Feb. 21, 1928. 1,659,733

F. M. HARBECK

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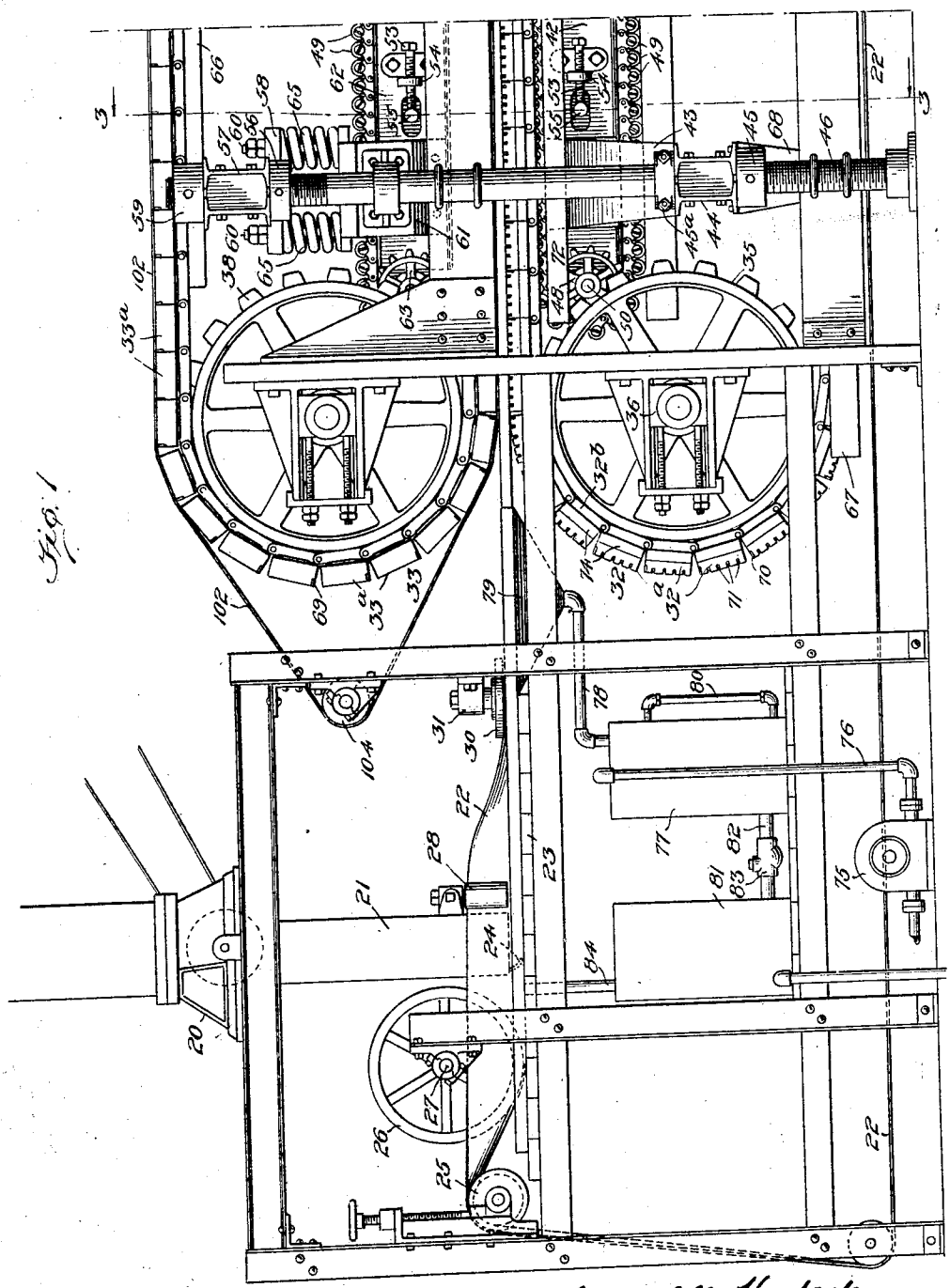


Fig. 1

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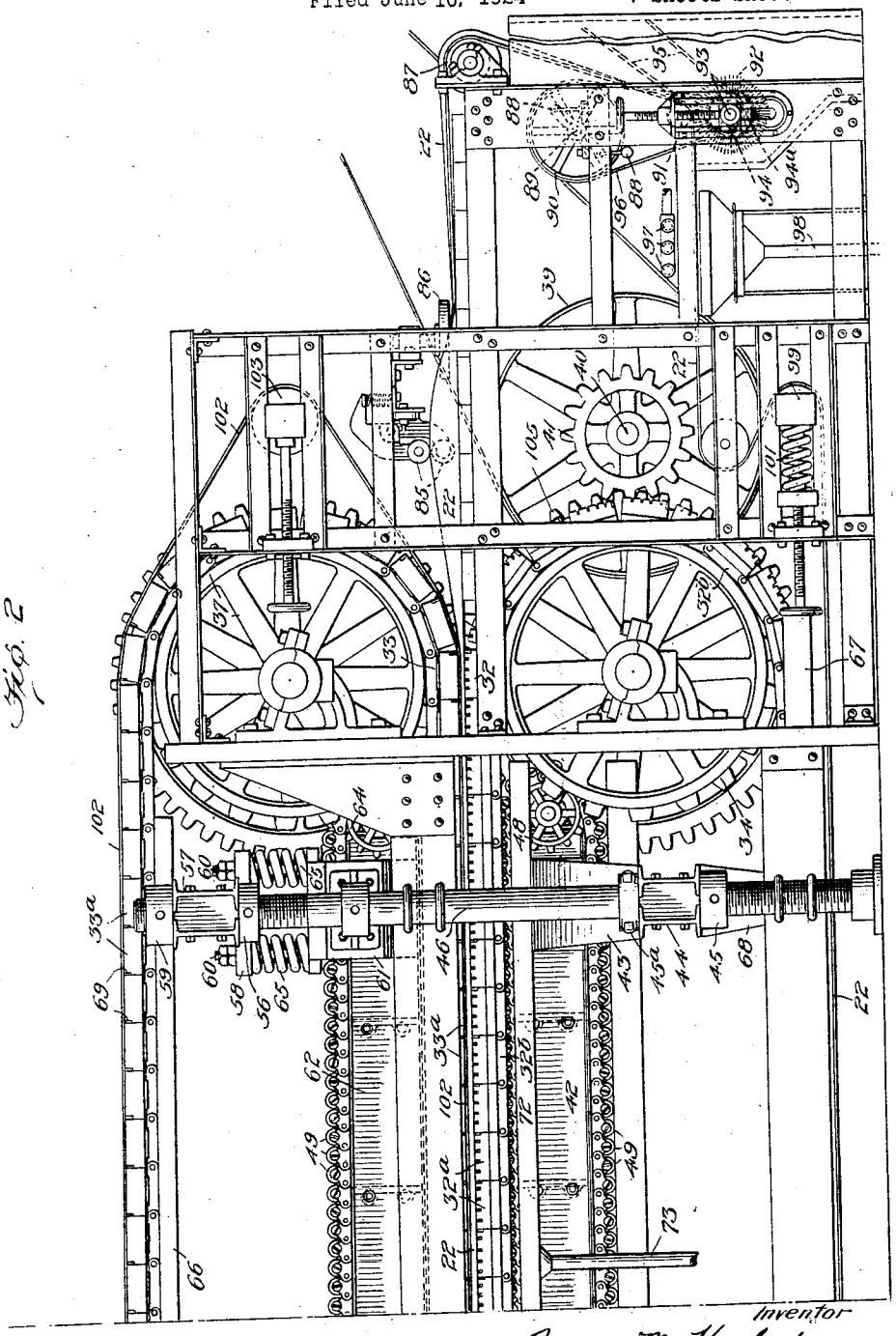


Fig. 2

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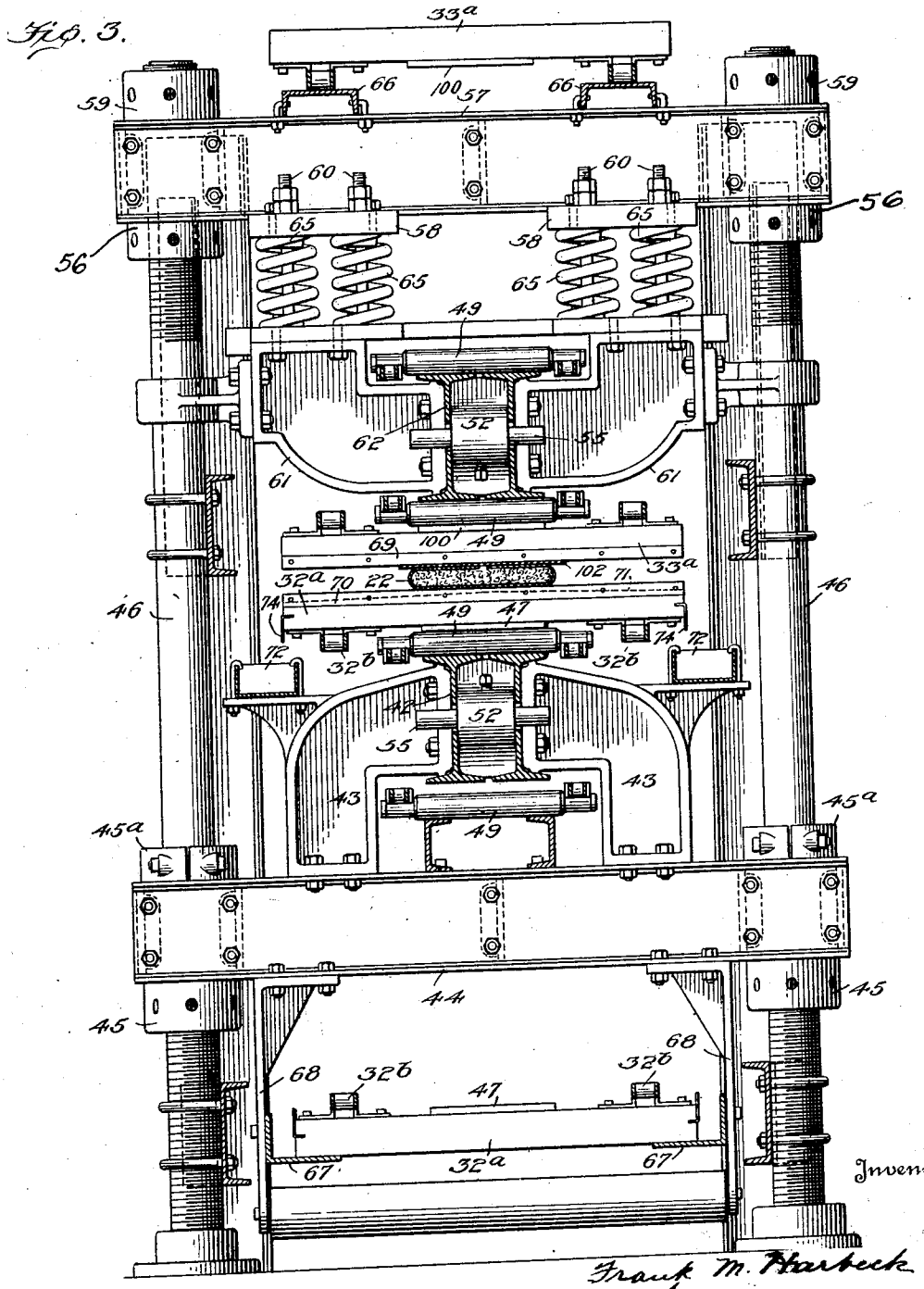
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Fig. 3.



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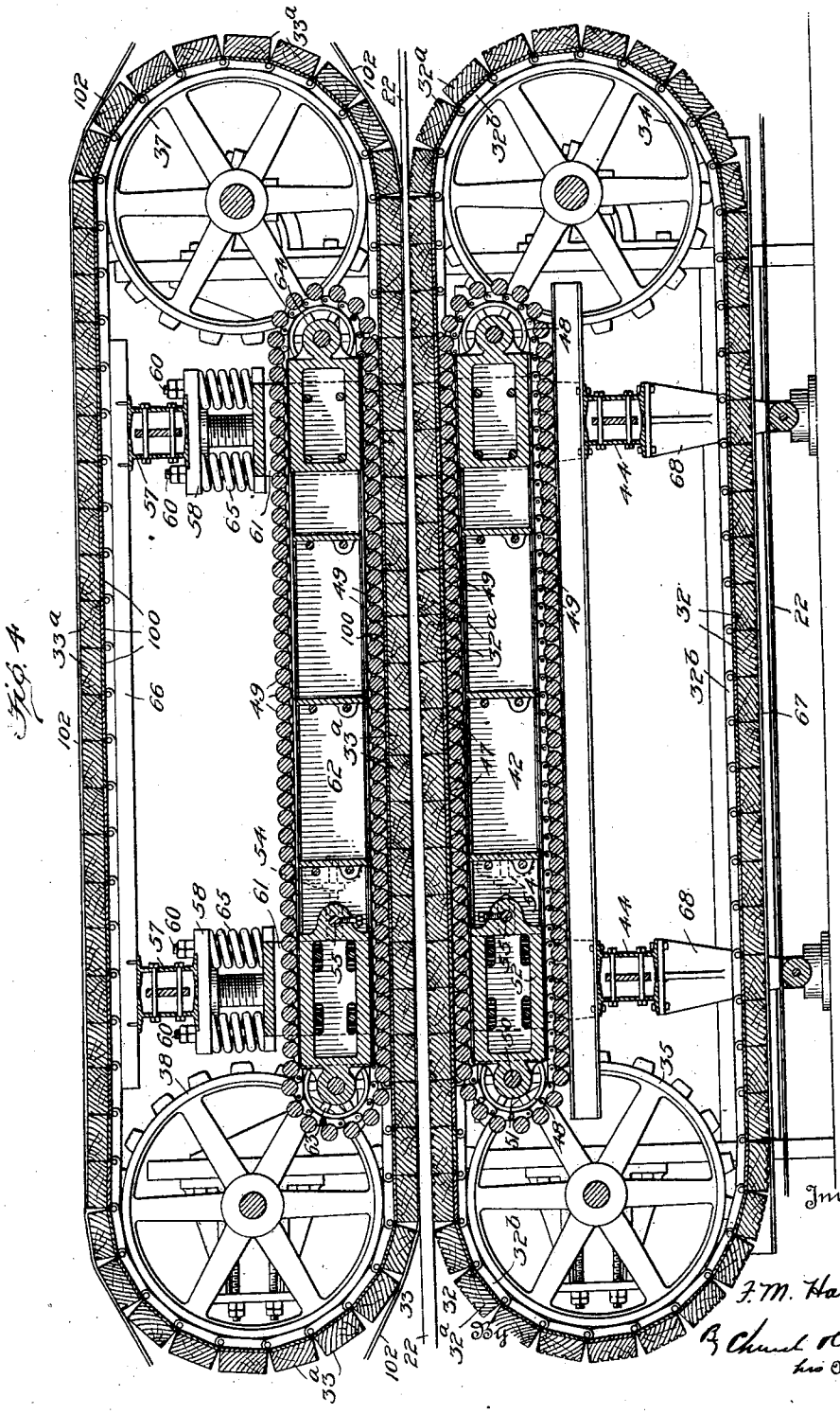


Fig. 4

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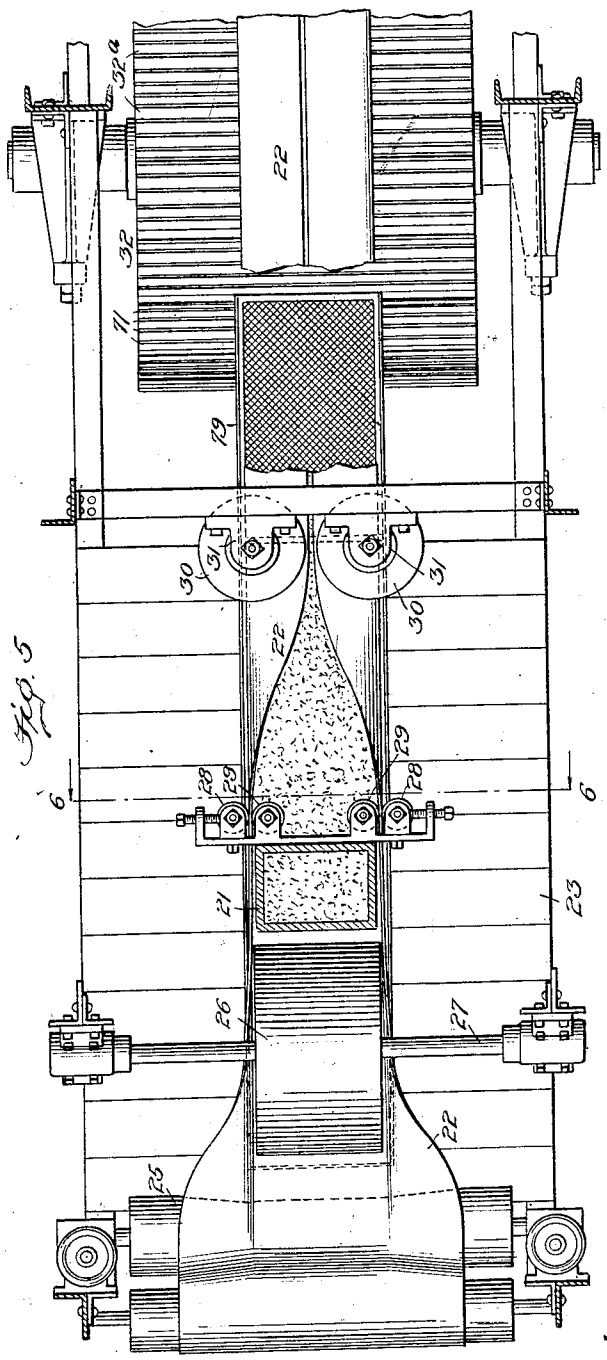


Fig. 5

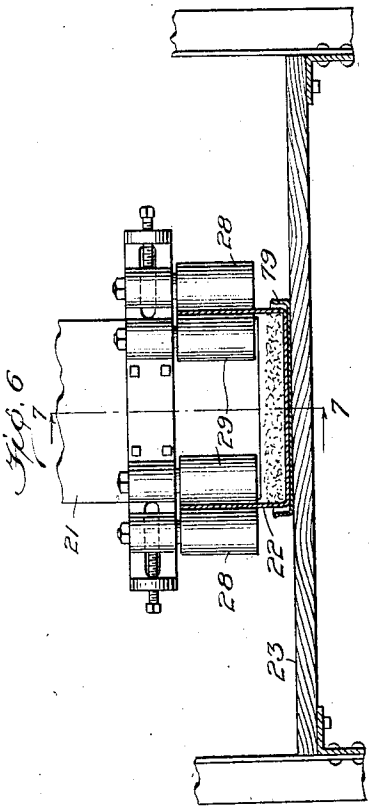


Fig. 6

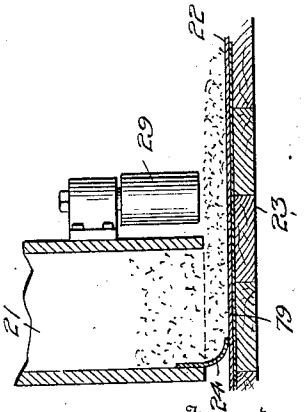


Fig. 7.

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Fig. 8

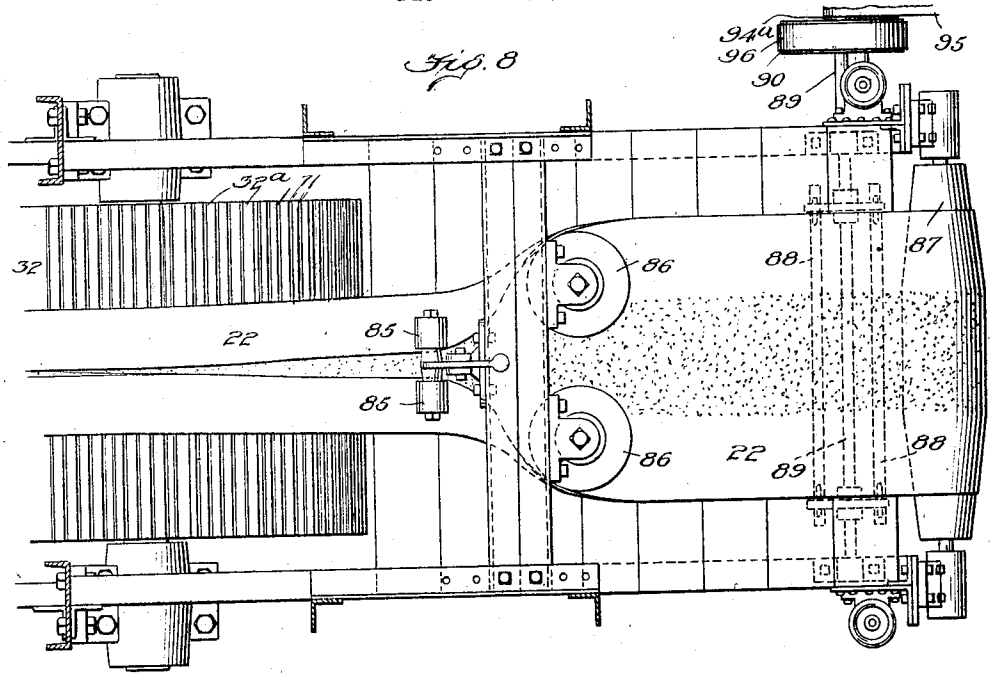


Fig. 9

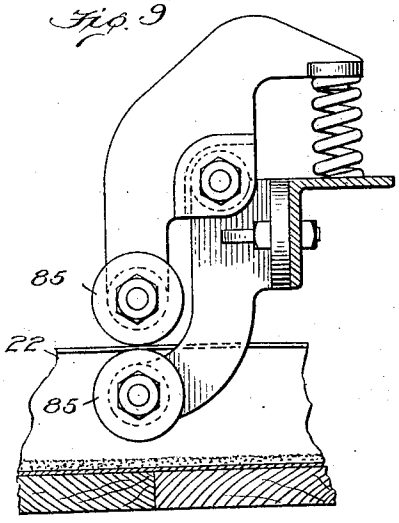
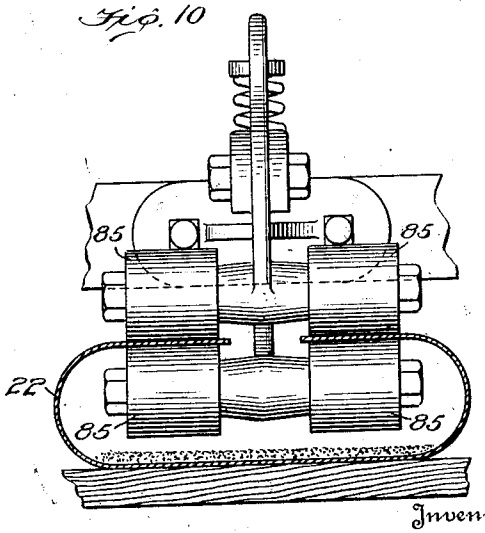


Fig. 10



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Fig. 11

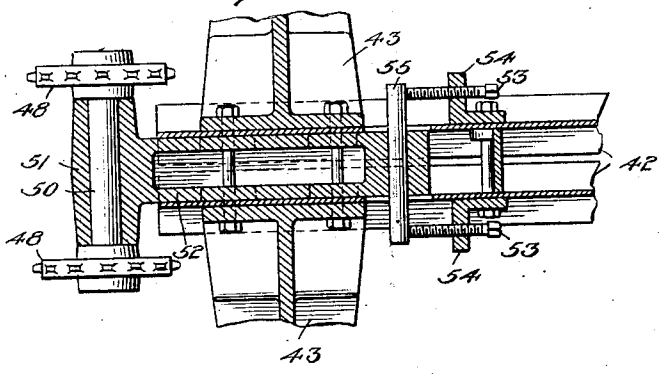


Fig. 12

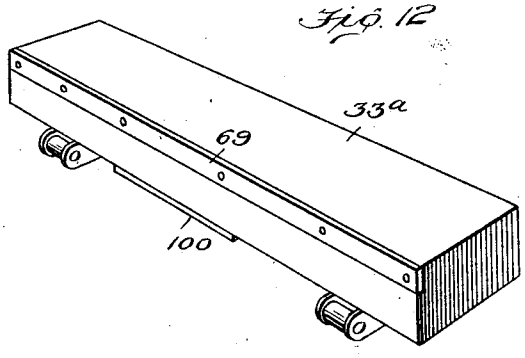
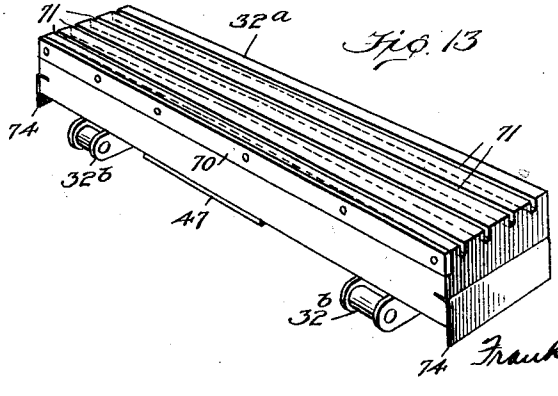


Fig. 13



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Patented Feb. 21, 1928. 1,659,733

UNITED STATES PATENT OFFICE.

FRANK M. HARBECK, OF ALEXANDRIA, VIRGINIA, ASSIGNOR OF ONE-HALF TO NATIONAL FRUIT PRODUCT COMPANY, INC., OF ALEXANDRIA, VIRGINIA, A CORPORATION OF VIRGINIA.

CIDER PRESS.

Application filed June 10, 1924. Serial No. 719,186.

This invention relates to certain new and useful improvements in cider presses, and particularly to a continuously operating press having mechanically actuated pressing means.

While there are quite a few examples of continuous mechanical presses in the prior art, it is believed that none of that type can be found in use in the present day cider making industry, hydraulc, intermittently operated presses being practically unversally used for expressing the juice from the pomace. It has always been desired to have a continously operating mechanical press for this purpose, but the industry has had to resort to the hydraulic press principally because of the high pressures under which the pomace is placed in expressing its juice. As a rule, the pomace is put under a maximum pressure of approximately 300 pounds per square inch with the result that, where a strip or layer of pomace twelve inches wide is placed between compressing platforms, those platforms are subjected to a load of nearly 3600 pounds per inch of length. To appreciate the pressures that are used in these cider presses, it need only be stated that the hydraulic presses range in size from 64 ton presses to presses havng a working pressure of 325 tons. To make the pressure-transmitting parts of such size that they would stand up under that high pressure, they would be too large to be practical and it is believed that this is the primary cause for adopting the hydraulic press.

In addition to being a continuously operatng press, thus increasing the quantity of pomace that can be handled, the "time element" involved in the present invention, as compared with that of the hydraulic press, is substantially decreased, resulting in an increase in the quantity of pomace pressed. That is, in the average hydraulic press the pomace is placed on the platen or ram in layers about forty inches square, so it is apparent that, when the pomace is under the greatest presure and the density of the pomace correspondingly increased, considerable time is necessary to allow the juice to flow from the central portions of the layer through the highly compressed pomace to the edges of the layer. For economical reasons, this requires the pressure to be maintained on the pomace until the juice has thoroughly drained out, for, if it should be taken off, the pomace would act like a sponge and re-absorb the juice within the boundaries when expanding as the pressure is relieved.

Other objects of the invention reside in certain details and, briefly described, are as follows:

To provide a firm backing for the platforms at all points throughout their length so that neither of the platforms can yield at any point.

To make the pressure-transmitting parts adjustable toward each other in a frame separate from the frame in which the platforms are mounted and in conjuncton with this feature of adjustability, provide means for regulating the pressure exerted by the platforms on the pomace passing between them.

An endless traveling apron on which the pomace is conveyed between and through the platforms is adapted to have its edge portions folded over the pomace before the pomace reaches the platform to confine the pomace to a certain relatively narrow area so that the juice can pass out the sides of the layer quickly. This obviates the necessity of forming openings in the platform flights to permit the escape of the juice, the juice in the present instance flowing to the side edges of the platform into collecting troughs at the sides of the lower platform.

To provide means at the exit ends of the platform to unfold the endless conveyor apron and addtional means for removing the compressed pomace from the apron and, if desired, means for rinsing or washing the apron before it reaches the point where it again receives a charge of pomace.

As quite a large quantity of juice is free in the pomace, the present invention also contemplates the provisions of means, preferably in the form of suction apparatus, for extracting such free juice from the pomace after said pomace has been deposited on the endless apron, but before it passes between the pressing platforms.

With these and other objects in view, the invention consists in certain novel details of construction and arrangement and combinations of parts all as will be hereinafter more fully described and the novel features thereof particularly pointed out in the appended claims.

In the accompanying drawings,—

Figures 1 and 2, jointly, show a side elevation of the machine embodying the present improvements.

Fig. 3 is a sectional view of Fig. 1.

Fig. 4 is a detail view showing the mounting of the sprockets carrying the antifriction elements.

Fig. 5 is a top plan view illustrating the belt folding devices.

Fig. 6 is a plan view of the mechanism for folding the pomace conveying apron.

Fig. 7 is a section on line 7—7 of Fig. 6.

Fig. 8 is a plan view of the means for unfolding the apron.

Fig. 9 is a section on line 9—9 of Fig. 8.

Fig. 10 is a detail view of the flights of the traveling platforms.

Fig. 11 is a detail view showing the adjustability of the sprockets carrying the antifriction elements; and

Figs. 12 and 13 are detail views of the flights of the upper and lower platforms, respectively.

In the preferred construction of the present machine, there is a main frame which comprises a series of longitudinally spaced uprights at each side, suitably braced and anchored for supporting the major portions of the machine.

At one end of the main frame, at the top thereof, there is a pomace grater 20 for grinding the apples. This grater is similar to the type of grater now used in the vinegar producing industry. The pomace goes from the grater 20 to a hopper 21 immediately beneath it and is discharged from the hopper onto a cloth belt in the form of an endless apron 22, the thickness of the layer of pomace on the apron being governed by the height of the hopper bottom above the apron. The apron 22 is supported by a stationary platform 23 and to prevent the pomace spreading on the cloth toward the end of the frame, there is a sheet of rubber forming a flat valve 24 secured to the inner wall of the hopper.

The endless apron 22, in going through the machine, is guided by a series of rollers, and the roller 25 over which the apron passes just before it passes beneath the hopper 21, is cut-away intermediate its ends to allow the central longitudinal portion of the apron to be a little slack. Between the pulley 25 and hopper 21, apron 22 passes beneath a pulley 26 mounted on a shaft 27 journaled in the main frame, which pulley 26 depresses the central portion of the apron to form it into a trough and after the apron has received the pomace and passed beyond the hopper, the upstanding side edge portions thereof pass between, and are supported by, vertically disposed rolls 28, 29, journaled in suitable boxes on the main hopper. The apron then passes under two rubber disks 30, journaled on vertical axes in boxes 31, with the result that the upstanding side edges of the apron are turned down over the pomace and central portion of the apron, the edges of the apron practically meeting above the pomace.

The apron then conveys the pomace through or between the endless traveling pressing platforms 32, 33, each composed of articulated flights in sections. In the lower platform, the flights 32^a are connected together by the sprocket chain 32^b which travels on sprockets 34, 35 in the main frame. Sprockets 34 at one end of platform 32 are fixed, but the slack in the platform can be regulated by the adjustability of the bearings 36 of sprockets 35. The upper platform 33 is of similar construction, and travels on sprockets 37, 38, in the main frame. Sprockets 37 mesh with sprockets 34, and both of said platforms are propelled by power applied to a pulley 39 on a shaft 40 which carries a pinion 41 meshing with a sprocket 105 on one of the shafts of the sprockets for the lower platform.

To firmly support the upper reach of the lower platform 32, there is a supporting member preferably consisting of two longitudinally extending I-beams 42 that are secured in brackets 43 which are in turn mounted at each of their ends on two transverse I-beams 44. Said cross beams 44 are mounted at each side of the machine on relatively large nuts 45 that are adjustable on the screw threaded portions of uprights 46 the cross beams being held down against the nuts by collars 45^a.

To reduce the friction and wear on the under faces of the flights 32^a of the platform 32, said flights are lined with metal plates 47 and at each end of the longitudinally extending I-beams 42 there are a pair of sprockets 48 on which travels an endless chain of antifriction elements 49. To regulate the slack in the chain of antifriction elements, the sprockets at one end of the said beams are mounted on a shaft 50 journaled in a bearing 51 that may be adjusted. This bearing has a shank 52 that projects between the webs of the beams 42 and which may be adjusted longitudinally of those beams by a screw 53 in a take-up box 54 on one of said beams and engaging a cross pin 55 extending from said shank through a slot in one of the beams.

The uprights 46 which are arranged in pairs at opposite sides of the machine and are spaced at opposite ends of the platforms

32, 33, constitute a supplemental frame that supports the beams just described and the means for placing the pomace under pressure.

At the upper ends of uprights 46 of the supplemental frame there are a second series of adjustable nuts 56 each supporting a pair of cross beams 57 to which there is fixedly secured, adjacent each side of the apparatus, a relatively heavy bearing plate 58. As will be understood, there is a pair of these cross beams 57 at each end of the upper platform. To hold the cross beams down tight against the nuts 56, there is provided a nut 59 on each of said uprights 46 above the cross beams. Supported from the bearing plate by bolts 60, in any desired way, are a pair of brackets 61 between which there are secured a pair of longitudinally extending I-beams 62, called the pressure beams, quite similar to the beams that support the upper reach of the lower platform. Likewise, the flights 33^a of the upper platform are lined on their inner sides with metal plates 100 to run on antifricton elements that are arranged in an endless chain adapted to travel on sprockets 63, 64, one pair of which is adjustable like sprockets 48 at the ends of the beams 62.

The castings forming the brackets 61 have ways therein fitting loosely on the uprights 46 to guide the pressure beams vertically.

The bolts 60 are free to slide in the bearing plates 58 to permit vertical movement of the pressure beams 62, and interposed between the bearing plates and the brackets 61, at each end of the upper platform, there are a number of heavy pressure springs 65, one surrounding each of the bolts 60.

With this arrangement of the main and supplemental frames, one supporting the platforms and the other adjustably supporting the pressure means, the pressure placed upon the pomace between the platforms can be nicely regulated. For instance, by taking up on the bolts 60 until the pressure exerted by springs 65 on the brackets 61 and pressure beams 62 is such as is desired, then by adjusting the nuts 45 and 56, or nuts 56, alone, the pressure beams 62 and supporting beams 42 can be adjusted with respect to each other until the upper reach of the lower platform and the adjacent or lower reach of the upper platform are just, say, touching. The pomace, tending to push the platform apart, will then, of course, be subjected to the pressure exerted by the springs 65. It will be understood that these adjustments will be such that, at the entrance end, the pressure exerted on the pomace will be relatively slight, but will be gradually increased and the maximum reached as the pomace approaches the opposite end of the platforms.

As will be apparent, the beams 42 and 62, on which the antifriction elements run, form rigid backings or supports for the platform reaches throughout their length and in order that this characteristic of firmness or inflexibility will be present in the platform reaches when under pressure, the antifriction elements are af small size so that there will be no appreciable space between the points at which they contact with the reaches of said platforms.

So far, only the proximate or adjacent reaches of the platforms have been described, but it might be here mentioned that suitable tracks, in the form of channel beams 66 on top of cross beams 57 are provided for the upper reach of the upper platform, and tracks 67 for the lower reach of the lower platform are attached to brackets 68 depending from the cross beams 44.

Between each two adjacent flights 33^a of the upper platform there is a strip 69 of rubber packing to prevent the juice going up between flights and the flights 32^a of the lower platform are likewise provided with packing strips 70, and in addition are channeled transversely, as shown at 71 in Fig. 10. These channels lead the juice expressed from the pomace to the side edges of the lower platform, where it drops into troughs 72 extending alongside the platform and from whence it is conveyed by a pipe 73 to any desired point for collection. As the layer of pomace is confined to relatively narrow limits and is relatively shallow, as compared with a multiplicity of layers that are simultaneously compressed in the present day hydraulic press, the juice is expressed from the pomace and finds its way into the troughs in a comparatively short time, thus cutting down the "time element" as before mentioned. To prevent the juice running from the edges of the flights 32^a back on the under surfaces of said flights, each flight has a drip plate 74 attached to its ends.

When the apples are grated, a large percentage of their juice is liberated, and as it would be needless and probably not economical to convey this juice, with the pomace, between the platforms to be expelled by the latter, the apron 22 passes over a free juice extracting means, preferably in the form of a suction apparatus. This apparatus consists of a suction pump 75 connected by pipe 76 to an air-tight receiving tank 77 which in turn is connected by a pipe 78 to a screened pan 79 at a point near the platforms 32, 33, although the pan extends back to a point beyond the chute 21. The receiving tank 77 has a glass gage 80 by which the operation of the suction apparatus may be observed. From the receiving tank 77 the juice is conducted to a tank 81 by a pipe 82 in which there is a check valve 83 to permit the flow of juice out of tank 77 without interfering

with the suction. Free juice draining off the pomace in the immediate vicinity of the chute 21 is conducted directly to tank 81 by a pipe 84.

After the apron 22 passes from between the platforms its edges are engaged first by horizontally disposed adjustable rollers 85 and then by disks 86 on vertical axes, all in the main frame, which rollers, jointly, serve to unfold the apron. After this, the apron passes over a roller 87 at the extreme end of the main frame and then down where it is engaged by a series of revolving beaters 88 mounted on a shaft 89 having thereon a pulley 90. These beaters engage the under side of the apron and dislodge the pomace from the opposite side of the apron. Below the beaters the apron passes around a roller 91 and at this point its upper side is engaged by a revolving brush 92 on a shaft 93 adjustably journaled in the main frame. The shaft 93 has two pulleys 94, 94a thereon, to one of which power is applied by a belt 95 from any suitable source, and the other of which is connected by a belt 96 to the pulley on the beater shaft for revolving the beaters.

As a final step in cleansing the apron there may be, if desired, a series of pipes 97 adapted to spray water against the under side of the apron, the water passing through and rinsing the apron and then being conveyed off by a pipe 98.

After the apron passes the rinsing apparatus, it passes over or around a series of rolls to the point where it receives the pomace from the chute 21. These rolls which are mostly shown more or less diagrammatically, are journaled in the frames, but one of them, at least, as that indicated at 99, is journaled in adjustable bearings acted upon by springs 101 to maintain the apron taut at all times.

As the apron enters between the platforms, it is covered by a belt 102 which provides sufficient friction on the apron to prevent the edges of the latter being forced or spread outward by the pressure of the platforms. This belt runs on rollers 103, 104, at opposite ends of the frame, the roller 103 being adjustable to regulate the tautness of said belt.

What I claim is:

1. In a cider press, the combination with the main frame, upper and lower platforms carried by the main frame, a supplemental frame comprising uprights spaced longitudinally of the platforms and arranged in pairs at opposite sides of the platforms, upper and lower cross members each slidable and adjustable vertically on each pair of uprights, supporting means mounted on the lower cross members to firmly support the upper reach of the lower platform, means carried by the upper cross bars firmly bearing against the lower reach of the upper platform, means for adjusting the upper cross members on the uprights, and means interposed between the upper cross members and the last mentioned means carried thereby for depressing said last mentioned means and said upper platform toward the lower platform.

2. In a cider press, the combination of the main frame, upper and lower endless platforms supported in the main frame and having juxtaposed reaches, longitudinally spaced uprights arranged in pairs at opposite sides of the platforms, upper and lower cross members on each pair of uprights, each of said cross members being adjustable vertically on said uprights, a longitudinal beam on the lower cross bars supporting the upper reach of the lower platform, and a longitudinal beam yieldingly suspended from the upper cross bars and bearing against the lower reach of the upper platform with a regulable pressure.

3. In a cider press, the combination of the main frame, upper and lower endless platforms supported in the main frame and having juxtaposed reaches, longitudinally spaced uprights arranged in pairs at opposite sides of the platforms, upper and lower cross members on each pair of uprights, a longitudinal beam on the lower cross bars supporting the upper reach of the lower platform, and a longitudinal beam yieldingly suspended from the upper cross bars and bearing against the lower reach of the upper platform, each beam and its cross bars being adjustable vertically on said uprights.

4. In a cider press, the combination of the main frame, upper and lower endless platforms supported in the main frame and having juxtaposed reaches, longitudinally spaced uprights arranged in pairs at opposite sides of the platforms, upper and lower cross members on each pair of uprights, said cross members being adjustable vertically on the uprights, a longitudinal beam on the lower cross bars supporting the upper reach of the lower platform, a longitudinal beam suspended from the upper cross bars and adapted to bear against the lower reach of the upper platform, a series of springs interposed between the cross bars and the beams to yieldingly urge the upper and lower beams toward each other, and means for regulating the pressure exerted by the springs on said cross beams.

5. In a cider press, the combination of a main frame, integral supporting uprights, endless upper and lower pomace platforms carried by said frame and having juxtaposed reaches, a support for antifriction elements between the reaches of each platform, said supports being slidable on said uprights and positioned in proximity to the juxtaposed reaches of the platforms, anti-friction elements interposed between said supports and

juxtaposed reaches and bearing against said reaches, and yieldable means adjacent each end of one support for urging the same bodily toward the other under a regulable mechanical pressure.

6. In a cider press, the combination of a main frame, integral supporting uprights, endless upper and lower pomace platforms carried by said frame and having juxtaposed reaches, a support for antifriction elements between the reaches of each platform, said supports being slidable on said uprights and positioned in proximity to the juxtaposed reaches of the platforms, antifriction elements interposed between said supports and juxtaposed reaches and bearing against said reaches, and means at the ends of said supports for adjusting each of said supports longitudinally of said uprights and relatively to the other throughout their length.

7. In a cider press, the combination of a main frame, fixed supporting uprights, endless upper and lower pomace platforms carried by said frame and having juxtaposed reaches, a support for antifriction elements between the reaches of each platform, said supports being positioned in proximity to the juxtaposed reaches of the platforms, antifriction elements interposed between said supports and juxtaposed reaches and bearing against said reaches, each of said supports being movable on said uprights and adjustable toward each other, and means for regulating the pressure exerted on pomace conveyed between the platforms.

8. In a cider press, the combination of a main frame, integral supporting uprights, endless upper and lower platforms carried by said frame and having juxtaposed reaches, a support for antifriction elements between the reaches of each platform, said supports being adjustable vertically on said uprights and one of said supports being adapted to be fixedly positioned with respect to a reach of one platform and the other support being yieldingly urged throughout its length toward a juxtaposed reach of the other platform, and anti-friction elements interposed between the supports and juxtaposed reaches of the platforms.

9. In a cider press, the combination of a main frame, integral fixed uprights, endless upper and lower platforms carried by said frame and having juxtaposed reaches, a support for antifriction elements between the reaches of each platform, said supports being adjustable vertically on said uprights and one of said supports being adapted to be fixedly positioned with respect to a reach of one platform and the other support being yieldingly urged throughout its length toward a juxtaposed reach of the other platform, said supports being adjustable toward each other, and means for regulating the pressure exerted on the support that is yieldingly urged toward the platform.

10. In a cider press, the combination of a main frame, upper and lower platforms carried by said frame and having juxtaposed reaches, a supplemental frame comprising integral supporting uprights, an antifriction roller support slidable on the uprights of the supplemental frame between the reaches of each platform, anti-friction rollers on said supports engaging the juxtaposed reaches of the platforms, means for adjusting said roller supports vertically on the uprights and relative to each other, and means for urging one support toward the other under a regulable mechanical pressure.

11. In a cider press, the combination of a main frame, upper and lower platforms carried by said frame and having juxtaposed reaches, a supplemental frame comprising integral supporting uprights, an antifriction roller support slidable on the uprights of the supplemental frame between the reaches of each platform, anti-friction rollers on said supports engaging the juxtaposed reaches of the platforms, means at each end for moving the upper support longitudinally of the uprights toward and away from the lower platform whereby the pressure exerted on pomace passing between the platforms may be increased as the pomace travels between the platforms, and means for mechanically placing one support and platform under a regulable, yielding pressure.

12. In a cider press, the combination of a main frame, integral supporting uprights, endless traveling upper and lower platforms supported in the main frame and having juxtaposed reaches, endless chains of relatively small antifriction elements bearing against each of the juxtaposed reaches of the platforms, a supporting way slidable on said supporting uprights for each chain of antifriction elements, said elements of each chain being positioned close to each other whereby they engage the platform substantially throughout their juxtaposed reaches, one of said supports being adapted to be fixed with respect to the reaches of the platforms, and means for placing the other support and its platform under yieldable pressure toward the fixed support throughout its length.

13. In a cider press, the combination of upper and lower endless traveling platforms having juxtaposed reaches, integral supporting uprights, a series of vertically adjustable cross-members, means for adjusting said juxtaposed reaches toward each other, and mechanical presser devices suspended from said cross members and engaging one of said platforms for urging one of said juxtaposed reaches toward the other.

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