A. & B. HULLINGER.

MACHINE FOR DRYING GARBAGE.

APPLICATION FILED APR. 4, 1914.

1,218,559.

Patented Mar. 6, 1917.

2 SHEETS—SHEET 1.

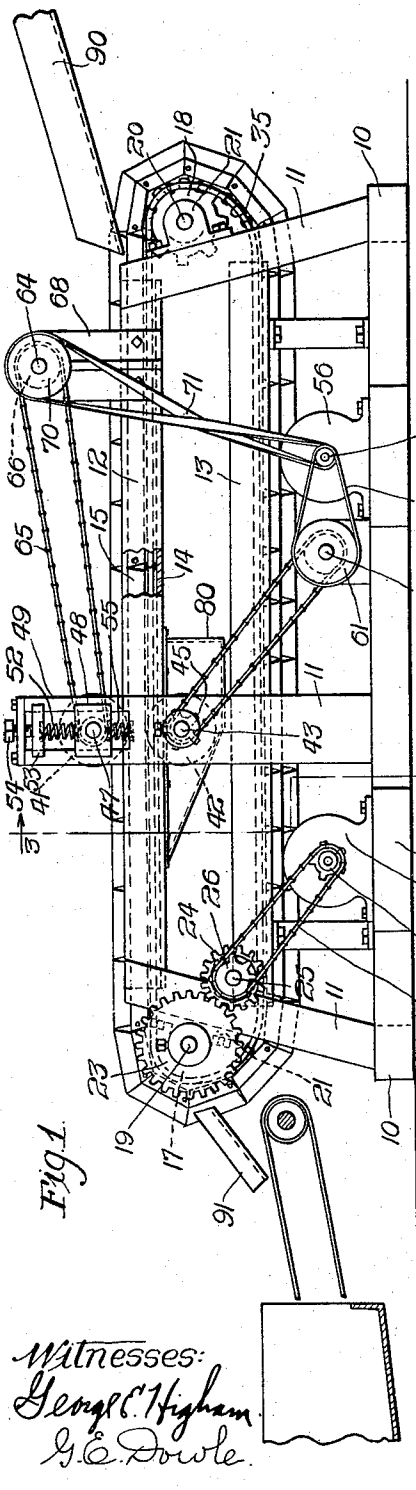


Fig. 1.

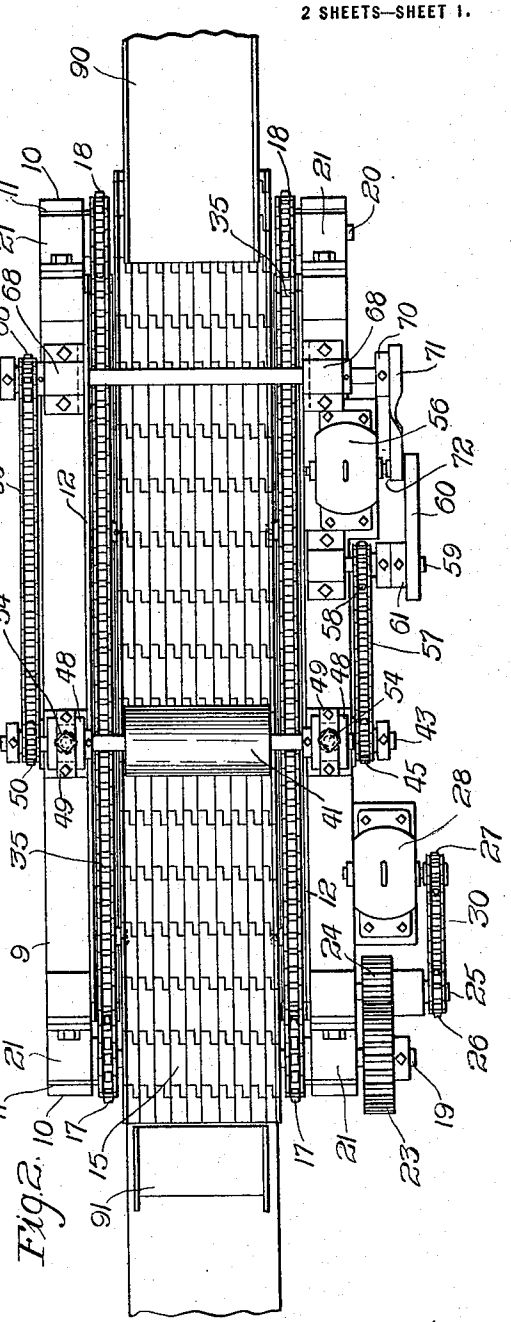


Fig. 2.

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2 SHEETS—SHEET 2.

Fig. 4.

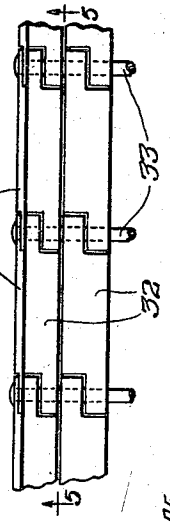


Fig. 5.

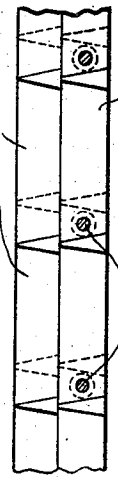


Fig. 6.

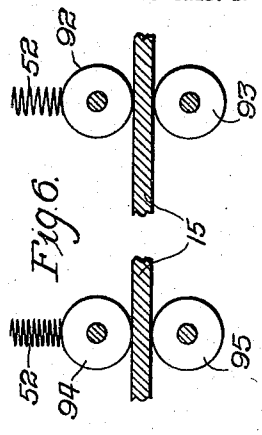
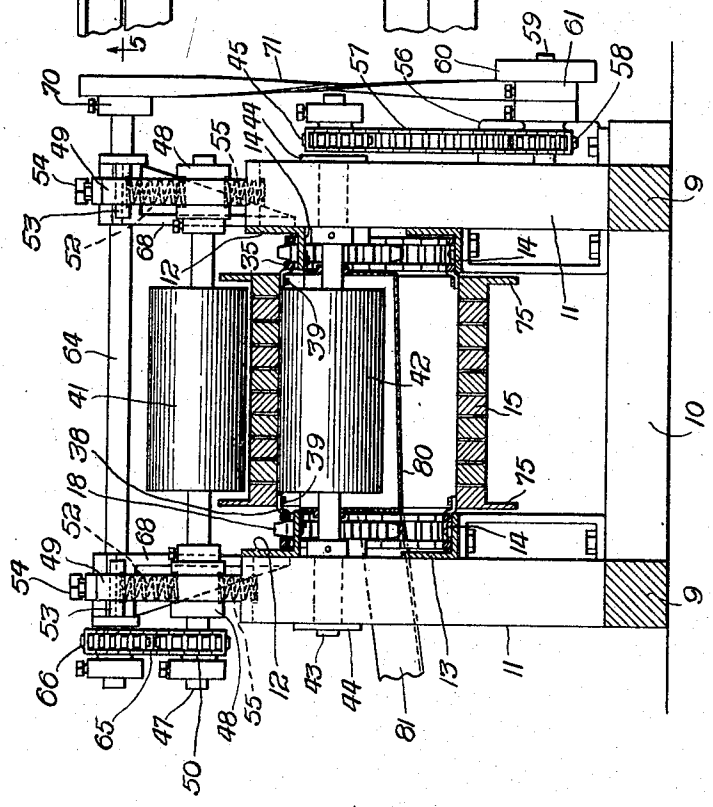


Fig. 3.



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UNITED STATES PATENT OFFICE.

ASHTON HULLINGER AND BEN HULLINGER, OF CHICAGO, ILLINOIS, ASSIGNORS TO VULCAN MACHINERY AND REDUCTION CO., OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

MACHINE FOR DRYING GARBAGE.

1,218,559. Specification of Letters Patent. Patented Mar. 6, 1917.

Application filed April 4, 1914. Serial No. 829,574.

To all whom it may concern:

Be it known that we, ASHTON HULLINGER and BEN HULLINGER, citizens of the United States, and residents of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Drying Garbage; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in the art of drying garbage and the like for the purpose of subsequently treating same to produce a fertilizer, or for other purpose, and the invention refers more specifically to means for mechanically predrying the garbage, either before or after it has been crushed or ground in a grinding machine, and prior to delivery to a heat drying apparatus, so as to thereby reduce the cost of fuel required, under prior practice, to dry the garbage; to shorten the time of handling a given amount of garbage, and to increase the capacity of the garbage drying apparatus.

Among the objects of the invention is to provide an exceedingly simple, efficient and reliable device for mechanically predrying the garbage for the purpose set forth, and one which may be produced at small cost and operated with an economical expenditure of power.

A further object of the invention is to provide an improved traveling bed upon which the garbage is delivered and by which it is carried to the pressing and squeezing rollers, which possesses a high degree of flexibility to adjust it to the driving and guiding rollers; is strong and durable to withstand the squeezing pressure brought upon the material to be dried, which is self cleaning and which may be readily repaired at small cost.

The invention consists in the matters hereinafter set forth and more particularly pointed out in the appended claims.

As shown in the drawings:—

Figure 1 is a side elevation of a drying machine embodying our invention.

Fig. 2 is a plan view thereof.

Fig. 3 is a vertical section on the line 3—3 of Fig. 1.

Fig. 4 is a plan detail illustrating the conveyer table or bed.

Fig. 5 is an edge detail of the conveyer table. Fig. 6 is a detail showing a modification of the pressing means.

As shown in the drawings the frame of the machine consists of two lower horizontal rails or stringers 9, 9 end rails 10, 10, upright posts 11, 11 arranged at the sides of the machine, and upper and lower horizontal members 12, 13 extending longitudinally of the machine. The said upper and lower horizontal members, as herein shown, are made of angle bars, with their flanges 14 directed inwardly to constitute upper and lower tracks which support the traveling bed and the driving chains, hereinafter to be described.

15 designates the said traveling bed which has the form of an endless conveyer. It is trained about front and rear sprocket wheels 17, 18 at the front and rear ends, respectively, of the machine frame. The driving shafts 19, 20 of the said sprocket wheels are mounted in bearings 21, 21 supported on the frame. The shaft of the rear sprocket extends laterally beyond the frame to constitute the driving shaft for the movable bed or conveyer. As herein shown, the extended end of the said shaft is provided with a large gear wheel 23 which meshes with a pinion 24 that is rotatively mounted on a stud 25 which is fixed to and extends laterally from the adjacent side of the machine frame. Mounted also on said stud 25 to rotate thereon and fixed to the pinion 24 is a sprocket wheel 26. About said sprocket wheel 26 and a sprocket wheel 27 on the power shaft of a motor 28 is trained a driving belt 30 through which power is transmitted from the motor to drive the traveling or movable bed.

The said traveling or movable bed is made relatively wide and is made flexible to pass around the sprocket wheels 17, 18. It is made of a construction to constitute a continuous supporting surface. It comprises a plurality of relatively short, narrow link sections 32, 32 (Figs. 4 and 5) arranged side by side throughout the width of the bed and having notched or off-set overlap-

ping engagement at their ends, and pivoted together at their overlapping ends by means of pivot rods 33 which, as herein shown, extend throughout the width of the bed from side to side thereof. The liquid squeezed from the material as it is pressed between the roller 41 and the bed may pass in part through the spaces between the link sections thereof or be in any other suitable manner drained from the bed and separated from the garbage being treated. Said link sections are spaced sufficiently close together to prevent the passage of any substantial quantity of solid material therebetween. Such solid material which may find its way between the links will be cleared from the links by relative movement thereof in the parts of the flexible bed that pass around the sprockets, as will be obvious from an inspection of Fig. 1. Thus the traveling bed becomes self cleaning.

From an inspection of Fig. 5, it will be noted that the links are made individually relatively deep and heavy, so that the belt composed thereof is capable of withstanding the heavy pressure of the squeezing rollers. The said links may be made of soft steel or other material suitable to the character of the product being operated upon. By reason of the relatively narrow width and length of the links, the bed is designed to adapt itself to the pressing rollers and to the variable thickness of layers which pass between the bed and the upper presser roller, so as to thereby avoid imposing undue stress on the bearings, of the upper and lower rollers or on the elements of the bed. Moreover, by reason of the relatively small dimensions of the links, a breakage of one of said links is not serious, as it may be readily replaced.

As herein shown, the movable bed is driven from front and rear shafts 19, 20 by means of sprocket driving chains 35, 35 suitably attached to the edges of the movable bed, said sprocket chains being trained about the sprocket wheels 17, 18 fixed, respectively, to the rear and front carrying shafts 19, 20. The means for connecting the driving chains to the said movable bed consist, as herein shown, of suitable studs or projections 38, 38 made integral with certain links of the chain, which overlap and are attached to certain of the side links of the conveyer bed by rivets 39.

Arranged below and above the movable bed, and preferably at one side of the longitudinal center, are upper and lower presser or squeezer rolls 41, 42, respectively. The lower roll engages and directly supports the flexible bed, while the upper roll is spaced a suitable distance above the bed to receive between the same and the bed a film or layer of the garbage product being operated upon. The shaft 43 of the lower roll is mounted in suitable bearings 44 at the sides of the frame, and is extended beyond the frame at one side thereof to carry a sprocket wheel 45 by which the lower roll is driven. The shaft 47 of the upper roll is mounted in suitable bearing boxes 48 which, as herein shown, engage suitable vertically slotted guides 49, that rise from and are fixed to the frame, so that said bearings and said upper roll may move toward and from the traveling bed. The said shaft 47 extends at one end beyond one side of the machine frame and is provided at its extended end with a sprocket wheel 50 by which the upper presser roll may be driven.

The said upper presser roll 41 is pressed yieldingly toward and upon the material carried by the movable bed by means of springs 52, 52 associated with the guides and interposed between the bearing boxes 48 and suitable abutments 53 in the said guides, as most clearly shown in Fig. 1. The said upper abutments 53 are engaged by the lower ends of adjusting screws 54, screw-threaded through the upper ends of the guides, whereby the springs may be adjusted to exert more or less compressive force on the upper roll 41 to press it upon the product carried by the movable bed. In order that the upper roll 41 may be held off the traveling bed when no material is passing through the machine abutments 55 are arranged below the roll carrying boxes 48, herein shown as comprising spring abutments, which are arranged between said boxes and the lower ends of the guides therefor. Said spring abutments also prevent the upper roll from dropping abruptly upon the bed after it has been raised therefrom in passing over a relatively solid constituent of the garbage material, as a stone or a piece of metal. Said upper roll, in practice, weighs many hundreds of pounds and a sharp or abrupt dropping of the roll upon the bed would be disastrous.

The lower roll is shown as driven from a motor 56, suitably supported on the base of the machine or at the side thereof, through the medium of a sprocket belt 57 which is trained about the sprocket pinion 45 on the shaft of the lower roll and about a sprocket pinion 58 on a horizontal counter shaft 59 which is mounted in the machine frame. The said counter shaft 59 is driven from the motor by means of a belt 60 that is trained about a pulley 61 on the said counter shaft 59 and a pulley 62 on the shaft of the motor 56.

The upper roll is driven from a second counter shaft 64 through the medium of a sprocket chain 65 trained about a sprocket pinion 66 on said counter shaft and the sprocket wheel 50 on the shaft of said upper roll. The said counter shaft 64 is shown as mounted in bearings 68, 68 carried by

the machine frame, and extends transversely across and above said frame. The shaft is provided at one side of the machine adjacent to the motor 56 with a belt pulley 70 which is driven by a belt 71 from a pulley 72 on the shaft of the motor 56. As herein shown, the belt 71 is crossed in order that the surfaces of both upper and lower presser rolls in contact with the bed shall move in the same direction as said bed. Preferably, the said presser rolls, especially the upper one, will rotate at a peripheral speed slightly in excess of the speed of the bed.

In order to prevent the material being operated upon from falling off the sides of the conveyer bed, the sides of said bed are provided with upstanding flanges or ledges to constitute side walls of the resultant trough-like bed. Preferably, and as herein shown, said side rails are made of short sections 75 which are made integral with the outer or side links of the conveyer and stand upwardly therefrom, with each flanged section overlapping at its ends adjacent flanged sections, as shown in Fig. 5.

The liquid which is pressed or forced between the link sections of the bed from the garbage material as it passes beneath the upper presser roll 41 may be caught by a drain pan 80 suitably supported below the upper roll and between the upper and lower laps of the conveyer bed. Said pan inclines downwardly toward a drain trough 81 which leads downwardly and laterally to the side of the machine to a suitable place for disposal of said liquid.

In the use of the machine described in a system for the disposal of garbage, garbage, either ground in a suitable grinding machine, or in a raw state, when suitable for immediate drying, is delivered through a chute 90 to the movable bed at the front end of the machine. The movable bed carries the garbage rearwardly beneath the presser roll 41 and said garbage is subjected to a pressing or squeezing operation between said roll and said bed, the bed being supported or upheld by the lower roll 42. At this point, from forty to sixty five per cent. of the moisture of the garbage is driven from the material and is drained from the bed. The predried garbage is, by the movable bed, delivered to an inclined chute 91 which directs it to and through a heat drying apparatus where the remaining moisture is driven therefrom.

By reason of the mechanical predrying of the material, and because of the fact that the material enters the heat drying apparatus with about or quite one-half of its original moisture removed, the period of drying of the material in the heat drying apparatus is greatly shortened, with the result of greatly reducing the fuel necessary to produce the drying heat. For the same reason, the capacity of the heat drying apparatus is greatly increased, and a greatly increased volume may be treated therein, as compared to prior practice.

In some instances, we may provide more than one set of presser rolls through or between which the material progressively passes, as shown in Fig. 6, where 92, 93 designate the first set of rolls and 94, 95 designate the succeeding set of rolls. In this arrangement, it will be desirable that the succeeding rolls operate upon the material with progressively greater pressure which may be affected by the adjusting screws 54. Thereby a greater percentage of moisture may be mechanically driven from the material being operated upon.

It will be understood that other material than garbage may be operated upon by said machine, in the same general manner as herein set forth. The liquid pressed from the material may be treated to reclaim therefrom any by-products of value. The dried material may also be treated to reclaim therefrom any products of value, or may be employed for fertilizer uses.

It is obvious that the illustrated structural details may be considerably varied within the spirit and scope of the invention, and the invention is not limited to such details except as hereinafter made the subject of specific claims and as imposed by the prior art.

We claim as our invention:—

1. In means for treating garbage and the like, for the purpose set forth, an endless traveling conveyer bed, a lower fixed supporting roll to support the bed, an upper yieldingly pressed roll, above the lower fixed roll to yieldingly press the material on the bed, and yielding means to hold the upper roll out of contact with the bed.

2. In means for treating garbage and the like, for the purpose set forth, an endless traveling conveyer bed, a lower fixed supporting roll to support the bed, and an upper pressing roll above the bed and the lower roll, with adjustable spring pressed means to press the upper roll toward said bed and a yielding abutment to hold the upper roll out of contact with said bed.

3. In means for treating garbage and the like, for the purpose set forth, an endless traveling conveyer bed, a lower fixed supporting roll to support the bed, an upper spring pressed roll to press the material upon said bed, and means to actuate said upper and lower rolls comprising means to impart to said upper roll a peripheral speed greater than the speed of said bed.

4. A machine for the purpose set forth, comprising a traveling carrier, having a straight treating or supporting surface from end to end of the machine and longitudi-

nally and transversely flexible, said carrier being composed of narrow short links arranged closely side by side to constitute a continuous or unbroken supporting portion, said links having at their ends offset overlapped portions and hinged together at their overlapped portions by transverse hinge rods, said offset overlapped portions being shorter than the main wider bodies of the links, which latter are twice the width of the end offset portions and of substantially greater length than said offset portions, a lower bed-supporting roller, an upper coöperating squeezing roller and supporting and driving means for the rollers and carrier.

5. A machine for the purpose set forth comprising a traveling carrier, having a straight treating or supporting surface from end to end of the machine and longitudinally and transversely flexible, said carrier being composed of narrow short links arranged closely side by side to constitute a continuous or unbroken supporting portion, said links having at their ends offset overlapped portions and hinged together at their overlapped portions by transverse hinge rods, said offset overlapped portions being shorter than the main wider bodies of the links, and the offset portions at the ends of the links being of less length than that of the main bodies of the links, a lower bed-supporting roller with fixed bearings to sustain it, an upper squeezing roller and yielding means to sustain the latter roller and to normally support it out of contact with the carrier but to permit it to be displaced away from the carrier.

In testimony, that we claim the foregoing as our invention we affix our signatures in the presence of two witnesses, this 1st day of April, A. D. 1914.

ASHTON HULLINGER.
BEN HULLINGER.

Witnesses:
CHARLES J. MICHAL,
HARRY J. HULLINGER.

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