No. 667,408. Patented Feb. 5, 1901.

W. F. SNYDER & F. L. BLOSS.

CURD MILL.

(Application filed June 13, 1900.)

(No Model.) 2 Sheets—Sheet 1.

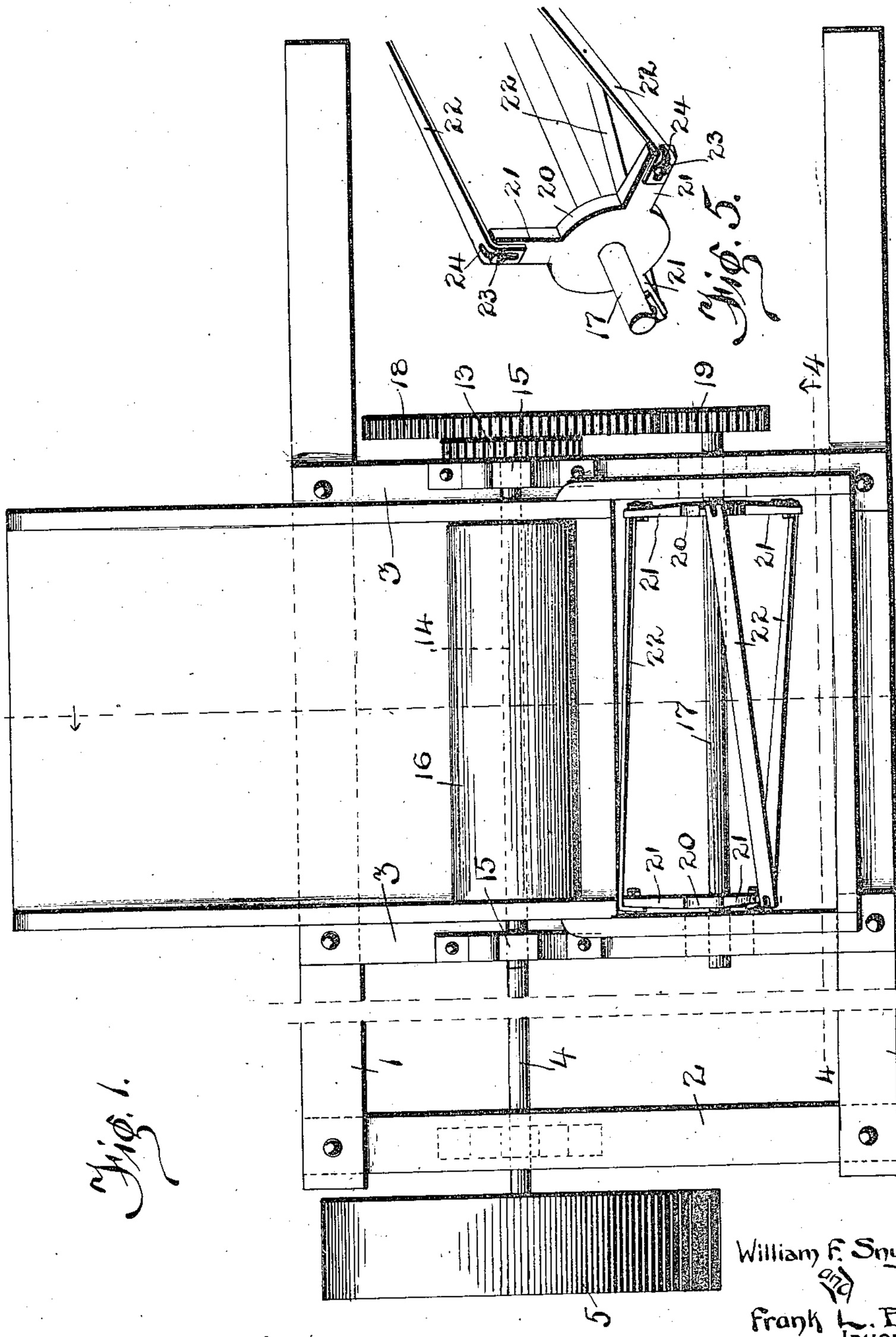

Fig. 1.

Fig. 5.

Witnesses:
Horace Fritz
H. Foxe Pardoe

William F. Snyder
and
Frank L. Bloss,
Inventors.

By Marion & Marion
their Attorneys.

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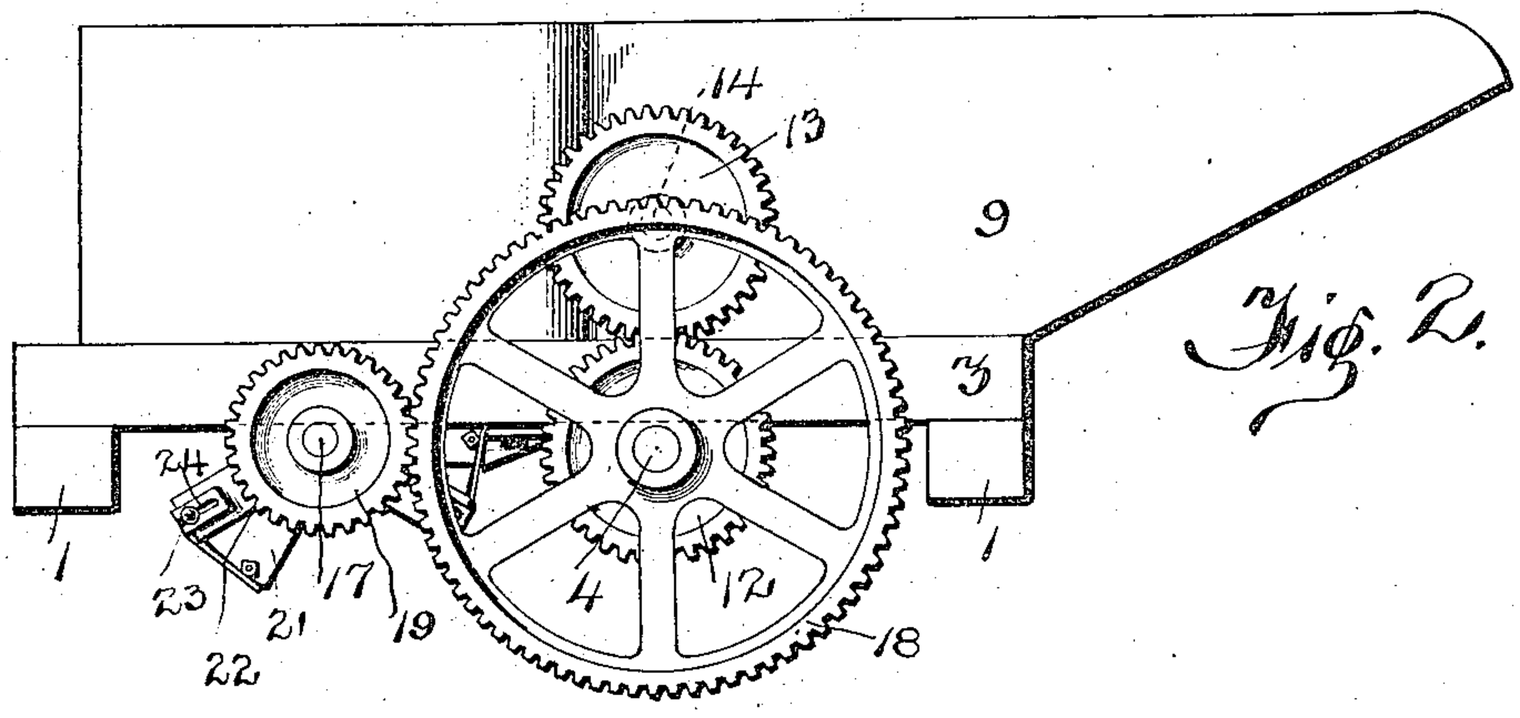


Fig. 2.

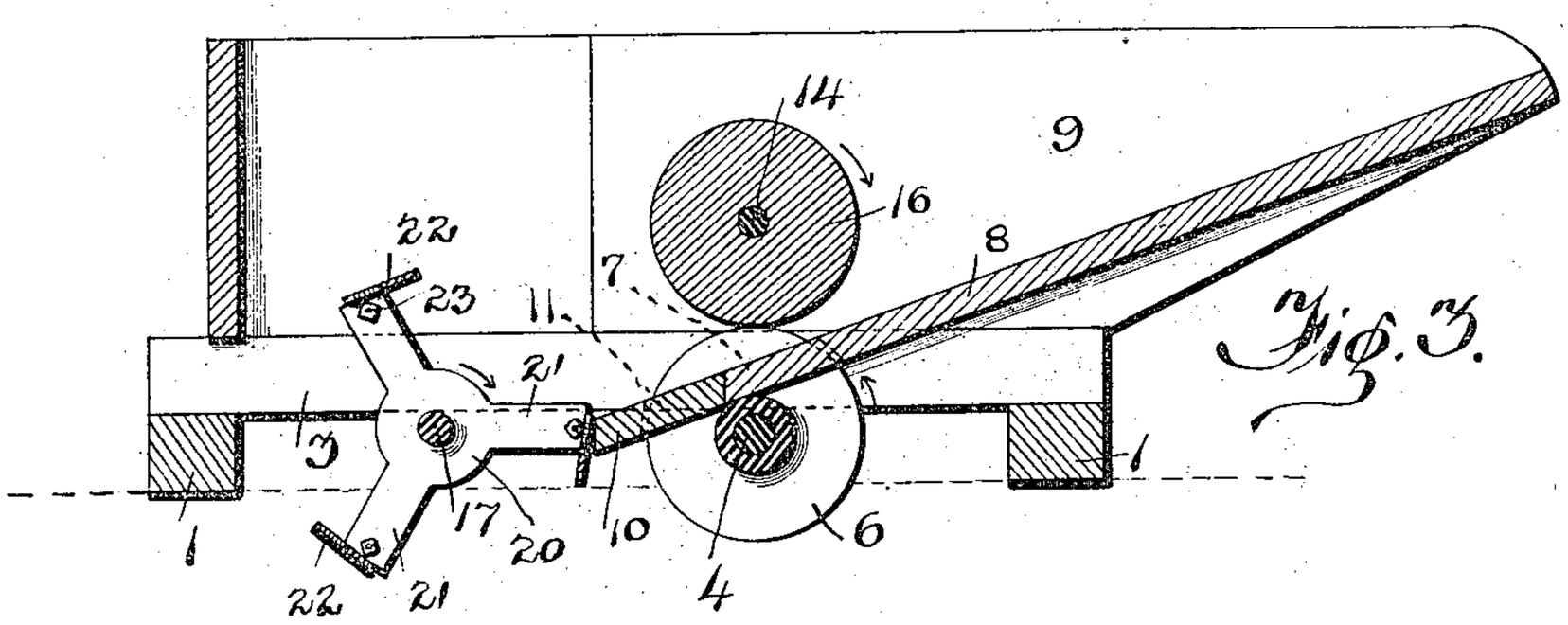
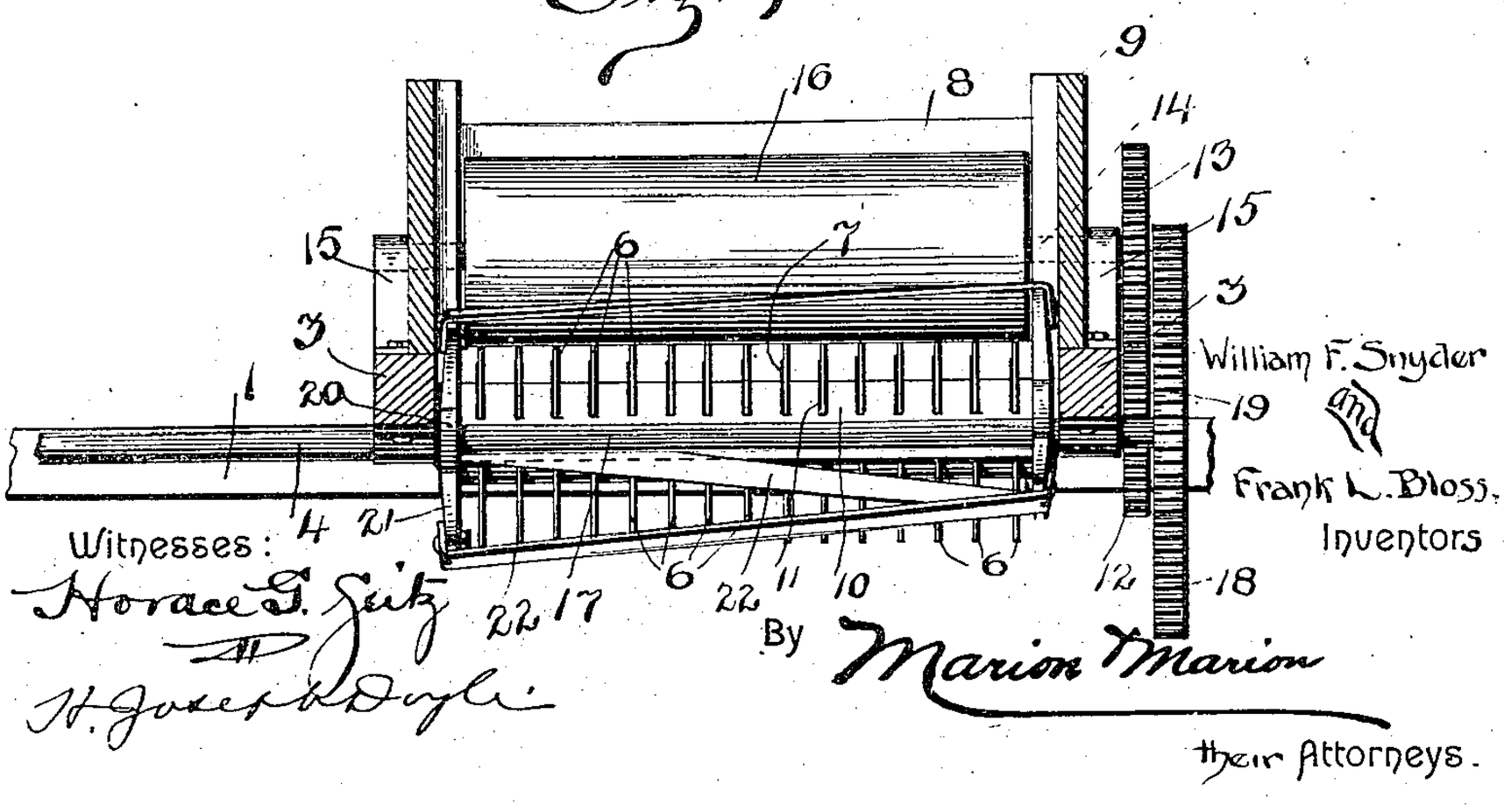


Fig. 3.

Fig. 4.



Witnesses:
Horace G. Seitz
H. Joseph Doyle

William F. Snyder and
Frank L. Bloss,
Inventors

By Marion & Marion
their Attorneys.

UNITED STATES PATENT OFFICE.

WILLIAM F. SNYDER AND FRANK L. BLOSS, OF ANDOVER, NEW YORK.

CURD-MILL.

SPECIFICATION forming part of Letters Patent No. 667,408, dated February 5, 1901.

Application filed June 13, 1900. Serial No. 20,193. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM F. SNYDER and FRANK L. BLOSS, citizens of the United States, residing at Andover, in the county of Allegany and State of New York, have invented a new and useful Improvement in Curd-Mills, of which the following is a specification.

Our invention relates to improvements in cheese-making apparatus, and has particular relation to curd-mills.

One object of our invention is to provide a mill of this character which is capable of being driven at a relatively high speed and continuously without deteriorating the product.

A further object is to provide a mill in which the curd is automatically fed to the cutting mechanism and carried therethrough, the curd during its passage being first cut into strips substantially square in cross-section, which strips while moving during the feeding being cut off to form cubes, the latter passing out of the path of movement of the moving strips automatically.

A further object is to provide a structure embodying a series of cutting-disks moving in the same direction as the curd is moved and a rotary cutter moving in an opposite direction to the cutting-disks, said cutter operating in connection with a stationary coacting cutting edge.

A further object is to provide a construction in which the curd is substantially compressed in its passage through the cutting-disks, said compressing action serving to aid in the automatic feeding of the curd through the cutting mechanism.

A further object is to provide a construction which is simple and efficient in operation, durable in construction, which combines a minimum number of parts, which can be readily assembled and taken apart for cleaning purposes, &c., and which can be made at a low cost of manufacture.

To these and other ends, the specific nature of which will be readily understood as the invention is hereinafter disclosed, our said invention consists in the improved construction and combination of parts hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the appended claims.

In the drawings forming a part of this specification, and in which similar reference characters indicate similar parts in all of the views, Figure 1 is a top plan view of our improved curd-mill. Fig. 2 is a side elevation of the same. Fig. 3 is a vertical cross-sectional view taken on the line 3 3 of Fig. 1. Fig. 4 is a longitudinal sectional view taken on the line 4 4 of Fig. 1. Fig. 5 is a detail view showing the manner in which the rotary cutter is formed.

Curd-mills, by reason of their necessarily operating in connection with a substantially semiliquid mass, must combine certain qualities present only in machines used for that purpose. The primary object of such machines is to eliminate the whey as much as possible and with rapidity. In doing this the general practice is to subject the curd to what might be called a "disintegrating" process, in that the molecular structure of the curd is changed, this being accomplished by cutting the curd into strips and sometimes again cutting these strips to form cubes, after which these cubes are again passed through the mill until a proper separation of the molecular structure is obtained. The machines heretofore constructed for this purpose have generally been so formed as would allow of their being operated only by hand, the use of a reciprocating plunger being employed to force or feed the curd into a position where it would be acted upon by knives arranged in proper manner, the curd being fed under pressure. With such constructions a continuous operation is not possible, owing to the requirement of successive recharging of the plunger-cylinder, making it compulsory that the mill be operated by hand, and while other constructions have been used heretofore they are not capable of being operated with rapidity and continuity without deteriorating the product obtained.

The present apparatus is intended to accomplish the same results as a slowly-operating or hand machine, yet enabling it to be run at a relatively high speed and with continuity, as well as compelling a minimum cost for labor with an increased output. These results are obtained by means of the mill we now describe in detail.

1 1 designate two longitudinally-extending beams, spaced apart, which are held in proper

position by the end cross-beam 2 and intermediate beams 3 3, as shown in Fig. 1, the opposite end of the beams 1 requiring no support.

Extending longitudinally of the above-described frame is a shaft 4, mounted in suitable bearings in the cross-beam 2 and beams 3 3, the outer end of said shaft being provided with a suitable drive-wheel 5, as shown in Fig. 1. The shaft 4 extends through the beams 3 3 and intermediate the beams is provided with suitable spaced cutting-disks 6, (shown in Figs. 3 and 4,) which are adapted to be rotated by said shaft. Said disks may be mounted in any suitable manner and may be held as to proper spacing by any suitable auxiliary means—such, for instance, as being clamped between the opposing faces of two supporting-blocks. Said disks 6 are adapted to extend through suitable slots 7, formed in the inclined bottom 8 of the hopper 9, said hopper resting on said beams 3 3 and being removably secured thereto, if desired. Said bottom 8 to enable a readier removal is formed in two parts, the lower part 10 forming a continuation of the main portion, as shown in Fig. 3, and said lower part 10 having also slots 11 coinciding with the slots 7, thus providing a bottom extending beyond the path of movement of the disk, yet arranged to form a continuous passage-way from the hopper and without changing the angle of inclination of the bottom and without varying the direction of movement of any material passing said cutting-disks. The lower part 10 of the bottom may be secured to the beams 3 in any suitable manner.

The inner end of the shaft 4 is provided with a suitable gear-wheel 12, which is adapted to coöperate with a similar gear-wheel 13, mounted on a shaft 14, extending in vertical alinement with the shaft 4, said shaft 14 being mounted in suitable bearings 15 on the beams 3. The shaft 14 extends through the sides of the hopper 9, said hopper having suitable slots to allow of its being readily passed over the shaft, and is provided intermediate the sides of the hopper with a suitable roll, preferably wood, against which said cutting-disks 6 rotate, said roll and said disks moving simultaneously in opposite directions. By this construction it will be seen that when the curd is placed in the hopper its egress therefrom is possible only through the spaces formed between the disks 6, and as the bottom 8 is inclined the normal tendency of the curd will be to move toward said disks. During such movement, however, the curd comes in contact with the roll 16, which, being driven in the direction shown by the arrow in Fig. 3, will aid in forcing the curd toward the disks and at the same time tend to compress the curd between it and the bottom 8, thus making strips of equal thickness and width, which strips are pushed forward by the continuing movement of the roll 16 and the feeding movement of the curd in the hopper.

As heretofore explained, the strips of curd are forced toward the front of the mill by the continuous movement of the roll 16, said strips being formed substantially continuous in length. As these strips are designed to be cut into lengths of substantially predetermined size, means must be provided for severing these strips, and as the feeding movement is continuous the cross-cutting movement should also be continuous. In the present construction this cross-cutting is obtained by means of a rotary cutter, which is best disclosed in the drawings. In forming this cutter a shaft 17 is provided, extending in a plane parallel to that of the shaft 4, said shaft being mounted in suitable bearings formed on the beams 3. Said shaft 17 is given a rotary movement by the two gear-wheels 18 and 19, located on the shafts 4 and 17, respectively.

The shaft 17 is provided intermediate the beams 3 with two or more disks 20, each having radially-extending arms 21, said disks being secured to the shaft to be rotated thereby. The number of disks 20 is preferably two, one near each end, while we prefer to provide each disk with three spaced arms 21; but it is to be understood that the number of disks and arms may be varied as found desirable. As shown in the drawings, said disks 20 are secured on the shaft 17 in such manner as will allow said arms 21 to be out of longitudinal alinement. In other words, said arms extend radially at different angles relative to the arms on the opposing disk. The outer ends of said arms 21 form supports for the knives 22, said knives being preferably formed of substantially narrow metal strips and having their ends bent inwardly and extending radially along said arms, to which they are secured by suitable means, such as bolts 23. To enable said knives to be adjusted properly, suitable slots 24 are formed therein, as shown best in Fig. 5. By reason of the relative angular arrangement of the arms 21 the knives 22 in their movement coact with the forward edge of the lower part 10 to produce an action similar to a pair of shears. This cross-cutting by the shearing action shown is of advantage in that there is no necessity of stopping the feeding movement of the curd strips, such as would be necessary were the cutting to be done simultaneously along the entire length of the cutting edge. The angle at which said knives or blades 22 extend is not necessarily fixed; but it is preferable that they be arranged so that there is not a continuous cutting, in so far as the rotary cutter is concerned, it being understood, of course, that sufficient time must be allowed to enable the roll 16 to feed the curd strips forward a sufficient distance for the forming of the cube.

While we have shown and described the knives or blades 22 as formed of strips, said knives may be formed of wire, if desired, although the use of strips will tend to cause the cubes to be thrown forwardly by the knives.

In operation the mill is placed over the

cheese-vat and requires the services of but one person to operate, his duty being to keep the hopper substantially filled with the curd, the cubes simply passing back into the vat and being again placed into the hopper for further action. As the three moving elements—the roll 16, the disks 6, and the rotary cutter—are each driven from the same point, it will be obvious that the cubes will have substantially the same size whether the mill be run at a high or low speed.

Having thus described our invention, what we claim as new is—

1. In a curd-machine, the combination with a series of spaced cutting-disks; a feed and compressing roll located over said disks and coöperating therewith; and a rotating cutter, said disks and said cutter being arranged to cut in directions at right angles with each other; of a hopper having an inclined bottom extending from the rear end of the hopper to a point contiguous to the path of movement of said rotating cutter, said disks extending through said bottom, whereby a continuous feed-table is provided extending through the cutting-disks to said cutter.

2. A curd-mill comprising a hopper having an inclined bottom; a rotating shaft extending transversely of said hopper; a series of spaced cutting-disks carried by said shaft and extending through said bottom and into said hopper intermediate the ends of said bottom; a feed and compressing roll located over and mounted to coöperate with said cutting-disks, the movement of said disks and roll aiding the feeding movement of the curd, whereby curd strips will be formed; and a rotating cutter mounted to coöperate with the forward end of said bottom, whereby said strips will be cut into cube form without varying the direction of their movement.

3. A curd-mill comprising a support; the hopper 9 removably mounted thereon, said hopper having the sectional inclined bottoms 8 and 10, the latter being carried by the support; the shaft 4 having spaced cutting-disks 6 extending through said bottom; the shaft 14; the gears 12 and 13; the feed and compressing roll 16 located over and coöperating with said disks; the shaft 17; the gears 18 and 19; and the cutters carried by the said shaft 17 and coacting with the forward end of the portion 10, substantially as and for the purpose described.

4. In a curd-mill, the combination of means for cutting the curd into strips and means for feeding said strips; and a rotating cutter located in the path of movement of said strips and coacting with a fixed edge, said cutter comprising a drive-shaft; spaced disks carried thereby, said disks having radial arms; cutting-knives mounted on the outer ends of said arms, said knives having inwardly-extending slotted flanged portions adapted to embrace the arms; and bolts extending through said slots and said arms, for adjustably securing said knives to said arms, substantially as described.

In witness whereof we have hereunto set our hands in the presence of two witnesses.

WILLIAM F. SNYDER.
FRANK L. BLOSS.

Witnesses:
A. M. BURROWS,
G. B. HERRICK.