby a downwardly flowing liquid wall is formed at the base of said roll, delivering the material to said wall in a liquid current traveling in the direction of rotation of said roll, raising the magnetizable particles of said material in said liquid wall, conveying them out of said wall on said roll and removing them therefrom by means of a liquid jet.

3. Apparatus for the wet magnetic separation of material, comprising a rotating magnetic roll, means for passing the material in a liquid current beneath said roll in the direction of roll rotation, and means for supplying a liquid to the descending lateral surface of said roll, whereby a liquid wall is formed between the base of said roll and the surface of said liquid current.

4. Apparatus for the wet magnetic separation of material, comprising a rotating magnetic roll, means for passing the material in a liquid current beneath said roll in the direction of roll rotation, means for supplying a liquid to the descending lateral surface of said roll, whereby a liquid wall is formed between the base of said roll and the surface of said liquid current, and means for supplying a liquid to the ascending lateral surface of said roll for removing the material attracted by said roll and conveyed thereby out of said liquid wall.

5. Apparatus for the wet magnetic separation of material, comprising a rotating magnetic roll, a sluice for guiding the material beneath said roll transversely to the axis thereof, a magnet system beneath said sluice and opposite said roll, means for forming a liquid wall between the base of said roll and said sluice, means for tilting the apparatus as a unit, and means for laterally displacing said roll.

In testimony whereof the foregoing specification is signed in the presence of two witnesses.

GEORG ULLRICH.

Witnesses:
E. KLIPPEL,
ROGER L. AUSPACH.