Figure 1.

Figure 2.

Figure 3.

Figure 4.

Figure 5.

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The present invention relates to rotary kilns, cooling and drying drums in which the material to be burned, cooled or dried is caused to pass through chambers formed by longitudinal partitions with cascade devices. Each chamber or duct receives a portion of the material so that the material is distributed over the whole cross sectional area of the drum and is thus exposed to an increased transmission of heat, either for heating or cooling or drying.

It has, however, been found that in a drum provided with such devices the conveying action of the drum is considerably reduced. The speed at which the material is carried through the drum may, of course, be increased by making the drum and the cross sectional area of the inner chambers or ducts larger, but as a result the velocity of the air through the drum is reduced, with a consequent decreased heat transmission, while the initial costs are increased.

Another mode of increasing the speed at which the material is carried through the drum is to rotate the drum at a higher speed, but this involves a strong stirring up of the material and, consequently, an increase in the amount of dust which is mixed with the heat transmitting air and is carried out of the drum by it.

It is the object of the present invention to overcome the retardation of the material through the drum, and at the same time to provide efficient means for controlling the speed at which the material is carried through the drum.

In accordance with the invention the interior of the rotary drum, in addition to the provision of longitudinal partitions and cascade devices or lifters which extend from the central portion of the drum toward but not to the drum wall and serve only for the purpose of exposing the material to the air which traverses the drum, but not for causing the material to move longitudinally through the drum, is also provided with conveyor flights located between the drum wall and the several devices referred to, which devices are not extended fully to the drum wall but leave an annular space between the lifters and the drum wall in which the longitudinal movement of the material is mainly effected by the conveyor flights. The provision of flights in such space is particularly effective, as the relative speeds of the material and of the rotary parts are higher in that region than at any other region of the interior of the drum. As it is also desirable that the material be conveyed through the drum in a gentle manner, that is, without excessive agitation, the drum can be rotated at a comparatively low speed while at the same time the passage of the material through the drum is not unduly retarded. Material which, for the purpose of being treated in the drum, has been formed into lumps by nodulization or briquetting, is consequently exposed to breaking up to a lesser extent than when the drum rotates at high speed.

The invention will now be described with reference to the accompanying drawing, wherein several embodiments are illustrated and in which:

- Figure 1 is a view in cross section of one form of construction;
- Figure 2 is a view of the same in longitudinal section;
- Figure 3 is a view in cross section of a modified form of construction; and
- Figures 4 and 5 are detail views in cross section and on a larger scale of features of construction to be described.

The partitions and cascade devices or lifters within the shell of the drum may be constructed and arranged in any usual or suitable manner provided they are not extended to the drum wall. In the construction shown in Figures 1 and 2 the drum 1 rests on supporting rollers 2, and is provided internally with longitudinal partitions or lifters 3 which divide the drum tube into a number of longitudinal ducts or chambers but are not extended to the drum wall. Conveyor flights 4 are arranged in the annular space between the drum wall 1 and the partitions 3 and preferably are placed radially in line with the partitions and serve to connect them with the shell. In order to distribute the material 5 in the several chambers there is provided in connection with each of the flights a longitudinal, projecting wall or guide vane 6 which, in the rotation of the drum, serves to direct a portion of the material at the circumference of the drum into the several chambers into which the drum has been divided. The amount of material which passes into the chambers in the interior of the drum is dependent upon the distance between the front edges of these guide vanes 6 and the drum wall. The remaining portion of the material at the circumference of the drum is subjected, by the flights 4, to a more powerful conveying action than the portion which passes into the chambers. The distance between the front edges of the guide vanes 6 and the drum wall must, therefore, be so adjusted that the distribution of material in the interior of the drum and the speed of the material through the drum will be the most suitable for the transmission of heat. In order to provide for such adjustment...
the forward part 81 of each guide vane 6 may be movable, as by being hinged, as at 81, and provided with a supporting rod 64 adjustable from the outside of the drum, as shown in Figure 4.

For the purpose of adjusting the speed at which the material is carried through the drum the flights 4, or some of them, are preferably detachably supported so that some may be removed or additional flights added, or are rotatable relatively to the drum axis, so that they can be more or less inclined in relation to their direction of movement, as the speed of the material is to be increased or reduced. As shown in Figure 5, at 41, the flights may be rotatable about a radial axis and be adjustable from the outside by means of a bolt passing through the drum shell. A check of the speed of the material can be obtained, if desirable, by turning the flights to such an extent that they counteract the forward movement of the material and are thus capable of effecting a heaping up of the material.

In Figure 3 is shown a construction in which the drum consists of two concentric tubes 1 and 7, both the outer tube 1 and the inner tube 7 being provided internally with conveyor flights 4. The flights 4 need not necessarily be arranged directly opposite the partitions 3 and connect the partitions to the drum wall, but may be placed freely in the spaces between the partitions.

Various changes in details of construction and arrangement can be made to suit the convenience of the manufacturer or user without departing from the spirit of the invention, except so far as it is defined in the accompanying claims.

I claim as my invention:

1. In a rotary kiln and the like, the combination of a drum provided with longitudinal chamber-forming partitions which do not extend to the drum wall but leave a space for the passage of material adjacent to the drum wall, conveyor flights between the drum wall and such partitions, and longitudinal, projecting walls or guide vanes to direct a portion of the material at the circumference of the drum into the chambers of the drum, the forward parts of the longitudinal, projecting walls or guide vanes being adjustable so that they can be moved towards or away from the drum wall.

2. In a rotary kiln and the like, the combination of a drum provided with longitudinal chamber-forming partitions which do not extend to the drum wall but leave space for the passage of material adjacent to the drum wall, conveyor flights between the drum wall and such partitions, and longitudinal, projecting walls or guide vanes to direct a portion of the material at the circumference of the drum into the chambers of the drum, the forward parts of the guide vanes being hinged to the main parts and provided with adjustable supports.

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