A. B. STARR.

DRYING MACHINE.

APPLICATION FILED NOV. 7, 1916.

1,297,926.

Patented Mar. 18, 1919.

4 SHEETS—SHEET 1.

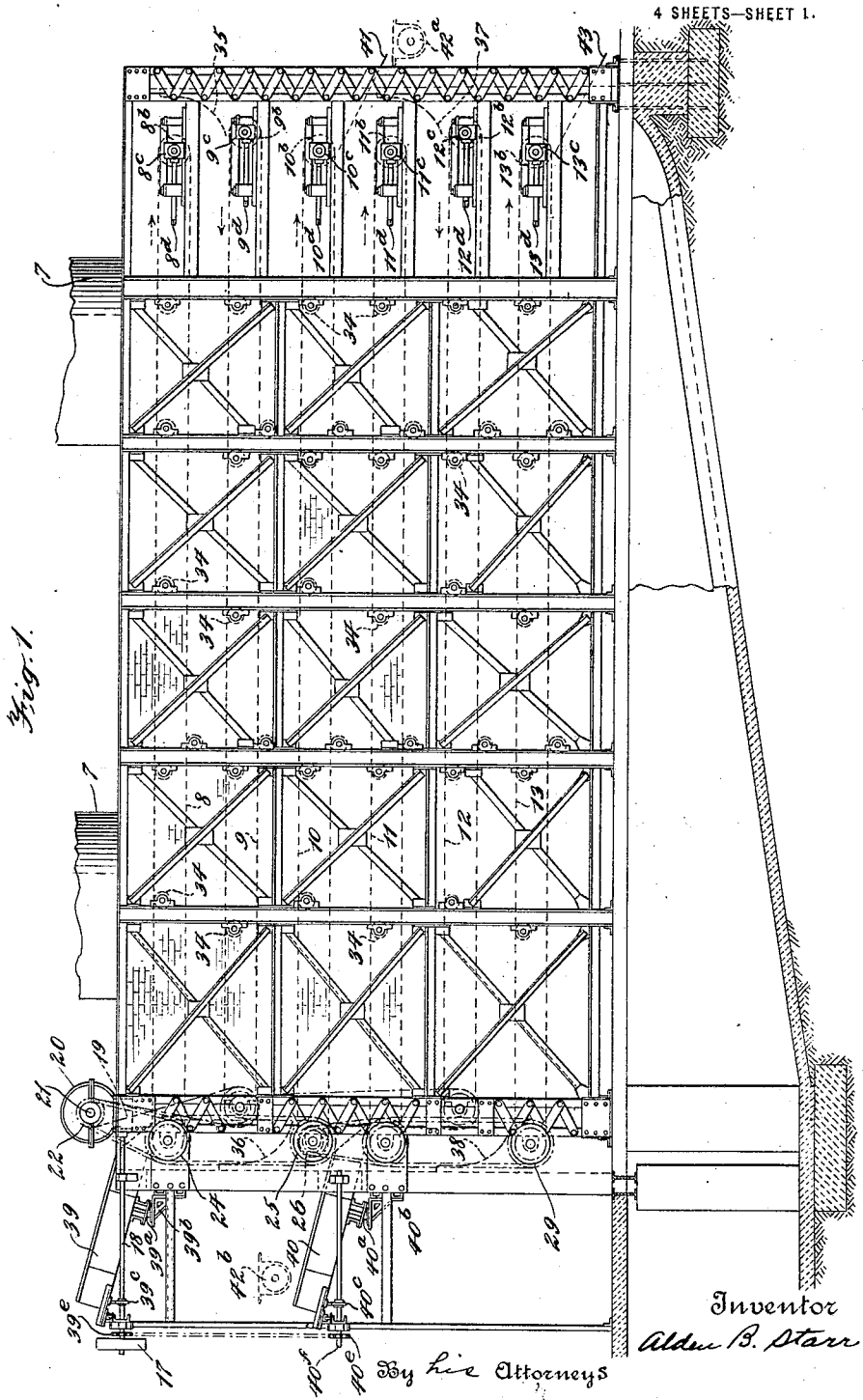


Fig. 1.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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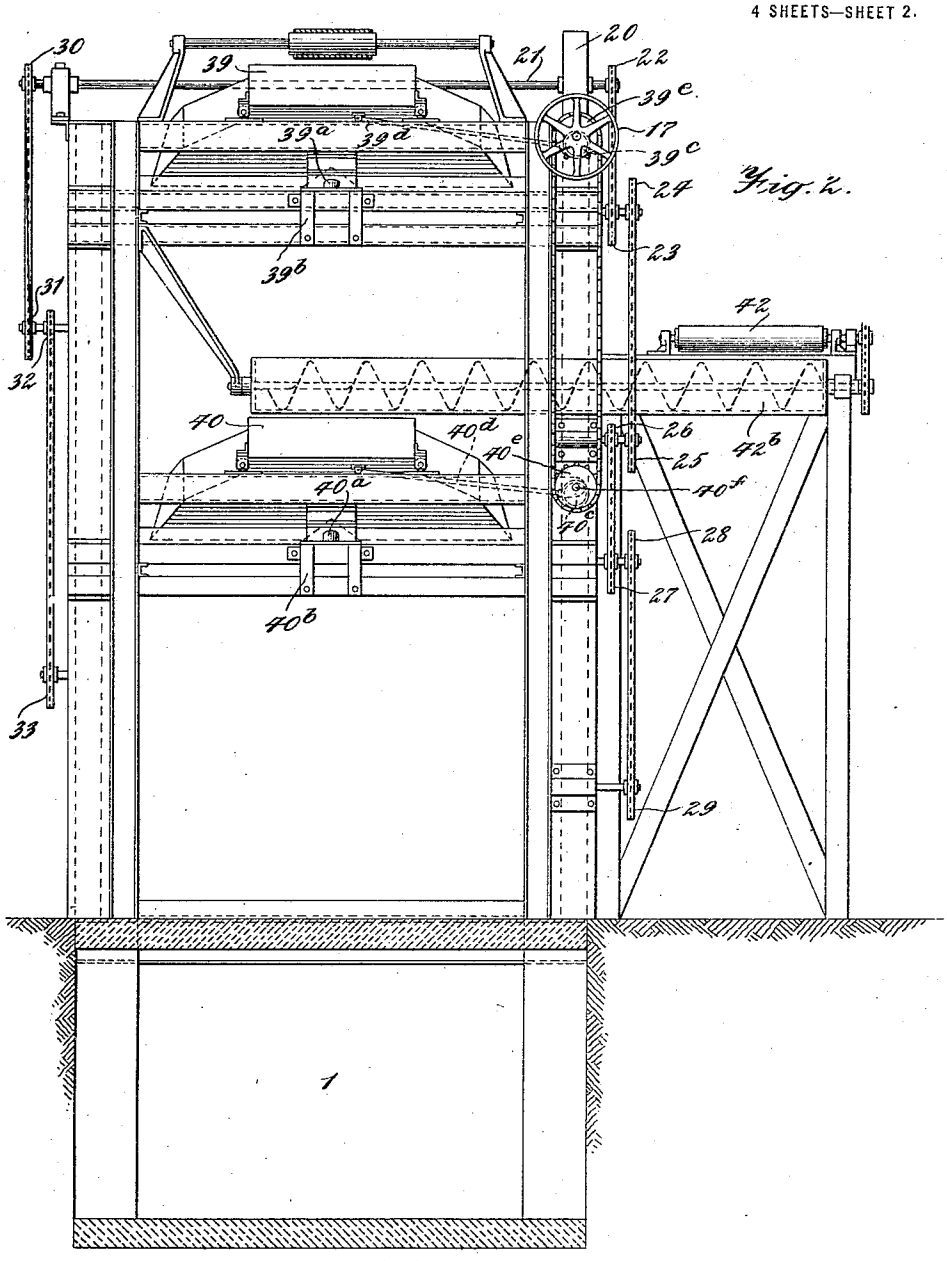


Fig. 2.

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4 SHEETS—SHEET 3.

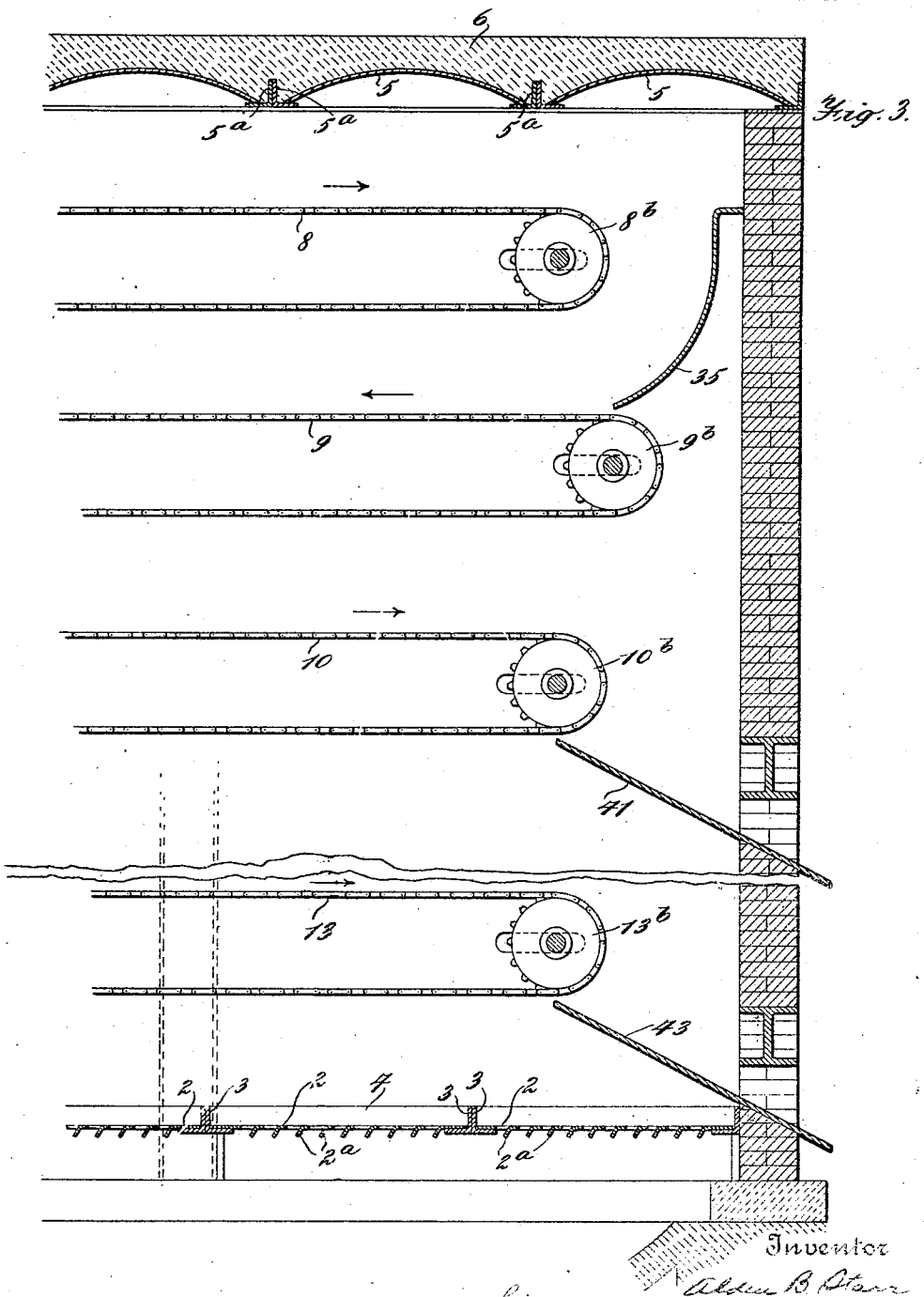


Fig. 3.

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4 SHEETS—SHEET 4.

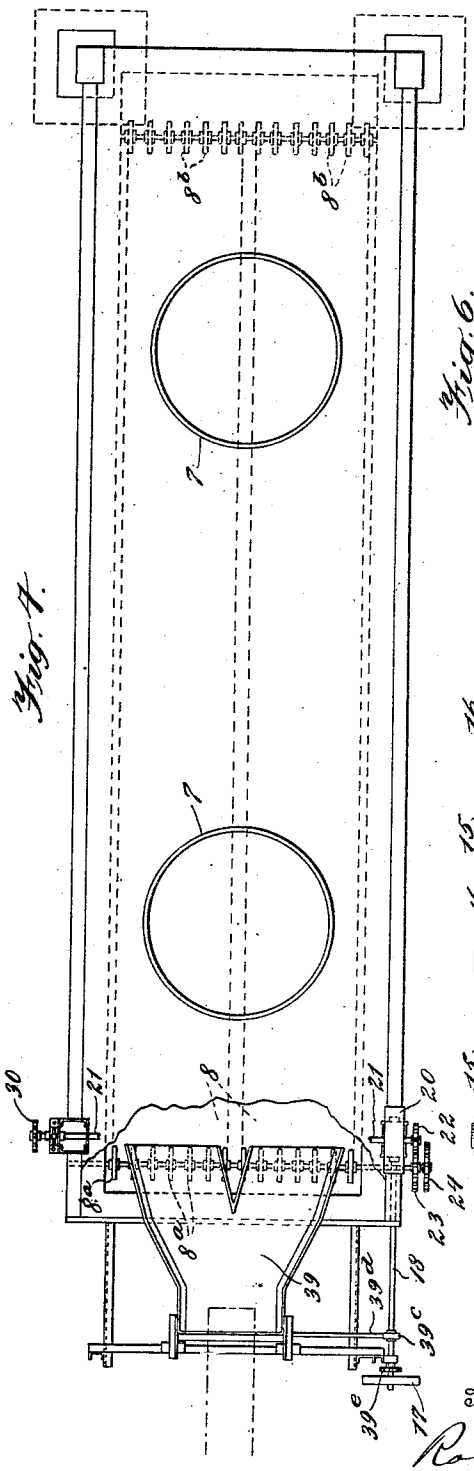


Fig. 4.

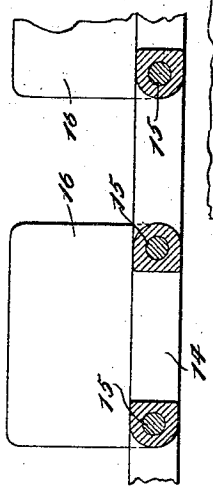


Fig. 6.

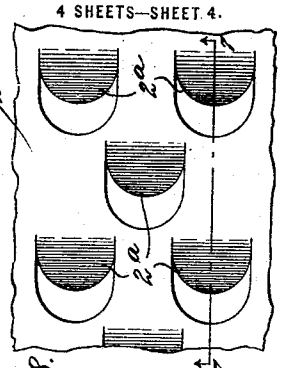


Fig. 8.

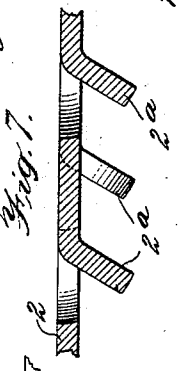


Fig. 7.

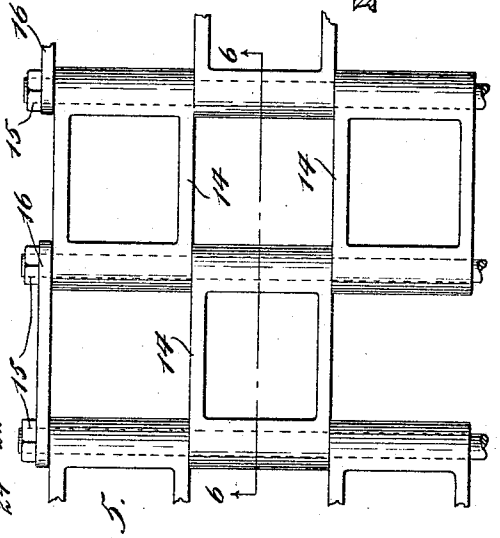


Fig. 5.

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UNITED STATES PATENT OFFICE.

ALDEN B. STARR, OF BROOKLYN, NEW YORK.

DRYING-MACHINE.

1,297,926. Specification of Letters Patent. Patented Mar. 18, 1919.

Application filed November 7, 1916. Serial No. 129,917.

To all whom it may concern:

Be it known that I, ALDEN B. STARR, a citizen of the United States, residing at the city of New York, in the borough of Brooklyn and State of New York, have invented certain new and useful Improvements in Drying-Machines, of which the following is a full, clear, and exact description.

My invention relates to drying apparatus and embodiments of my invention are particularly designed and adapted for the treatment of green cocoanut meat to produce copra. The nuts after being broken are received into by machine and partially dried until the meat separates from the fragments of shell, whereupon the partially dried material is delivered to a picking table where operators pick out the fragments of shell, and the meat is then conveyed to another portion of the apparatus where the drying is completed.

An object of my invention is to provide an apparatus for this purpose which will be continuous and automatic in its operation, reducing the handling of the material to minimum. Another object is to provide an apparatus which will be simple and expeditious in its operation and in which the liability to derangement will be minimized. Other general objects are reliability in operation, and simplicity, inexpensiveness, and compactness of construction. Still other objects and advantages of my invention will appear from the following description.

My invention resides in the features of construction and arrangements and combinations of parts hereinafter fully described and as pointed out in the appended claims.

Figure 1 is a side elevation of a complete apparatus embodying my invention;

Fig. 2 is a front end elevation of the same;

Fig. 3 is a longitudinal sectional elevation of the rear end of the same;

Fig. 4 is a plan of the same;

Figs. 5 and 6 are details, in plan and section, respectively, of a fragment of a conveyer belt or apron; and

Figs. 7 and 8 are details, in section and plan, respectively, of a fragment of a bottom plate.

There is a single drying chamber in the illustrated construction, although manifestly the partial and final drying might take place in different chambers. This chamber is shown as having its four walls composed of brick, the two side walls and the front wall being reinforced with steel truss work of well known construction against the outer faces thereof. For a foundation suitable concrete footings are provided. An excavation is made underneath the entire structure forming a passage 1 by which preheated air is delivered to the bottom of the drying chamber. This passage 1 progressively decreases in depth toward the rear of the structure in order to provide for the equal distribution of the heated air to all parts of the chamber.

The floor or bottom of the chamber is composed of a plurality of removable plates 2 as shown in Figs. 3, 7 and 8. These plates extend transversely of the chamber and rest upon transverse angle irons 3 which are supported by longitudinal angle irons 4 secured to the side walls of the chamber. The bottom plates 2 are perforated for the admission of the heated air, the perforations being formed by making semi-circular cuts leaving the deflector lips 2^a which are turned down to the position shown in order to direct the air into the chamber.

The top or roof of the chamber consists of a plurality of transverse roof plates 5 which are preferably formed of corrugated iron and are arched as shown, resting upon transverse angle irons 5^a which are supported on plates on the top of the wall. These roof plates are covered with a layer of concrete 6, and two ventilator openings 7 are provided in the roof which may communicate with a stack.

Running longitudinally of this drying chamber are a plurality of endless conveyers arranged one above the other. These conveyers compose two sets, the upper set being utilized for the preliminary or partial drying, and the lower set being utilized for the final drying. In the construction shown, there are three endless conveyers in each set, the conveyers 8, 9 and 10 composing the first set, and the conveyers 11, 12 and 13 composing the lower set. These conveyers run over and are impelled by sprocket wheels.

These conveyers are broad belts or aprons occupying substantially the entire width of the drying chamber. As shown in Fig. 4, they are preferably divided in the middle, the two halves being slightly separated, this being both for the purpose of conveniene in

manipulation and also to facilitate the feeding of material thereto, as will hereinafter appear.

The construction of these conveyers is illustrated in detail in Figs. 5 and 6. They are composed of a plurality of open links 14, the ends of which are provided with transverse openings for the reception of the transverse pivot and clamping bolts 15. Preferably the links in the consecutive longitudinal courses are staggered as shown in Fig. 5. Side plates 16 are provided along the outer edge of each belt portion, being composed of short sections which are spaced apart a sufficient distance to permit of the articulation around the sprocket wheels. Preferably the fragments of the cocoanuts are screened before being fed to the drier, in which operation all fragments smaller than the opening in the links of the conveyers are removed. The sprocket wheels are mounted upon transverse shafts which extend through the brick walls and find their bearings in the steel reinforcement. As shown, there are fourteen sprocket wheels on each transverse shaft, seven for each half of the conveyer, and the teeth engage in the links of the conveyer which are suitably formed for that purpose.

As indicated by the arrows in Figs. 1 and 3, the intermediate conveyers 9 and 12 run in an opposite direction to that of the other conveyers of the respective sets. Power is applied to the pulley 17, and on the opposite end of the pulley shaft 18 is a worm 19 which drives a worm wheel in the casing 20 on the shaft 21.

This shaft 21 drives the sprocket wheels for the conveyers on the front end of the apparatus. On the end of the shaft 21 adjacent the worm drive is a sprocket wheel 22 which is connected by a sprocket chain to a sprocket wheel 23 on the shaft of the driving sprocket wheels 8^a of the uppermost conveyer 8, the sprocket wheel 22 being so proportioned in size to that of the sprocket wheel 23 that a reduction in speed results. On the shaft of the sprocket wheel 23 is another sprocket wheel 24 of the same size which is connected by a sprocket chain to a sprocket wheel 25, also of the same size, on the shaft of the driving sprocket wheels of the conveyer 10.

On the shaft of the sprocket wheel 25 is a smaller sprocket wheel 26 which is connected by a sprocket chain to a sprocket wheel 27 on the shaft of the driving sprocket wheels of the uppermost conveyer 11 of the lower set, the relative size of the sprocket wheels 26 and 27 being such that a reduction in speed results. On the shaft of the sprocket 27 is another sprocket wheel 28 of the same size which is connected by a sprocket chain to a sprocket wheel 29 on the shaft of the driving sprocket wheels of the lower conveyer 13. Thereby the conveyers 8, 10, 11 and 13 are all driven in the same direction, but the conveyers 11 and 13 are driven at a lower speed than that of the conveyers 8 and 10.

On the end of the shaft 21 opposite the worm drive is a sprocket wheel 30 which is connected by a sprocket chain to a sprocket wheel 31 on the shaft of the driving sprocket wheels of the conveyer 9 and drives the conveyer 9 oppositely to conveyers 8 and 10, the sprocket chain being crossed for this purpose and the two sprocket wheels 30 and 31 being so proportioned that the conveyer 9 is driven at the same speed as that of the conveyers 8 and 10. On the shaft of the sprocket wheel 31 is a smaller sprocket wheel 32 which is connected by a sprocket chain to a sprocket wheel 33 on the shaft of the driving sprocket wheels of the conveyer 12, whereby the conveyer 12 is driven in the direction opposite to that of the conveyers 11 and 13. The two sprocket wheels 32 and 33 are so proportioned in size that the conveyer 12 has the same speed as that of the conveyers 11 and 13.

The sprocket wheels 8^b, 9^b, 10^b, 11^b, 12^b and 13^b at the rear end of the conveyers, are made adjustable in order to keep the conveyers taut. The shafts extend through slots in the brick walls and bear in longitudinally adjustable blocks 8^c, 9^c, 10^c, 11^c, 12^c and 13^c, respectively. These bearing blocks slide in suitable ways supported on the steel reinforcing frame and are adjusted by feed screws 8^d, 9^d, 10^d, 11^d, 12^d and 13^d, respectively, as shown in Fig. 1. It will be understood that this construction is duplicated on the other end of the shafts.

To support the conveyers at points intermediate of the sprocket wheels, idler rollers 34 are employed, the shafts of which extend through the side walls and bear in suitable bearings in the steel work, as shown in Fig. 1.

The several conveyers are all of the same length but the intermediate conveyers 9 and 12 are disposed longitudinally farther within the chamber than their coöperating conveyers, as a result of which the upper conveyer of each set dumps its material upon the intermediate conveyer at the inner end, and the intermediate conveyer dumps its material upon the lower conveyer at the outer end. Curved guide plates 35, 36, 37 and 38 are attached to the end walls and are positioned to direct the material upon the conveyers 9, 10, 12 and 13, respectively. This dumping from one conveyer to another serves in lieu of the customary turning by hand to stir up the material and expedite the drying.

The material is delivered to the conveyers 8 and 11 by inclined shakers 39 and 40, respectively, which are of the same construc-

tion. The shaker 39 is pivoted substantially centrally upon a pivot 39[a] which is upstanding on a bracket 39[b] on the front wall of the structure. An opening is provided through the front wall into which the inner end of the shaker extends and overhangs the outer end of the conveyer 8. The inner end of the shaker is divided, as shown in Fig. 4, forming a double spout, one of which overhangs each half of the conveyer and is of such a width that it just reaches the edges thereof in its oscillation. The material is thereby evenly distributed on the conveyer. In fact it is manifest that by thus dividing the conveyer and shaker a more even distribution is obtained than would be the case with a full width shaker and conveyer. The shaker is oscillated by an eccentric 39[c] on the shaft 18 which is operatively connected to the shaker back of the pivot by a pitman 39[d]. The shaker 40 is similarly operated from shaft 40[f] which is driven from shaft 18 by sprocket wheels 39[e] and 40[e] connected by a sprocket chain, as shown. The shaker 40 extends through an opening in the wall provided for the purpose and coöperates with the conveyer 11 precisely as the shaker 39 coöperates with the conveyer 8.

In operating to produce copra, the fragments of cocoanut are delivered, preferably by a suitable automatic conveyer, to the shaker 39 by which they are distributed to the continuously running conveyer 8, from which they pass successively to the conveyers 9 and 10. The speed of these conveyers is regulated to give the material sufficient time in the drying chamber to cause the meat to contract and release from the shell. From the conveyer 11 they are dumped on to a slide 41 from which they are conveyed to a picking table 42 by a screw conveyer 42[a], where operators sort over the material and remove the shells. The meat is then delivered to the shaker 40, preferably by an automatic screw conveyer 42[b] similar to the conveyer 42[a]. As explained above the second set of conveyers are preferably made to run slower than the first set, which is possible by reason of the fact that the material occupies less space with the shell removed. By the time it has traversed the three conveyers 11, 12 and 13, the meat is thoroughly dried and is delivered to the slide 43 from the last conveyer, whence it is conducted to the desired depository.

It is obvious that various modifications may be made in the construction shown in the drawings and above particularly described, within the principle and scope of my invention.

I claim:

1. A drying machine comprising a drying chamber, means for delivering preheated air to the bottom thereof, and removable plates forming the bottom of the chamber, the plates being perforated and provided with depending deflector blades for directing the air through the perforations.

2. A drying machine comprising a drying chamber, a passage for preheated air underneath the drying chamber, said passage progressively diminishing in cross-section from its intake to its opposite end, means for delivering preheated air to the intake end of the passage, and removable plates forming the bottom of the chamber, the plates being perforated and provided with depending deflector blades inclined toward the intake end of the passage and serving to direct the air through the perforations.

3. A cocoanut meat drying machine comprising a drying chamber having a perforated bottom, means for delivering preheated air to the bottom, a plurality of endless conveyers in the chamber disposed one above the other, and arranged in two sets, each conveyer except the lowermost of each set being arranged to deliver its contents to the conveyer immediately below, two chutes, one arranged to receive the contents from each lowermost conveyer, and impelling means for the conveyers arranged to drive one set at one rate and the other set at another rate.

In witness whereof I subscribe my signature, in the presence of two witnesses.

ALDEN B. STARR.

Witnesses:
WALDO M. CHAPIN,
MARY G. HART.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."