(No Model.) 2 Sheets—Sheet 1.

W. R. HINSDALE.

DESICCATING ROLL.

No. 363,827. Patented May 31, 1887.

Fig. 2

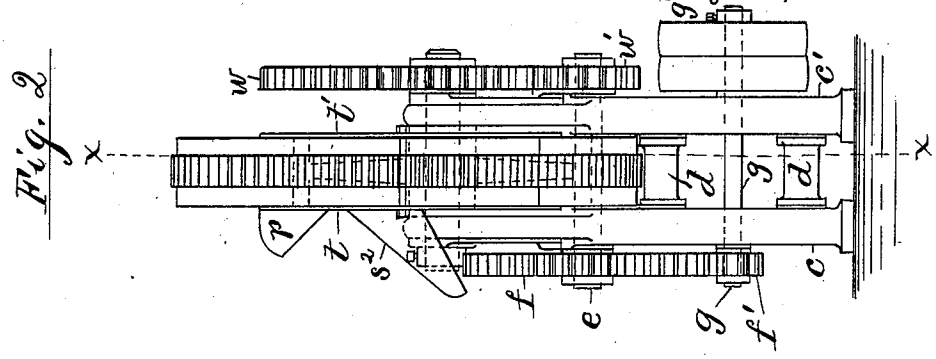
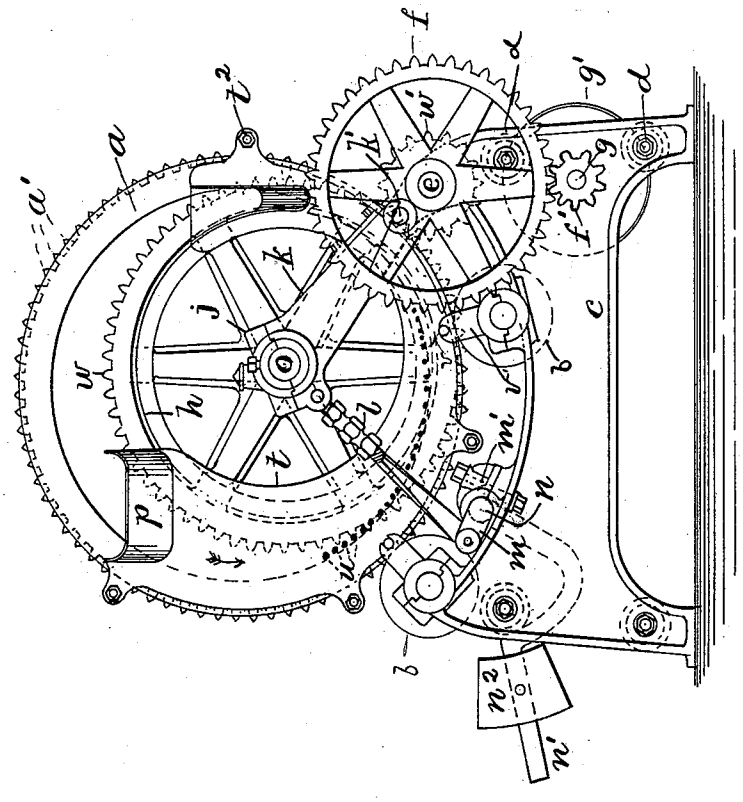


Fig. 1.



Attest:
L. Lee.
Henry J. Theberath

Inventor.
William R. Hinsdale,
per Crane Miller Attys.

N. PETERS. Photo-Lithographer, Washington, D. C.

(No Model.) 2 Sheets—Sheet 2.

W. R. HINSDALE.

DESICCATING ROLL.

No. 363,827. Patented May 31, 1887.

Fig. 3.

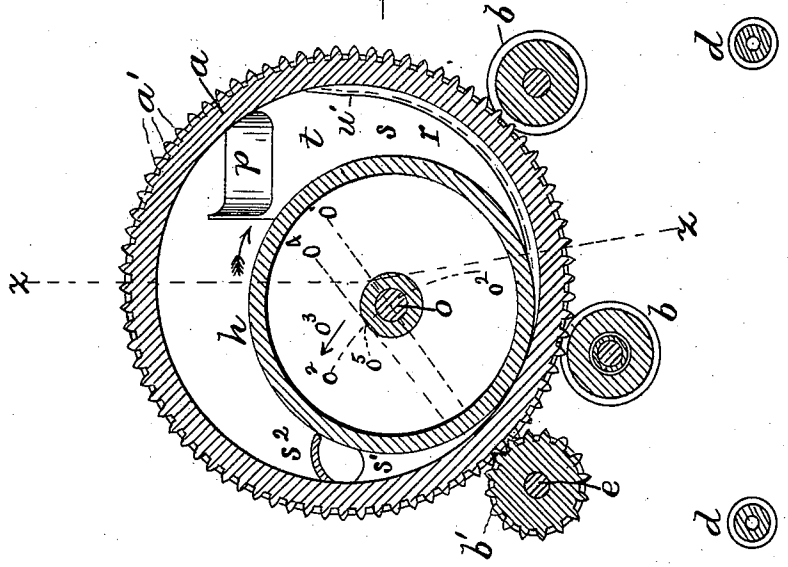


Fig. 4.

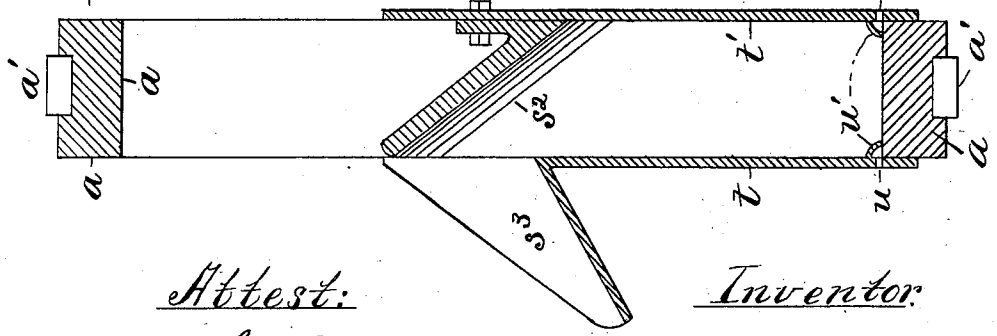
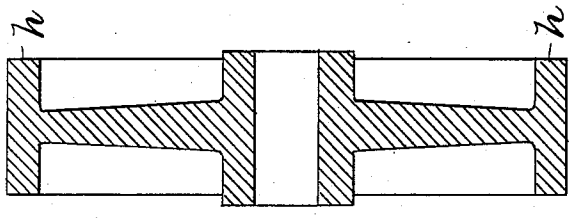


Fig. 5



Attest:

L. Lee.

H. J. Sheberath,

Inventor.

William R. Hinsdale,

per Crane & Miller, Atty's.

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM R. HINSDALE, OF BROOKLYN, NEW YORK.

DESICCATING-ROLL.

SPECIFICATION forming part of Letters Patent No. 363,827, dated May 31, 1887.

Application filed September 15, 1886. Serial No. 213,646. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM R. HINSDALE, a citizen of the United States, residing at Brooklyn, Kings county, New York, have invented certain new and useful Improvements in Desiccating-Rolls, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The object of this invention is to expel the water from sedimentary matters and to keep the fluid from mingling with the solid parts after the separation is effected. This object is attained by a construction of compressing-rolls in which the moist material is fed upward, so that the solid matters, when freed from their moisture, are lifted above the expelled fluid and are effectually prevented from mingling again therewith.

My invention is particularly applicable to the expulsion of the moisture from the sludge collected from sewage-tanks, as such matters may be transported and made useful with great facility, if in a condensed form, and because the nature of such sludge is adapted to quickly foul any kind of filtering apparatus which separates the fluid from the solid matters by any process for straining or filtering the same.

My present improvement consists, partly, in the combination, with a hollow cylindrical shell, of an internal roller in contact with the bore of the shell, of means for supporting and driving the shell, and means for producing a yielding pressure of the roller upon the shell, and partly in a particular construction to protect the outlets of the guards from being clogged.

Figure 1 of the drawings shows a side elevation of the entire apparatus; Fig. 2, an edge view of the same as seen from the right side of Fig. 1, two of the ties appearing at the nearer side of the frame and the parts in the rear of the ties being omitted from the view; Fig. 3, a vertical transverse section on line *x x* in Fig. 2; Fig. 4, a longitudinal section of the shell and its attachments on line *z z* in Fig. 3, and Fig. 5 a longitudinal section of the roller through its center line. Figs. 4 and 5 are drawn to a larger scale than Figs. 1, 2, and 3.

a is the shell, formed as a ring of cast-iron, supported at its lower side upon rollers *b*, and provided around the middle of its length with gear-teeth *a'*. The rollers are mounted between two frames, *c* and *c'*, connected together by ties *d*, and part of them are grooved at the middle to pass the teeth *a'*, while another is furnished with teeth *b'* to drive the shell *a* by contact with the teeth *a'*.

The shaft *e*, upon which the toothed roller *b'* is mounted, is provided with a gear, *f*, driven by a pinion, *f'*, shaft *g*, and fast and loose pulleys *g'*. The shell turns freely upon the several rollers, and sustains within it the drum *h*, which presses upon the inner side of the shell at one side of its lower point, thus forming spaces of unequal size at its right and left sides.

The drum-shaft *o* is carried in boxes *j* at the upper end of links *k*, which are pivoted to the frames *c c'* at such point that the movement of the links in one direction serves to retract the drum from the shell, and in the other direction to press the drum toward the shell. Connecting-rods *l* are affixed to the head of the links and coupled to cranks *m* upon a rock-shaft, *n*, which is pivoted in bearings *m'* upon the frame. The rock-shaft is furnished with a lever, *n'*, and weight n^2, to draw the links *k* sidewise and to press the drum upon the shell with a regulated pressure.

Cheek-pieces or guards *t t'* are applied to the ends of the shell or drum to confine the sludge between them, and the material is thus forced to pass between the drum and shell, which expels the fluid part, while the solid matters adhering to their surfaces are carried beyond their point of contact.

The drum and shell may be made of any length, but are shown of the same length herein, or quite short, forming narrow rings of metal, and the guards *t t'* are held snugly against the opposite sides of the same by tie-bars t^2, bolted between lugs extended from the guards beyond the line of the teeth *a'*. The guards are each provided at one point with a stud, *v*, which is held from movement by a lug, *v'*, fixed rigidly upon the frame *c c'*.

The shell and drum rotate freely between the guards, while the latter are held by the lugs *v'* from movement in any direction, the guards thus retaining a constant relation to

the frame and to the point of contact of the drum and shell.

As the drum rests at one side of the bottom of the shell, the spaces *s s'* at its opposite sides are of unequal capacity, and the sludge is fed into the larger space by means of a hopper, *p*, affixed to the guard *t*, and the drum and shell are revolved in the direction of the arrow to press the material forward into the smaller space, *s'*.

The effect of turning the links is shown by dotted lines in Fig. 3, the line *o'* indicating the direction of the link when the rolls are in contact, as shown in such figure, and the line o^2 being drawn concentric with the pivot *k'* of the links, and representing the movement of the drum when the links are turned in the direction of the arrow o^3.

Assuming the links to be moved to the direction of the line o^4, the center of the drum would be shifted to the point o^5. This point being farther from the interior of the shell than the center of the shaft *o* would effect the removal of the drum from contact with the shell, and permit foreign substances—as iron or stone of certain thickness—to pass between without injury to the rolls.

The function of the weighted lever *n'* is not only to produce an elastic pressure between the operative surfaces of the rolls, but to afford a certain degree of relief to their contact in case of necessity, and it is therefore immaterial whether a weight or spring be applied to produce such pressure, or whether the tension be applied by jointed links drawn laterally under the tension of the connections *l*, or whether it be effected by other suitable means.

The sludge matter is carried into the space *s'* and is delivered by a scraper, s^2, into a spout, s^3, formed upon one of the guards. To discharge the fluid from the space *s* without the escape of any sludge, outlet-holes *u* are formed in the guards along the inner edge of the shell and are protected by covers *u'*, formed upon the inner side of the guards and extended, in contact with the inner curve of the shell, so as to form a channel communicating with the holes *u*. The thinner liquid expelled from the sludge is able to escape at the extended line of the joint where the covers *u'* touch the shell, while the covers prevent the passage of any large particles through the holes *u*.

The scraper s^2 acts upon the operative surface of the shell, and also of the drum, if required, and prevents the carriage of the solid matter from the space *s'*, and the accumulated matter is then forced to escape through the opening in the guard *t*, which discharges to the spout s^3, the scraper being preferably inclined, as shown in Fig. 4, to facilitate such discharge. In the same figure the scraper is shown secured by bolts upon the guard *t'*, by which means it may be adjusted toward the moving surfaces when worn, or it may be pressed toward the same by means of a spring. The drum is shown rotated at the same rate of speed as the inside of the shell by a gear, *w*, at the outer end of its shaft *o*, and a pinion, *w'*, affixed to the end of the shaft *e*.

The operation of the device is continuous, the fast pulley upon the shaft *g* serving to rotate the drum and shell together, and the hopper being fed with a regulated supply of the wet material, which falls into the space *s*, from whence the solid matters pass beneath the drum to the space *s'* and the spout s^3, while the fluid escapes through the holes *u* in the guards and runs down beneath the machine, from whence it may be conducted in any required direction.

The weight upon the lever *n'* may be adjusted to produce any desired tension upon the shaft *o*, which carries the drum and rotates in the ends of the links *k*, and the pressure exerted by the drum upon the shell in expelling the moisture from the sludge may thus be varied as required.

To avoid the introduction of metallic or other injurious objects into the mill, the sludge or other material would require to be screened in some suitable manner before its introduction to the hopper *p;* and to prevent the overflowing of the space *s* with a superfluous charge of the material, the supply of the latter to the hopper may be regulated by a screw-conveyer, a chain elevator, or other form of carrier adapted to furnish a regular delivery.

By my improvement sewage matters may be subjected to treatment in suitable tanks to precipitate the sludge matters, and after the clarified liquid has been withdrawn the sludge may be readily concentrated, so as to bear handling in barrels to be transported for use as a fertilizer. In such a process the liquid expressed from the sludge would be conducted to one of the settling-tanks, as it would unavoidably contain a large amount of fine particles in suspension. Such particles would be entangled with the coarser matters precipitated in such settling-tank upon a subsequent chemical treatment, and could then be separated from the fluid by the action of my apparatus.

I have termed my invention "desiccating-rolls," as the function of the shell or ring *a* is similar, in certain respects, to that of a convex roller, and the operation of the machine, when made of suitable strength to exert great pressure, is adapted to press almost all the moisture from the material treated.

Having thus set forth my invention, what I claim herein is—

1. In a desiccating apparatus, the combination, with a hollow cylindrical shell and a drum fitted therein and mounted in yielding bearings, of a frame provided with rollers sustaining said shell, gearing to rotate the shell, guards fitted to the ends of the drum and shell and held stationary, as described, and means, as the weight n^2 and lever *n'*, applied to the drum-bearings for pressing the drum upon the interior of the shell in a yielding manner, as and for the purpose set forth.

2. In a desiccating apparatus, the combination, with a hollow cylindrical shell and a

drum fitted therein, of a frame provided with rollers sustaining said shell, gearing to rotate the shell, guards fitted to the ends of the drum and shell and held stationary, as described, and the links *k*, pivoted upon the frame, as at *k'*, and sustaining the drum-shaft *o* in their outer ends, and means, as connections *l*, for drawing the links laterally, and thereby pressing the drum against the inside of the shell, as and for the purpose set forth.

3. In a desiccating apparatus, the combination, with a hollow shell, of a drum rotated in contact with the inner side of the shell at one side of its bottom, and guards applied to the ends of the shell and drum, forming unequal spaces *s* and *s'*, the space *s* being supplied with a hopper, *p*, and the space *s'* with a scraper, s^2, and spout s^3, and the guards being provided with holes or outlets *u* and with covers *u'*, fitted to the inside of the shell, as and for the purpose set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM R. HINSDALE.

Witnesses:

THOS. S. CRANE,

L. LEE.