(No Model.)

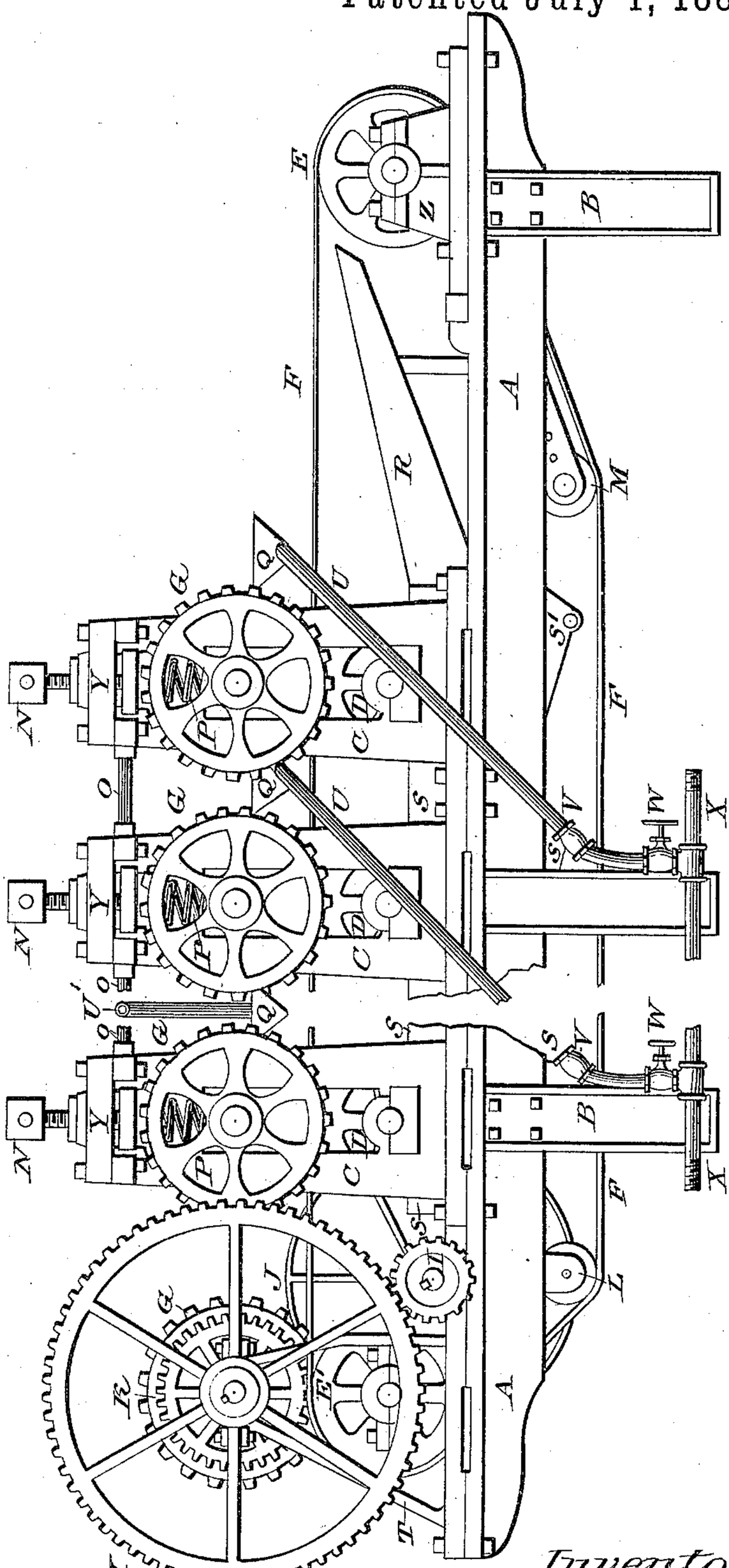
3 Sheets—Sheet 1.

H. T. YARYAN.

MACHINE FOR THE REMOVAL OF SACCHARINE MATTER FROM BAGASSE.

No. 301,198. Patented July 1, 1884.

Fig. 1.



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His Atty

(No Model.) 3 Sheets—Sheet 2.

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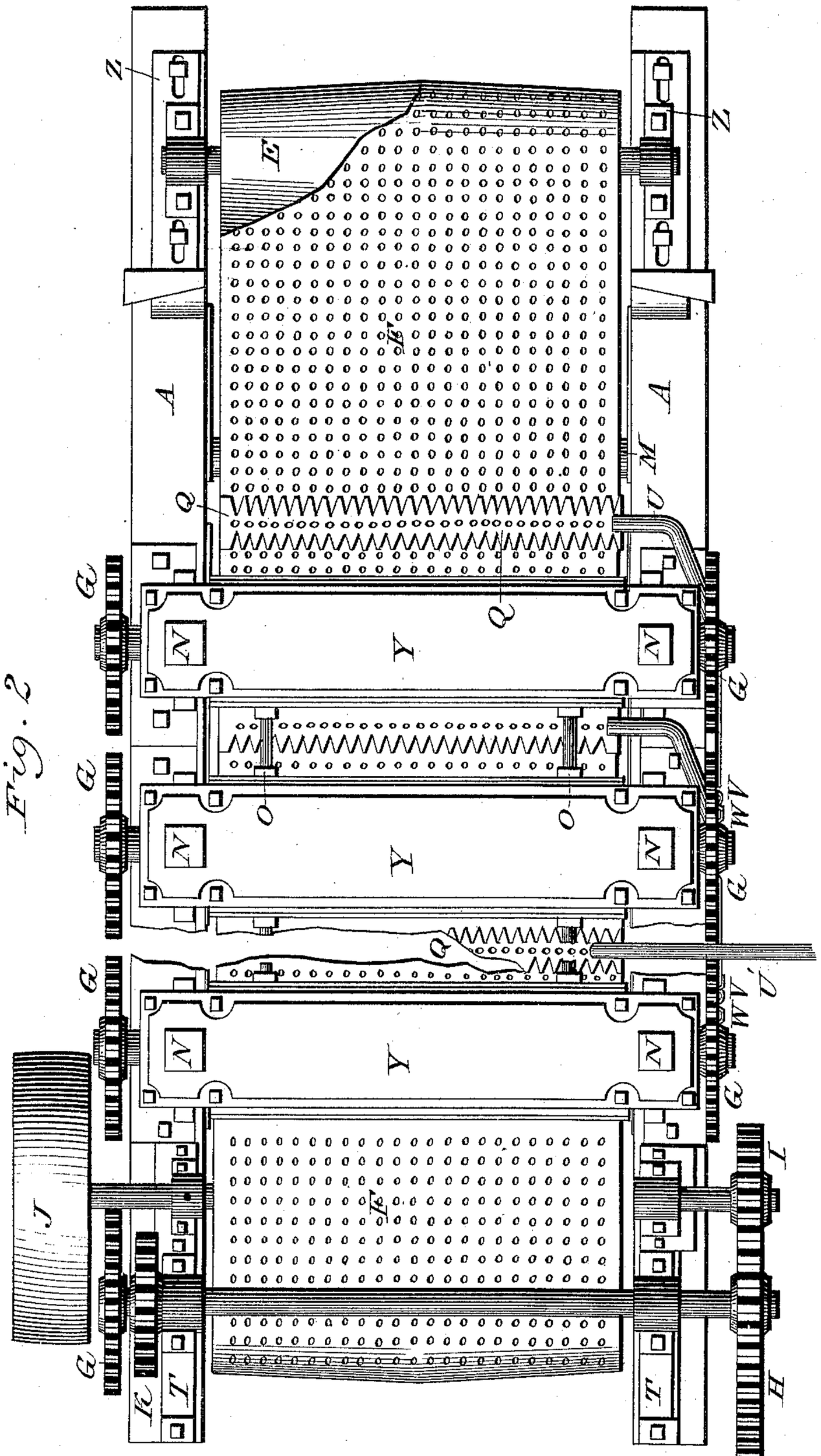
Fig. 2



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(No Model.) 3 Sheets—Sheet 3.

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Fig. 3.

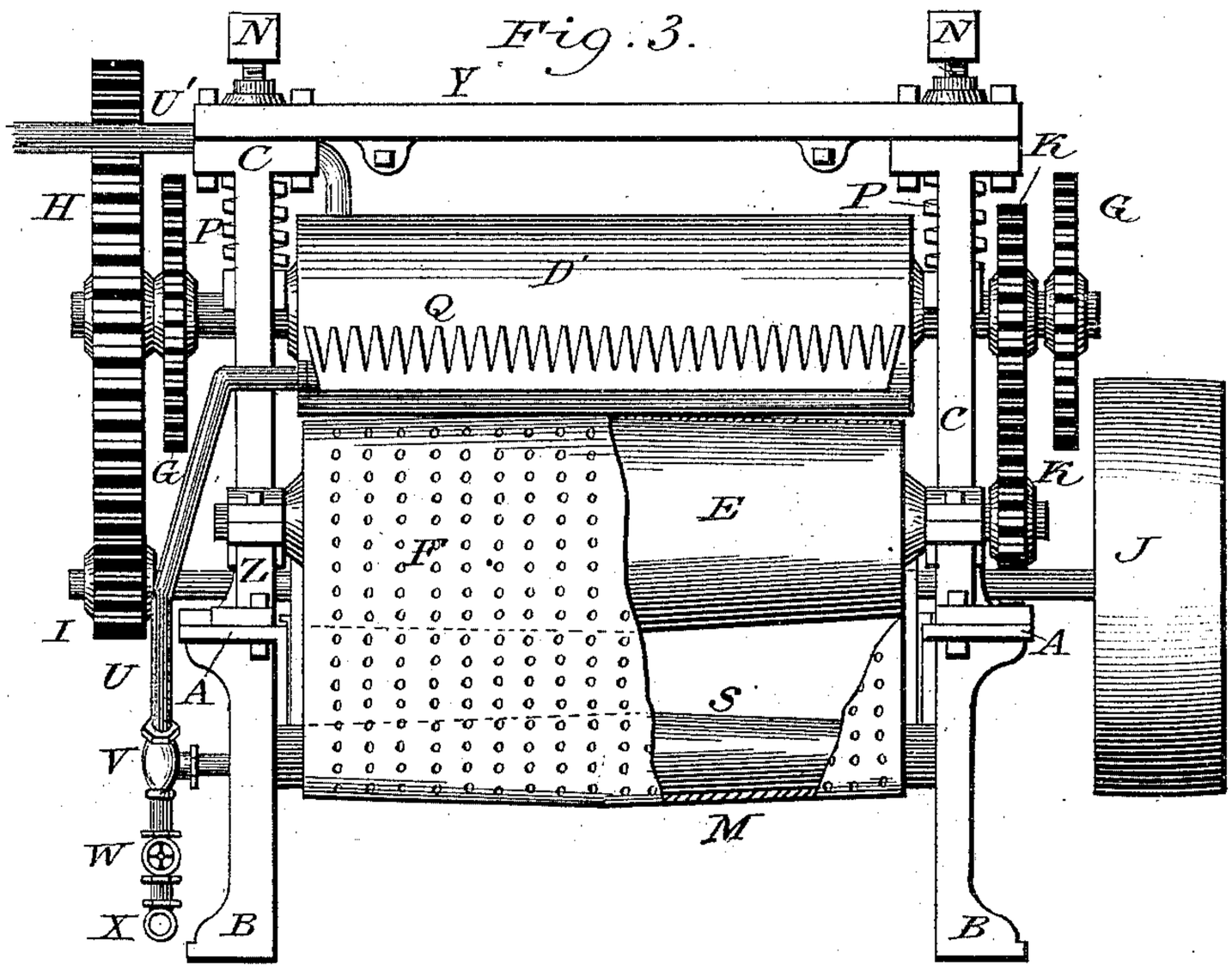
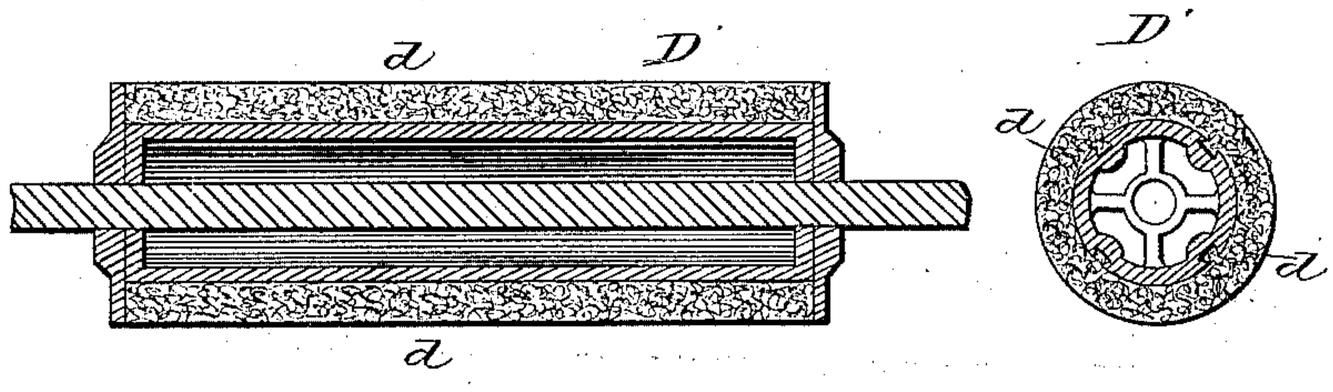


Fig. 4.



Witnesses
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His Attys.

UNITED STATES PATENT OFFICE.

HOMER T. YARYAN, OF TOLEDO, OHIO.

MACHINE FOR THE REMOVAL OF SACCHARINE MATTER FROM BAGASSE.

SPECIFICATION forming part of Letters Patent No. 301,198, dated July 1, 1884.

Application filed March 19, 1884. (No model.)

To all whom it may concern:

Be it known that I, HOMER T. YARYAN, a citizen of the United States, residing at the city of Toledo, Lucas county, Ohio, have invented a new and useful Machine for the Treatment of Bagasse, which I call a "Mechanical Diffuser," of which the following is a specification.

My invention relates to a machine for the removal of saccharine matter from sugar-cane or sorghum, which has been subjected to the usual process of squeezing and crushing between rolls. It is well known that bagasse usually retains from forty to fifty per cent. of its original saccharine matter, and the attempt to remove more has been the subject of many inventions. Usually the means adopted has been to moisten the bagasse and re-press it one or more times between the ordinary metallic rolls; but these efforts have resulted in failures, caused by the great amount of additional power required, or by the too great dilution of the juice, and the consequent expense of subsequent evaporation, or both.

The general object of my invention is, in effecting the nearly complete removal of saccharine matter from bagasse, to obviate the difficulties just referred to—

First, by reducing the amount of power required in re-pressing bagasse by substituting for rigid iron rolls, heretofore employed, rolls covered with rubber or other elastic substance, using only a moderate pressure and multiplying the number of compressions, sometimes as high as ten sets of rolls being employed. The amount of power required to run elastic rolls is very small, even where great pressure is exerted, as the elasticity at the release side of the rolls nearly equals the resistance at the feed side, which is not the case with inelastic rolls.

Second, by means of the mechanical diffusion device hereinafter described, to avoid to a greater extent than has hitherto been practicable the dilution of the juice, thus combining the diffusion process with forced expression.

In the accompanying drawings, made part hereof, Figure 1 is a side view of my device; Fig. 2, a top view; Fig. 3, an end view, (seen from the right in Fig. 1, which may be regarded as the front of the machine;) and Fig. 4, longitudinal and cross sections of elastic roll.

Similar letters refer to similar parts throughout the several views.

My machine is mounted upon a stout frame, A, provided with legs B. Housings C, designed to receive the journals and bearings of rolls D and D′, are securely bolted to frame A. Rolls D are composed, preferably, of cast-iron, hollow, while rolls D′, placed immediately above rolls D, are covered with india-rubber to a thickness of about two inches. I do not, however, limit my invention to a single elastic roll, as, obviously, both rolls in each pair may be elastic, though I prefer the arrangement described as cheaper, while accomplishing substantially the same result. At the ends of the machine are rolls or pulleys E and E′, over which and between rolls D and D′ of each set passes an endless perforated belt or apron, F. Upon each end of the shafts of rolls D′ is a sprocket or chain wheel, G. Numbering the rolls D′ in Fig. 1 from left to right, rolls Nos. 1 and 2, 3 and 4, 5 and 6, and so on, are geared together at one end by chains passing around each pair of sprocket-wheels, while at their opposite ends rolls 2 and 3, 4 and 5, 6 and 7, and so on, are in the same manner geared together in pairs, so that all the rolls D′ revolve in the same direction, the arrangement shown permitting the vertical travel of the journals of D′ in their respective housings. Motion being communicated to gear-wheel H through pinion I and driving-pulley J, a sprocket-wheel, G, upon the opposite end of the shaft of H, by chain-gearing, gives motion to the whole train, causing rolls D to revolve by contact, and endless apron F to travel between rolls D and D′ from right to left, Fig. 1. This motion of apron F is aided by roll or pulley E′, the shaft of which is connected with the driving-shaft by means of gear-wheels K and K′. Belt or apron F is kept taut by means of idler L and tightener M. The pressure of rolls D′ upon rolls D is regulated

by the thrust of compression-screw N upon compression-springs P, resting upon the journals of rolls D′. Y are cross-bars, and O tie-rods, designed to brace and strengthen the machine.

In front of each roll D′ and above perforated belt F is placed a trough, Q, provided with notches or perforations, or both, designed to distribute juice uniformly upon the belt and its burden of bagasse passing beneath. Under each set of rolls is a trough, S. The trough under the front set of rolls is marked S′, apron R constituting part thereof. These troughs are designed to catch the juice expressed by their respective sets of rolls as the juice falls through the perforations in belt F. Each trough S is provided with a pipe, U, leading to distributing-trough Q of the next preceding set of rolls. The contents of troughs S are forced therefrom into troughs Q by steam-jet pumps V, which are supplied with steam through regulating-valve W from steam-pipe X.

U′ is a pipe supplying to the trough Q belonging to the last set of rolls in the series fresh water or such other solvent as may be used.

As a substitute for the use of pumps, the rear end of the machine could be so elevated that the fluid in the machine would flow forward from roll to roll by its own gravity; but I prefer the arrangement shown.

Bagasse being spread upon the moving belt F at the front end of the machine is moistened as it passes under the drippings from trough Q. and, passing on, encounters the squeeze of the first set of rolls. The moistening and squeezing process is repeated at each set of rolls, the exhausted bagasse being finally discharged at the rear end of the machine, the juice resulting from the several expressions having fallen through the perforated belt into troughs S′ and S beneath.

It will be observed that an additional advantage is derived from the use of elastic rolls, in that it allows the use of an endless belt passing between the rolls, which is not practicable with rigid rolls, as the bagasse passing between the two unyielding surfaces would soon cut and destroy any flexible belt.

I apply water only once, and that through pipe U′, just before the bagasse reaches the last set of rolls. The very dilute juice expressed by this last set of rolls is pumped in front of the next preceding set, and this in turn to the next, and so on to the first set of rolls, where it meets the fresh bagasse from the cane-mill, and, after expression, runs off from trough S′ to a receptacle for juice. The bagasse travels in a direction opposite from the flow of the dilute juice, so that the bagasse richest in saccharine matter meets juice of the highest gravity, while the more exhausted material meets a gradually-attenuated solution, ending in pure water.

It is obvious from this description that practically all saccharine matter may thus be removed from bagasse without seriously diluting the juice, and by the expenditure of a comparatively small amount of power.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a machine for the removal of saccharine matter from bagasse or partially-exhausted comminuted sugar-cane or sorghum, the series of rolls composed of elastic substance, arranged substantially as shown and described, for the purposes specified.

2. In a machine for removing saccharine matter from bagasse, the combination of a series of elastic rolls with a series of pipes, troughs, or other conduits, by means of which a solvent passes through the machine in a direction opposite from that of the bagasse, substantially as shown and described, for the purposes set forth.

3. In a machine for removing saccharine matter from bagasse, the combination of a series of elastic rolls with perforated endless belt or apron passing between the rolls of each set or pair, all substantially as shown and described.

4. In a machine for removing saccharine matter from bagasse, the combination of a series of elastic rolls with perforated endless belt or apron F, and a series of pipes, troughs, or other conduits, by means of which a solvent passes through the machine in a direction substantially opposite from that of the bagasse, all as shown and described, for the purposes specified.

5. In a machine for the removal of saccharine matter from bagasse, the combination of elastic rolls D′ and rigid rolls D with endless belt or apron F and conduit U′, Q, S, V, U, and S′, substantially as shown and described.

6. The combination, in a machine for the treatment of bagasse, of a series of rigid rolls, D, and elastic rolls D′ and conduit U′, Q, S, V, U, and S′, all substantially as shown and described, for the purposes set forth.

7. The combination of rigid rolls D, elastic rolls D′, and endless belt F, with fresh-water inlet U′, distributing-troughs Q, troughs S and S′, pumps V, and pipes U, all substantially as shown and described, for the purposes specified.

8. The combination of a series of elastic rolls with sprocket or chain wheels G and endless perforated belt F, arranged substantially as described.

9. The combination of pinion I, gear-wheel H, and sprocket-wheels G, with series of elastic rolls D′ and rigid rolls D, substantially as shown and described, for the purposes set forth.

10. The combination of pinion I, gear-wheel H, sprocket-wheels G, and endless belt F, with series of rolls D and D′, substantially as set forth.

11. The combination of pinion I, gear-wheel

H, chain or sprocket wheels G, cog-wheels K and K′, pulley E′, and belt F, with series of rolls D and D′, all substantially as described.

12. The combination, in a machine for removing saccharine matter from bagasse, of fresh-water inlet U′, series of troughs Q S S′, steam-jet pumps V, and pipes U, with endless perforated belt F, substantially as shown and described, for the purposes set forth.

13. The combination of pinion I, gear-wheel H, sprocket-wheels G, cog-wheels K and K′, pulley E′, belt F, and rolls D and D′, with troughs Q S S′, jet-pumps V, and pipes U, substantially as shown and described, for the purposes set forth.

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Witnesses:
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H. W. BROWN.