April 12, 1932. G. OVERTON 1,853,451

DRY MILK MACHINE

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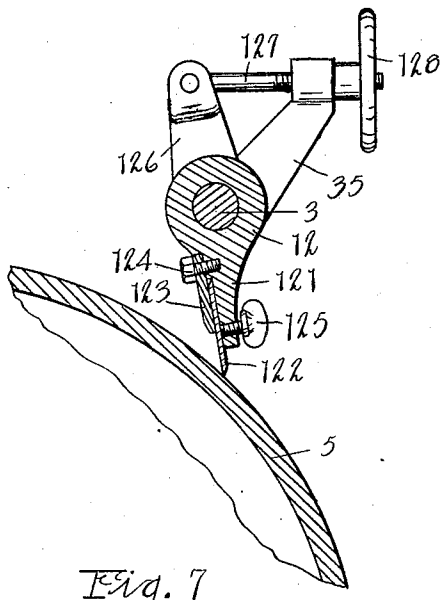


Fig. 7

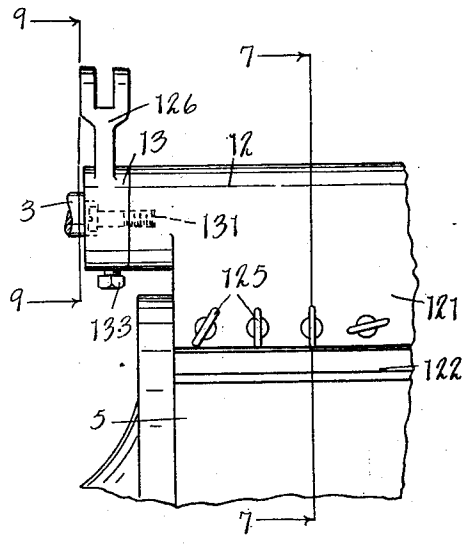


Fig. 8

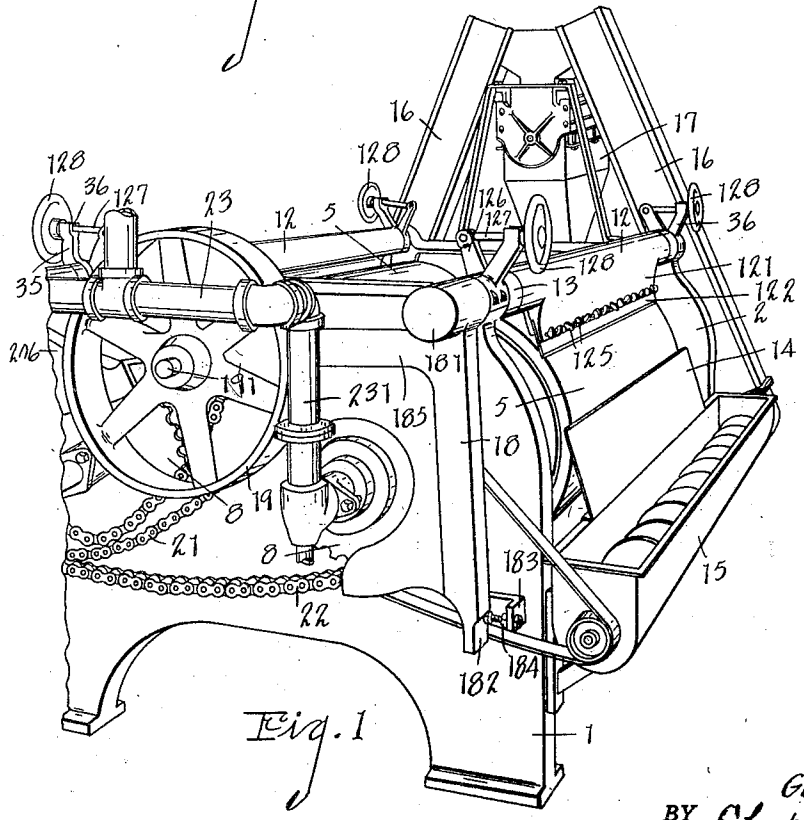


Fig. 1

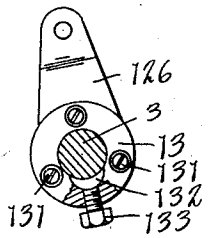


Fig. 9

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DRY MILK MACHINE

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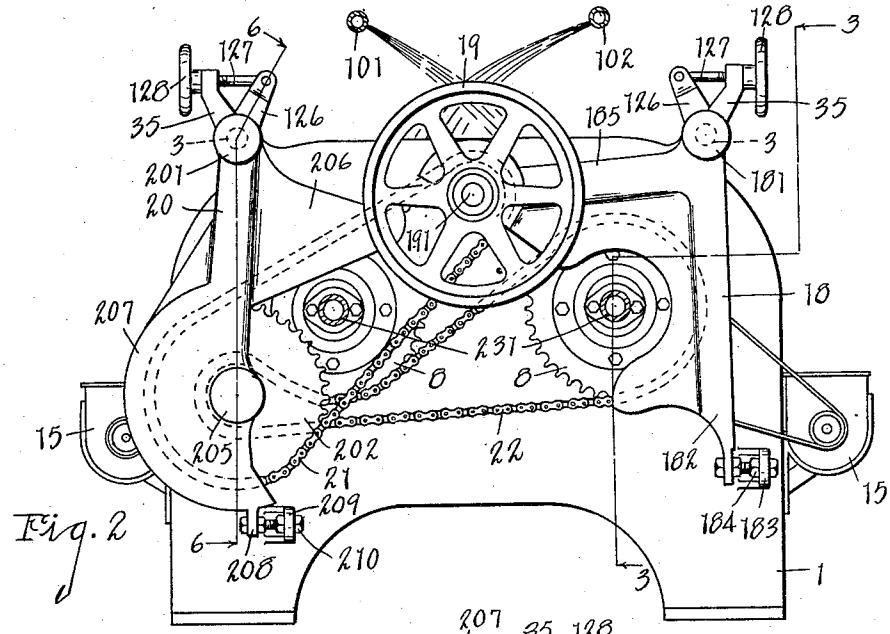


Fig. 2

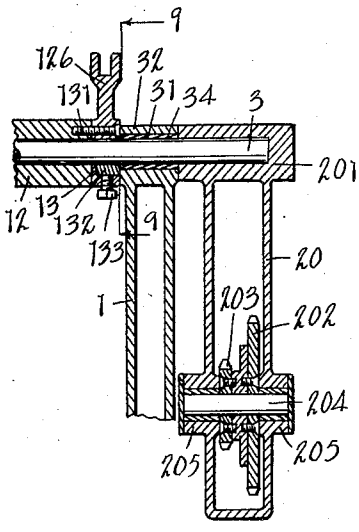


Fig. 6

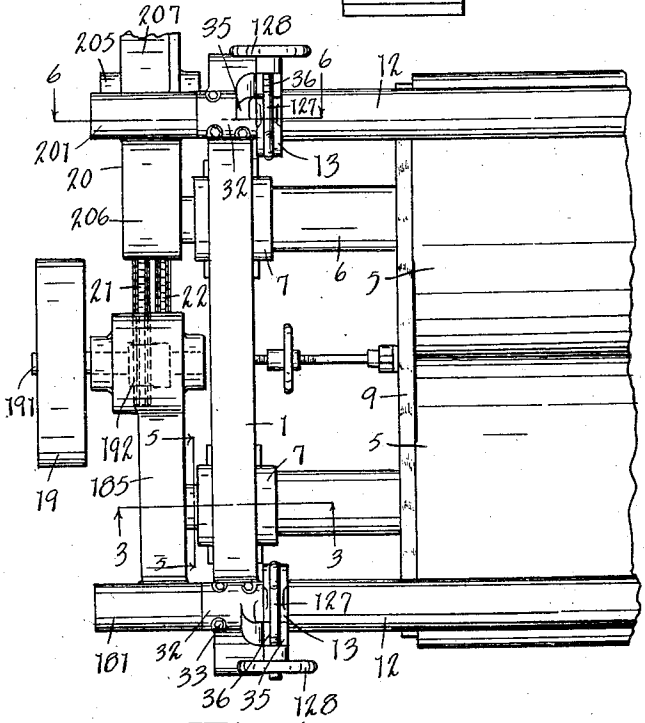


Fig. 4

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DRY MILK MACHINE

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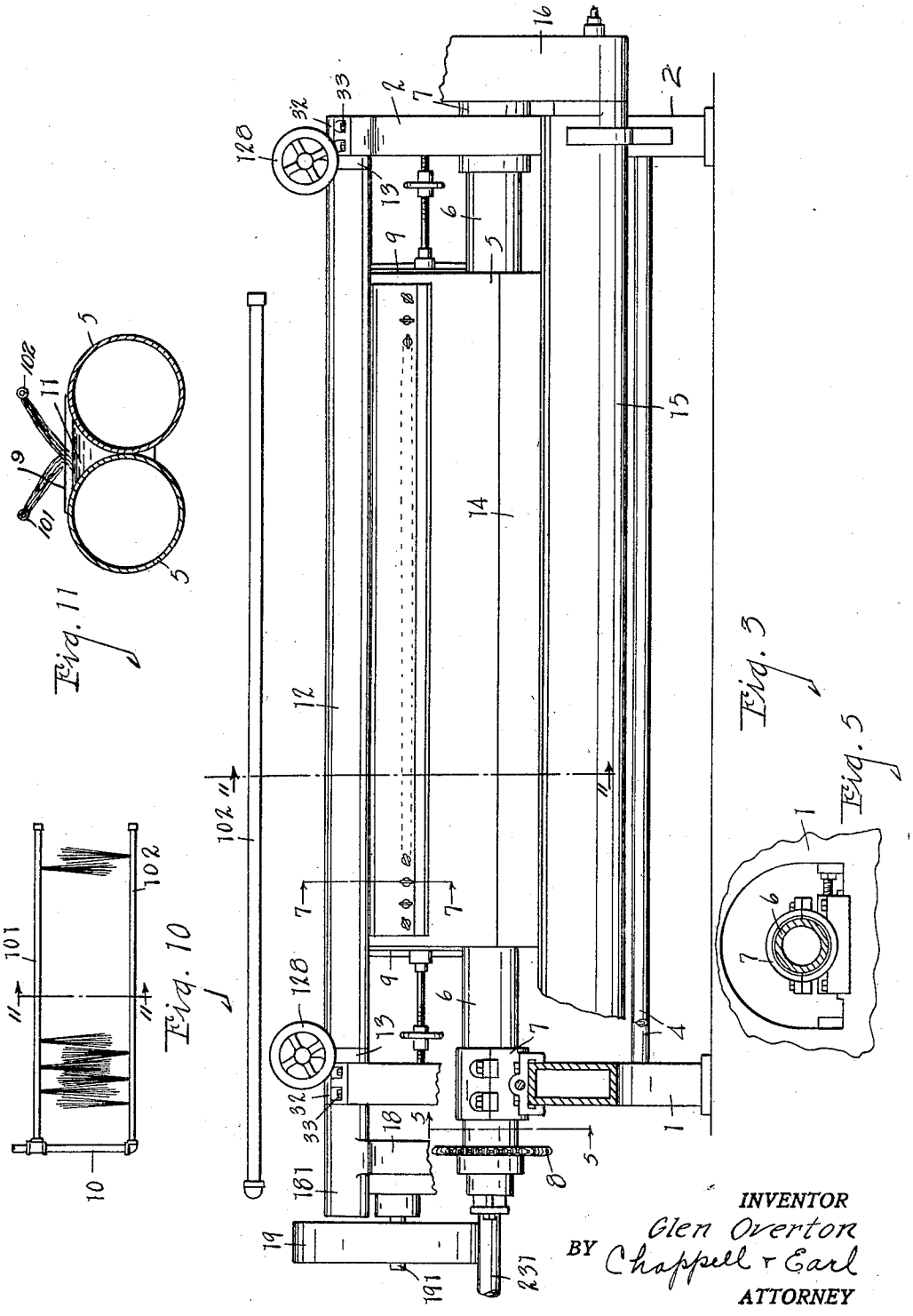


Fig. 11

Fig. 10

Fig. 3

Fig. 5

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UNITED STATES PATENT OFFICE

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DRY MILK MACHINE

Application filed October 15, 1928. Serial No. 312,456.

This invention relates to improvements in milk drying machines.

The main objects of the invention are:

First, to provide an improved rigid frame structure to carry the drying rolls, gear and scraper knives.

Second, to provide improved driving gear means and supports.

Third, to provide an improved scraper blade support and adjusting means.

Fourth, to provide improved scraper blade means.

Fifth, to provide improved means of delivering the milk to utilize to the maximum the heat developed in the machine.

Further objects and objects pertaining to details and economies of construction and operation will definitely appear from the detailed description to follow.

A preferred embodiment of my invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a detailed perspective view from the upper left hand end of the machine, showing the essential operating parts, portions being broken away.

Fig. 2 is an end elevation view from the gear driving end.

Fig. 3 is a detail elevation view partially in section on line 3—3 of Figs. 2 and 4, the driving sprocket wheel and means being shown in elevation.

Fig. 4 is a detail plan view of the driving end of the machine, a portion of the left hand housing being broken away.

Fig. 5 is an enlarged detail sectional elevation view on line 5—5 of Figs. 3 and 4 showing the adjustable bearing for the drying drum shaft.

Fig. 6 is a detail sectional view on the irregular plane of line 6—6 of Figs. 2 and 4.

Fig. 7 is an enlarged detail sectional view taken on line 7—7 of Figs. 3 and 8 showing details of the scraper blade supporting and adjusting means and of the scraper blade itself.

Fig. 8 is an enlarged detail view of the scraper blade and adjusting means being the upper left hand part of the structure appearing in Fig. 3.

Fig. 9 is a detail sectional elevation view on line 9—9 of Figs. 6 and 8, showing details of the adjusting means for the scraper support bearing.

Fig. 10 is a reduced detail plan view of the milk feed pipes showing the alternate relation of the spray jets.

Fig. 11 is a reduced detail transverse sectional elevation of the structure illustrated in Figs. 2 and 10 taken on a line corresponding to section line 11—11 of Figs. 3 and 10.

The parts will be identified by their numerals of reference which are the same in all the views.

The frame is made up of symmetrical ends 1, 2, the end 1 being constructed and adapted for adjustment of the sprocket gear hanger supports. These ends are very rigidly and accurately coupled at the top by longitudinal cylindrical bars of cold-rolled steel 3, 3 at each side (see Fig. 2). These are very rigidly secured to the frame by very tight fitting joints 31 which have caps 32 secured by screws 33 and babbitted at 34 (see Fig. 6). The ends of the bars 3 project through the end 1 to serve as pivot supports for the gear hangers (see Figs. 1 and 2) which are thus maintained in precise alinement with the frame and consequently with the scraper blade and with the milk drying drums or rolls.

The Babbitt joint (see Figs. 3, 4 and 6) is made in halves, a very tight fit and held slightly separated by shims and then forced down by the screws 33 to clamp the longitudinal top bars 3 very positively and securely in position.

The ends are provided with connecting brace rods 4 (see Fig. 3) which are secured adjustably in place by any suitable means to maintain the ends 1 and 2 in proper spaced relation after they have been connected to the longitudinal top bars 3.

The drying cylinders 5 (see Fig. 4) are carried on hollow shafts 6 with journals at each end supported in adjustable journal bearing 7 carried by each of the ends 1 and 2, whereby they are shifted laterally into perfect alinement and into parallelism with the top side bars 3. Each shaft is provided

with a driven sprocket wheel 8. Suitable end dams 9 (see Fig. 4) are inserted between the top sides of the rolls 5, 5 at each end to retain a quantity of milk between the same, the rolls being steam heated to any required temperature.

The milk is delivered from a feed pipe 10 having branches 101 and 102 (see Figs. 10 and 11) disposed parallel with and above one at each side the drier drums and perforated to deliver jets in alternate relation across and above the said rolls, whereby the milk which is delivered in gentle streams absorbs a very appreciable amount of the heat and is essentially preheated by the time it is delivered into the milk reservoir 11 formed by the heating drums as seen in Fig. 11. The spray in each instance thus passes completely across the heating zone, dissipating as it drops gently down so that the entire area is covered by the diffusing streams.

The milk, when thus heated, rapidly dries on the rolls which are revolving towards each other and outwardly from each other on the under side.

A thin film of milk dries on the rolls and is scraped off in a very thin sheet by the scraper means. This scraper must be very accurately supported and have a degree of flexibility to most effectively perform its work. The scraper comprises a longitudinal heavy cast sleeve 12, each of which is adjustable upon the round side bar 3, one such bar being located above the drum at each side of the machine.

At each end of the sleeve 12 is secured a collar 13 by countersunk longitudinal screws 131 through the face thereof into the said sleeve 12, as seen particularly in Figs. 6 and 9. A contact shoe 132 is recessed into the collar 13 and is forced tight against the side bar 3 by set screw 133 (see Fig. 9) so that while the sleeve 12 is adjustable on the side bar 3, all slack is taken up by this shoe and set screw which makes it possible to adjust this device within very fine limits. The heavy cast sleeve 12 on the heavy cylindrical side bar 3 provides a very strong support.

The scraper blade support 121 is carried by and made integral with the sleeve 12, see Fig. 7. The scraper blade 122 is held by the longitudinal clamp 123 by means of the clamp screws 124. The blade, in practice, is of tempered steel, one-eighth of an inch thick and projects beyond the support 121 an inch or more, thus presenting a blade having considerable flexibility. It is chamfered down from the top to a chisel edge.

With a perfect cylinder no adjustment of the blade is necessary, but an adjustment consisting of a series of set screws 125 is provided to take care of any contingency that may occur. An arm 126 is made integral with the collar 13 and is provided with an adjusting bolt 127 on which there is a hand adjusting nut 128.

On the cap 32 (see Fig. 4) is a rigid arm 35 offset with its upper end bifurcated at 36 to receive the adjusting bolt 127 by which the scraper blade is adjusted by means of the hand nuts 128.

The dried milk is scraped off the drums, passed down over the aprons 14 to the conveyor hopper 15, and is passed up by the elevators 16 to a delivery hopper 17 and thence out of the machine. The drying rolls are driven by sprocket means supported by hangers at the end of the machine. At the drive end of the machine the side bars 3 are extended and each carries a hanger which supports a part of the driving mechanism.

The hanger 18 (see Fig. 1) is provided with a hub 181 which is supported on one end of one of the bars 3. An arm 182 extends down into adjusting relation with lug 183 on the frame end 1 where its position is adjusted by the lock nuts 184. Arm 185 extends horizontally inwardly to the central portion of the face of the end 1. It carries the driven pulley 19 on shaft 191 carrying sprocket wheel 192 (see Fig. 4), so that by adjusting the hanger 18 the position of the pulley 19 and its associated sprocket wheel is adjusted to vary the tension and relation of these parts.

A hanger 20 is provided with a hub 201 which caps the end shaft 3 as seen in Fig. 6. At its lower end it carries the sprocket wheel 202 and the small sprocket wheel 203 which are secured to shaft 204 which is free to revolve in bearings 205, 205 in the lower part of the said hanger 20. The hanger 20 carries suitable guards 206, 207 for the sprocket wheels and chains which it carries.

A sprocket chain 21 couples sprocket wheel 192 to sprocket wheel 202 and drives the same.

A sprocket chain 22 (see Fig. 1) embraces sprocket wheel 203 and connects directly to drive the sprocket 8 on the front of the front driving drum. It is disposed under and engages and drives the sprocket wheel 8 of the opposite driving drum in the opposite direction. The upper run of the chain is deflected under this sprocket wheel so that in operation when the pulley 19 is driven it drives through the sprocket wheel 192, the sprocket wheel 202, which, because it is on the shaft 204, drives sprocket wheel 203 which actuates the sprocket chain 22 which, from its engagement with the sprocket wheels 8, 8 on the drying drums, drives the same towards each other at the top in the manner indicated.

The hanger 20 (see Fig. 2) has an ear 208 extending in proximity to a lug 209 and is adjustable by lock nuts 210 in a well-known manner. Steam is supplied to the drums from a header 23 and pipes 231 (see Fig. 1).

I have described my improved machine in its preferred form. It can be considerably

varied in its details without departing from my invention. I desire to claim the same in the specific form illustrated and also broadly as pointed out in the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a milk drying machine, the combination of a frame made up of suitable cast ends, round side bars connecting the upper portions of said ends together, being disposed and adjusted in parallel relation, clamped and seated in Babbitt metal joints with the side bars having projecting ends to serve as hanger supports, drier drums in parallel relation and parallel to the said side bars and supported by journals in suitable adjustable bearings on said frame, a sprocket wheel on each shaft of each drum for driving the same, a scraper comprising a heavy cast sleeve support embracing and adjustable on said side bars, a thin steel blade with projecting chisel edge clamped to said support disposed in angular relation to the periphery of each drum to flexibly contact with the side of each of said drying drums, set screws in the said support for adjusting the said blade, adjustable shoes for tightening the sleeve and support on the said side bars, adjustable arms with hand nuts for adjusting the said sleeve angularly, hangers pivotally supported by the projecting ends of said side bars to maintain the parallel relation thereof, a driven pulley with sprocket carried by one of said hangers, a pair of sprockets carried by the other of said hangers comprising a driven sprocket and a drive sprocket, the driven sprocket being connected and driven by said sprocket, a sprocket chain extending from the driven sprocket and disposed above and around one of said driven sprockets and beneath the other whereby the drums are driven in opposite directions, and adjusting means for the said hangers whereby the sprocket chain may be tensioned for driving the drying drums and the sprocket for driving the driven gear may be independently adjusted.

2. In a milk drying machine, the combination of a frame made up of suitable cast ends, round side bars connecting the upper portions of said ends together being disposed and adjusted in parallel relation, clamped and seated in Babbitt metal joints, drier drums in parallel relation and parallel to the said side bars and supported by journals in suitable adjustable bearings on said frame, means to drive said drums, a scraper comprising a heavy cast sleeve support embracing and adjustable on said side rails, a thin steel blade with projecting chisel edge clamped to said support disposed in augular relation to the periphery of each drum to flexibly contact with the side of each of said drying drums, set screws in the said support for adjusting the said blade, adjustable shoes for tightening the sleeve and support on the said side bars, and adjustable arms with hand nuts for adjusting the said sleeve angularly.

3. In a milk drying machine, the combination of a frame made up of suitable cast ends, round side bars connecting the upper portions of said ends together being disposed and adjusted in parallel relation, clamped and seated in Babbitt metal joints, drier drums in parallel relation and parallel to the said side bars and supported by journals in suitable adjustable bearings on said frame, means to drive said drums, a scraper comprising a heavy cast sleeve support embracing and adjustable on said side bars, a thin steel blade with projecting chisel edge clamped to said support disposed in angular relation to the periphery of each drum to flexibly contact with the side of each of said drying drums, adjustable shoes for tightening the sleeve and support on the said side bars, and adjustable arms with hand nuts for adjusting the said sleeve angularly.

4. In a milk drying machine, the combination of a frame made up of suitable cast ends, round side bars connecting the upper portions of said ends together being disposed and adjusted in parallel relation, clamped and seated in Babbitt metal joints, drier drums in parallel relation and parallel to the said side bars and supported by journals in suitable adjustable bearings on said frame, means to drive said drums, a scraper comprising a heavy cast sleeve support embracing and adjustable on said side bars, a thin steel blade with projecting chisel edge clamped to said support disposed in angular relation to the periphery of each drum to flexibly contact with the side of each of said drying drums, set screws in the said support for adjusting the said blade, and adjustable arms with hand nuts for adjusting the said sleeve angularly.

5. In a milk drying machine, the combination of a frame made up of suitable cast ends, round side bars connecting the upper portions of said ends together being disposed and adjusted in parallel relation, clamped and seated in Babbitt metal joints, drier drums in parallel relation and parallel to the said side bars and supported by journals in suitable adjustable bearings on said frame, means to drive said drums, a scraper comprising a heavy cast sleeve support embracing and adjustable on said side bars, a thin steel blade with projecting chisel edge clamped to said support disposed in angular relation to the periphery of each drum to flexibly contact with the side of each of said drying drums, and adjustable arms with hand nuts for adjusting the said sleeve angularly.

6. In a milk drying machine, the combination of a frame made up of suitable cast ends, round side bars connecting the upper portions of said ends together being disposed

and adjusted in parallel relation, clamped and seated in Babbitt metal joints with the side bars having projecting ends to serve as hanger supports, drying drums and scrapers carried by said frame, hangers pivotally supported by the projecting ends of said side bars to maintain the parallel relation thereof, a driven pulley with sprocket carried by one of said hangers, a pair of sprockets carried by the other of said hangers comprising a driven sprocket and a drive sprocket, the driven sprocket being connected to and driven by said drive sprocket, a sprocket chain extending from the driven sprocket and disposed around one of the driven sprockets of said drier and beneath the other whereby the drums are driven in opposite directions, and adjusting means for the said hangers whereby the sprocket chain may be tensioned for driving the drying drums and the sprocket for driving the driven gear may be independently adjusted.

7. In a milk drying machine, the combination of a frame made up of suitable cast ends, round side bars connecting the upper portions of said ends together being disposed and adjusted in parallel relation, clamped and seated in Babbitt metal joints with the side bars having projecting ends to serve as hanger supports, drying drums and scrapers carried by said frame, hangers pivotally supported by the projecting ends of said side bars to maintain the parallel relation thereof, and driving means carried by said hangers.

In witness whereof I have hereunto set my hand.

GLEN OVERTON.