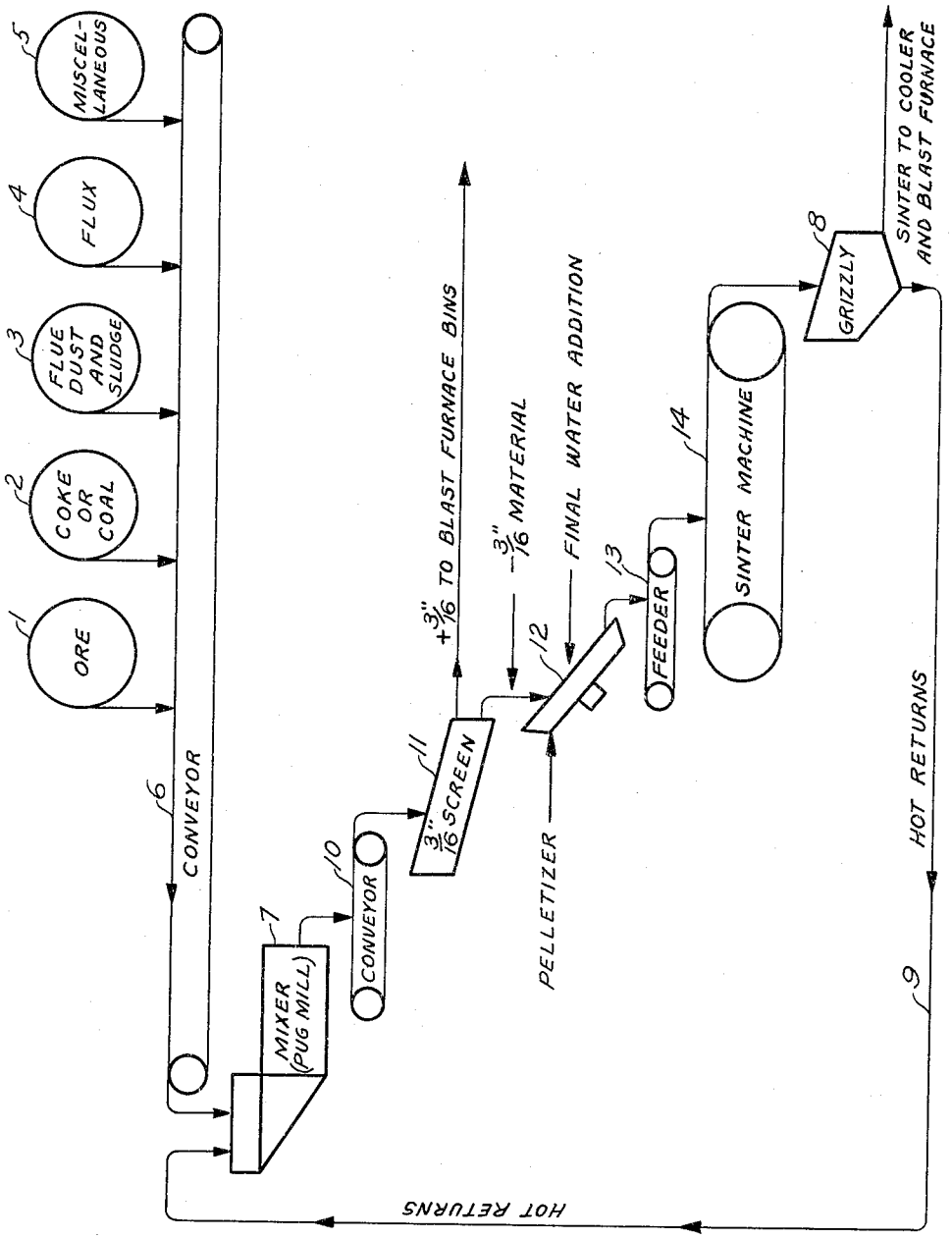
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METHOD OF SINTERING

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METHOD OF SINTERING

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This invention relates to a method of sintering, and particularly to the sintering of sticky iron ores.

A sinter mix containing hematite ores from the Lake Superior region or any of a number of foreign ores along with a rather fluctuating amount of sinter returns, may contain as much as 30% of material coarser than 3/16". This material is composed partly of screened ore and partly of returns which have passed through the grizzlies. The +3/16" material, in itself, is suitable for direct charging to the blast furnace and need not be sintered, so that to sinter it as in the conventional practice is essentially a waste of money. In addition, the +3/16" pieces of ore often will not sinter completely in the mix, thus causing inherent planes of weakness in the finished sinter.

Generally speaking, it is not practicable to screen such sticky ores as the hematites on a screen finer than 3/8". This type of ore usually contains up to 15% water, which results in clogged screens when the openings are small, and causes the ore to pass in an agglomerated compact mass over the small screen openings without separating the fine grains from the coarse. Therefore, 3/8" or 1/2" screens are usually the finest screens on which the screening of such ores is practical.

It is theoretically possible, of course, to dry such sticky ores by heating, and then to screen the dried ores and the returns separately, but it is prohibitively expensive in most cases to evaporate the great quantities of water contained in any large tonnage of these ores.

Accordingly, it is an object of this invention to utilize sinter returns so as to economically permit fine screening of sticky ores.

An additional object is to enable all +3/16" ore to be charged directly to blast furnace.

A further object is to produce a sinter of —3/16" ore with higher bulk density and greater tumbler strength than prior sinters containing larger particles.

Other and further objects, advantages and features of this invention will appear in the specification and claims, and in the attached single sheet of drawing.

The annexed drawing comprises a flow sheet showing diagrammatically the sequence of steps in this process.

The series of containers designated by the reference numerals 1–5 inclusive will permit normal amounts of the sticky ore, coke or coal, flue dust and sludge, flux and miscellaneous added materials according to individual plant practice to be fed by a belt conveyor 6 to a conventional pug mill 7 or similar mixer.

Additions of flue dust, or of dry hot sinter returns from the grizzly 8 and the hot returns conveyor 9, to the ore at the pug mill 7, as shown, or other suitable location prior to final screening, as desired, are made in sufficient quantity to reduce the water content of the mix to about 3 to 7.5%. The presence of the non-plastic materials (flue dust and returns) also gives the mix a new character for sintering.

While hot returns direct from the grizzly are preferred, it is possible for cold returns from a storage bin or other source to supplement or substitute for hot fines when necessary.

The resulting mixture will have a mealy consistency, and after passing from the pug mill 7 and conveyor 10 to a 3/16" (Tyler Standard) screen 11, the coarse material (+3/16") can be readily removed by screening and sent directly to the blast furnace bins (not shown).

The —3/16" sinter mix plus a final water addition is then pelletized in a suitable balling device, such as the revolving disc pelletizer 12 shown, and the pellets are then carried by feeder 13 to be sintered on a sintering machine 14 in conventional manner. The pelletizing of the —3/16" sinter mix before sintering will usually result in an increased sinter rate, but even should the sinter rate remain unchanged, an immediate gain in sinter plant throughput will still be realized in the amount of +3/16" material removed from the mix. The diversion to blast furnace use of the +3/16" material is an added advantage. The exact pellet size is not critical for sintering.

After passing through the sintering machine 14 and over the grizzly 8, the finished sinter is sent to the cooler and blast furnace.

In general, sinter made from the —3/16" sized and pelletized mix will have a greater specific bulk density and greater strength (as determined by standard tumbler test) than the same sinter made from a mix from which the +3/16" material has not been removed.

It is important to the improved sinter quality and productivity that the sinter mix be screened (+3/16" removed) after the addition of the return fines and before the final water addition is made. At that point, which is generally just after the pug mill, but may precede the pug mill, the sinter mix will be at a moisture content (3 to 7.5%) which is permissible for efficient screening.

Although this invention has been described with particular mention of its use with the Lake Superior hematites, it will be understood that other ores of similar character and properties may be utilized, with such other modifications or equivalents as may be necessary or appropriate, without departure from the spirit or scope of the invention or of the appended claims.

We claim:

1. In a process for treating excessively wet iron ores, the sequence of steps comprising mixing such wet ore with sufficient previously sintered dry material to reduce the water content of the mixture to between 3 and 7.5%, screening the mixture upon a 3/16" screen, remoistening the —3/16" portion to optimum water content for sintering, and sintering only this —3/16" material.

2. In a process for treating sticky wet ores, the successive steps of mixing a wet ore with sufficient dry flue dust and previously sintered material to lower the water content of the mixture to between 3 and 7.5%, screening the mixture to remove all the +3/16" material for other use, moistening and pelletizing the portion of less than screen size, and sintering the pelletized material.

3. In a process for treating a sticky ore which is normally unscreenable by reason of high natural water content, the succession of steps consisting of mixing the wet ore with sufficient hot sinter returns to dry the ore substantially to a water content between 3 and 7.5%, said mixture having then a mealy consistency, screening the

mixture while dry to remove the +3/16" material, moistening the −3/16" fines and concurrently pelletizing the moistened fines, sintering the pelletized material, passing the sintered material over a grizzly, and recycling hot fine returns from the grizzly to the mixing step.

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