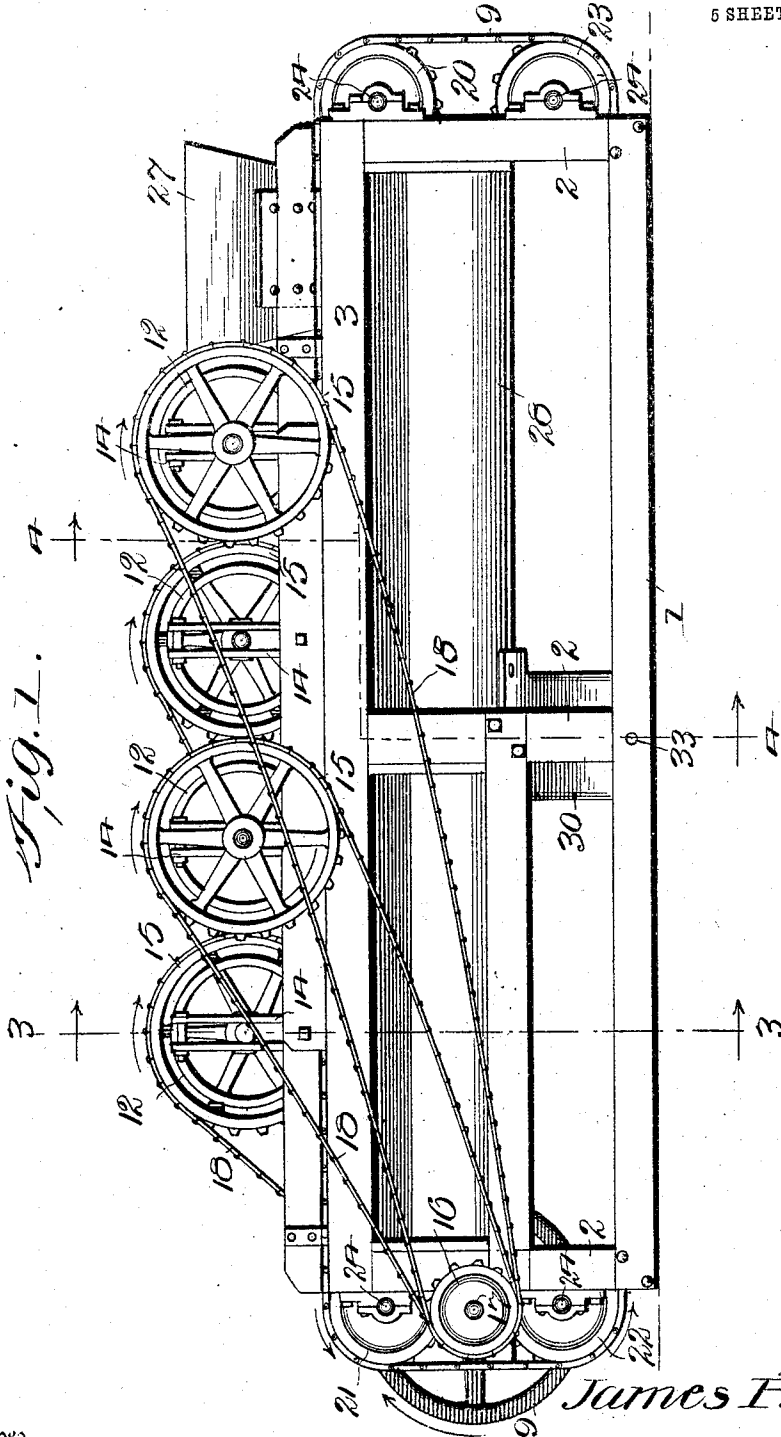


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CLAY PULVERIZING AND STONE SEPARATING MACHINE.

APPLICATION FILED JULY 20, 1904.

5 SHEETS—SHEET 1.



Witnesses

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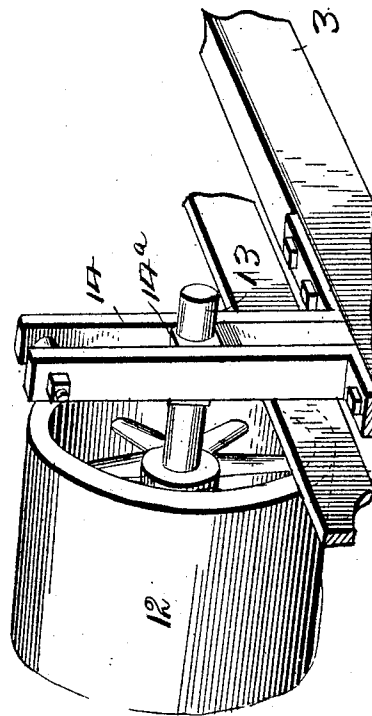
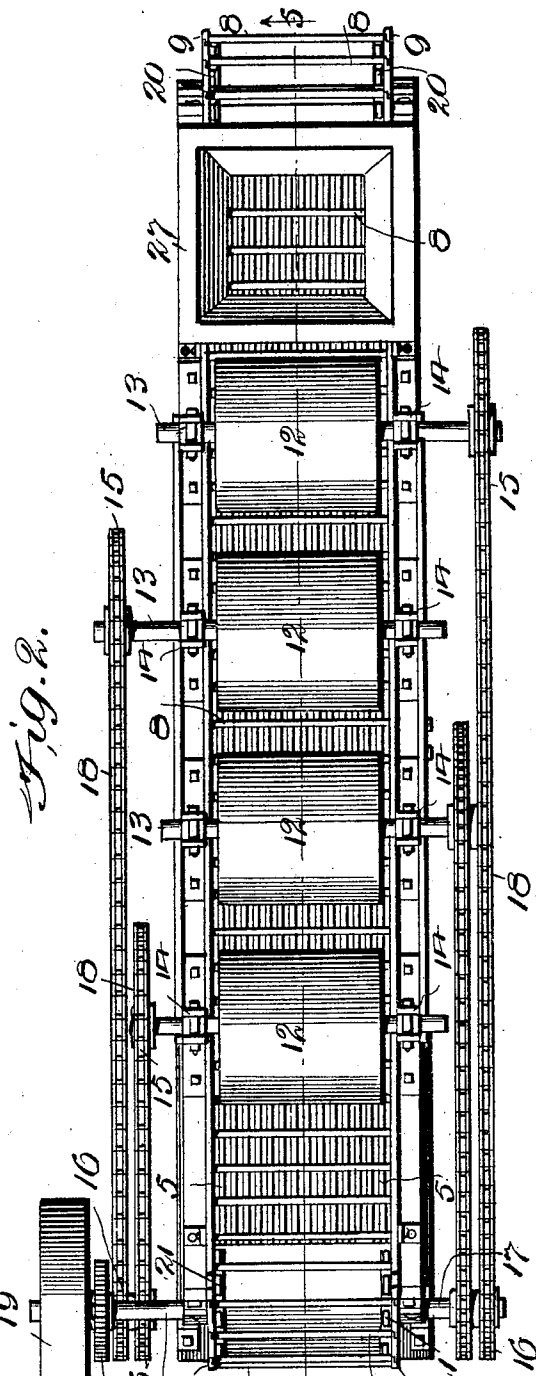
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5 SHEETS—SHEET 2.



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5 SHEETS—SHEET 3.

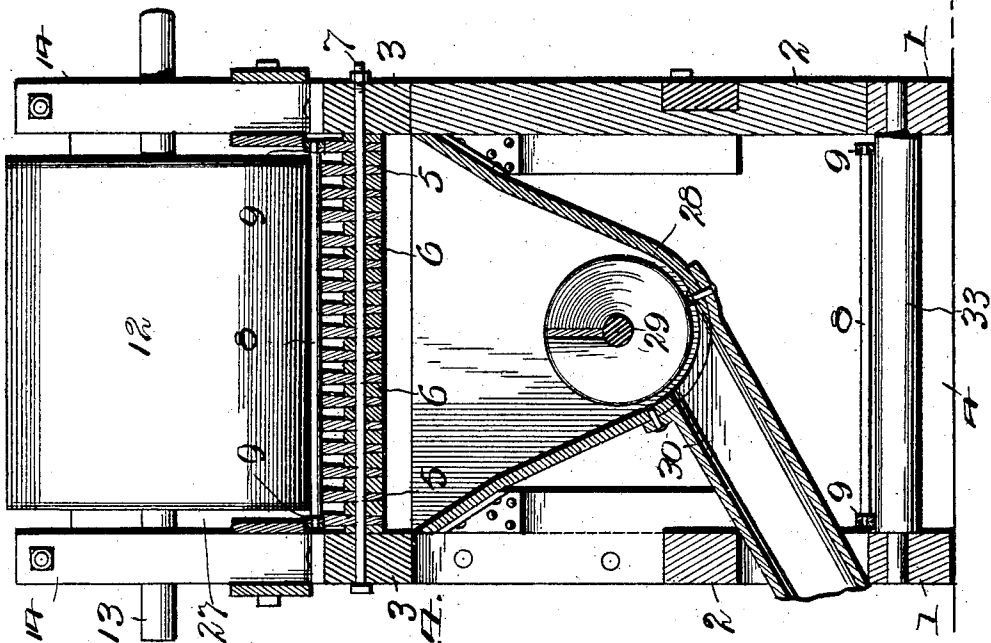


Fig. 1.

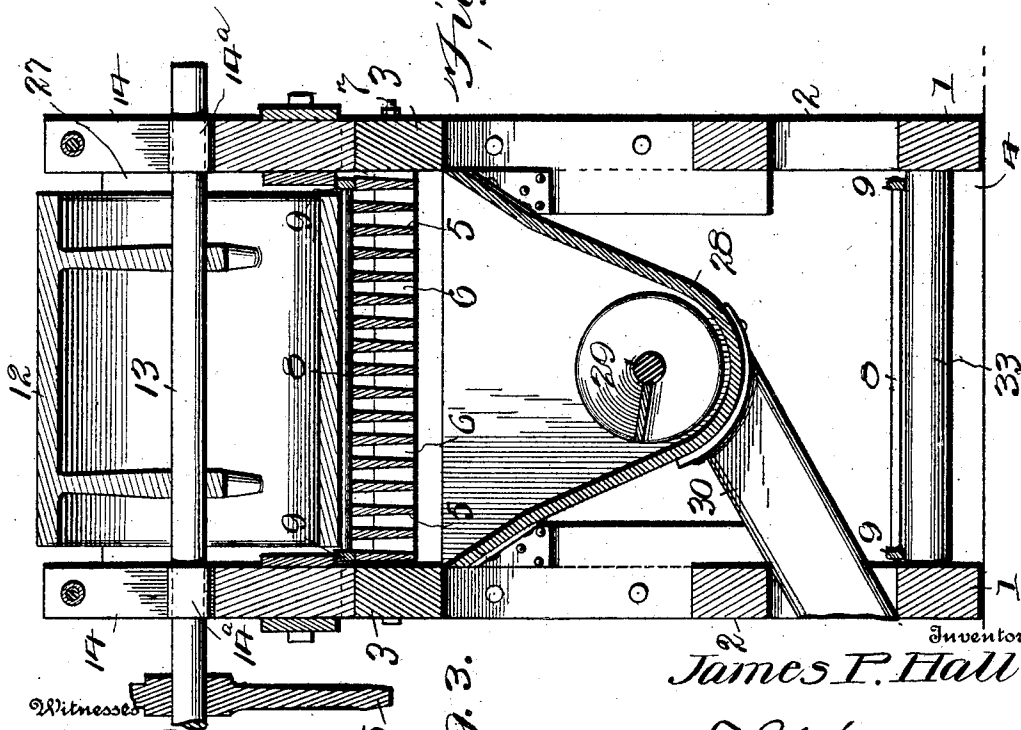


Fig. 2.

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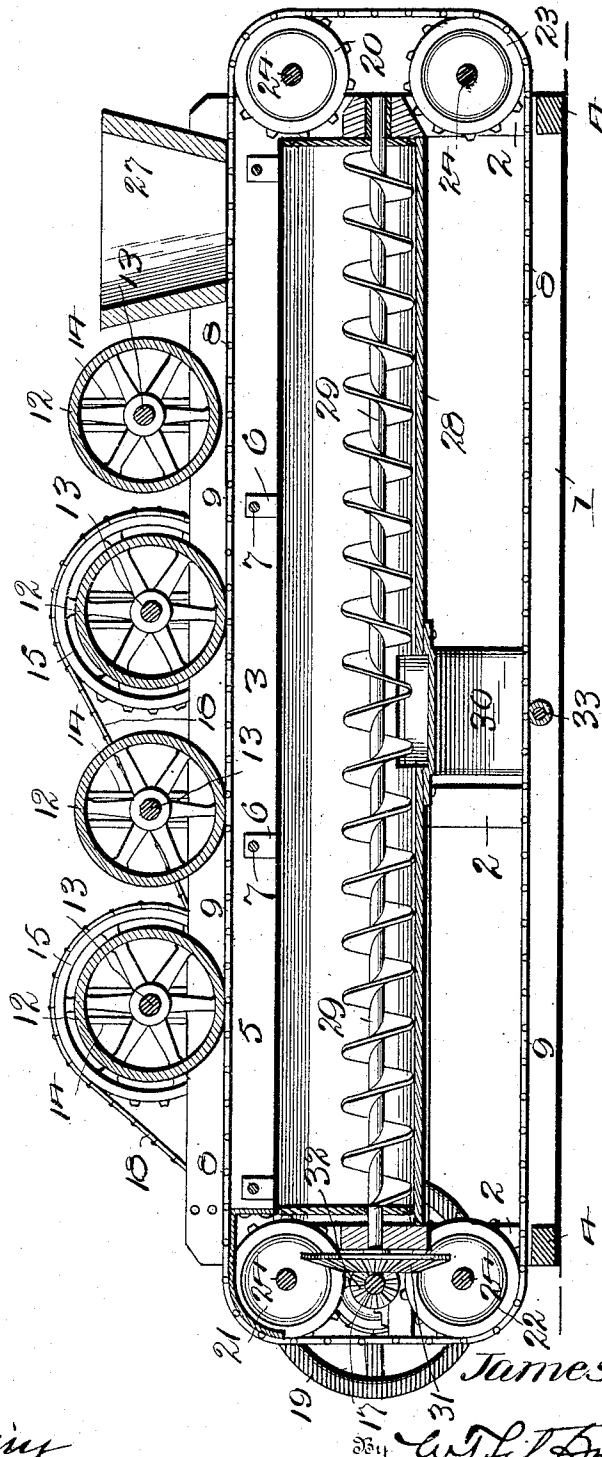
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5 SHEETS—SHEET 4.

Fig. 5.



Witnesses

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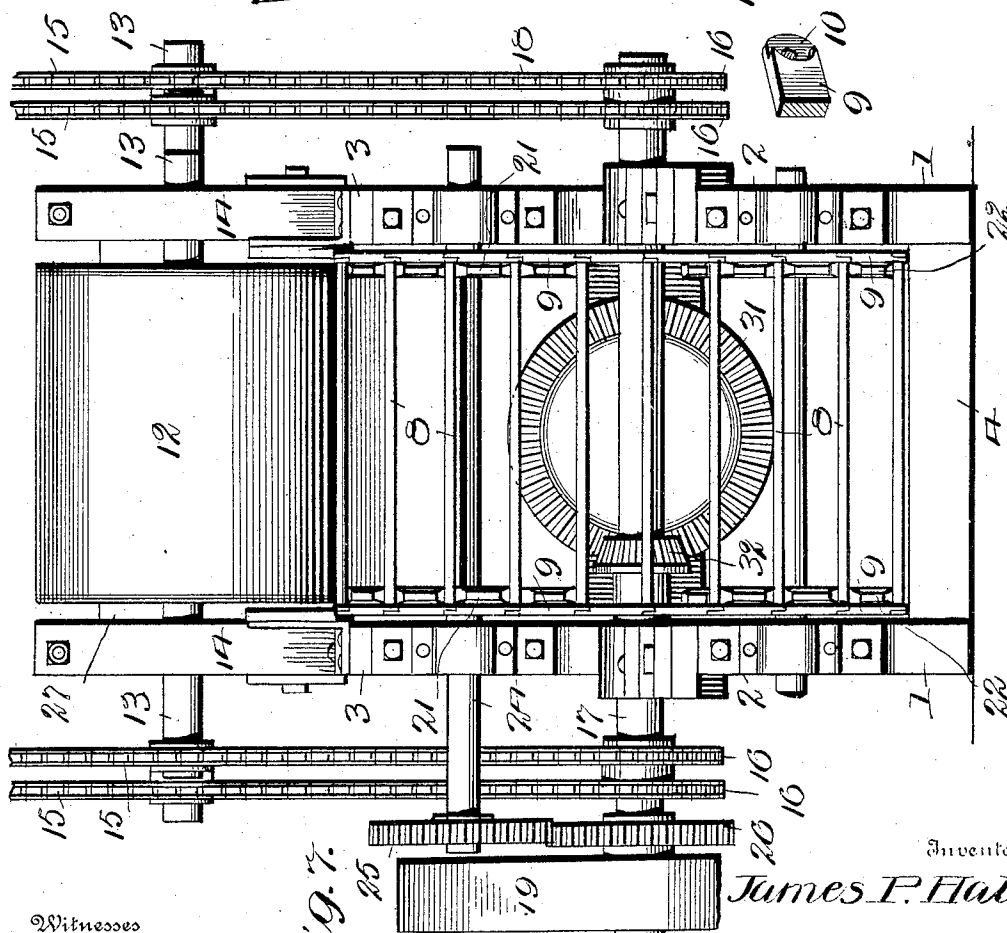
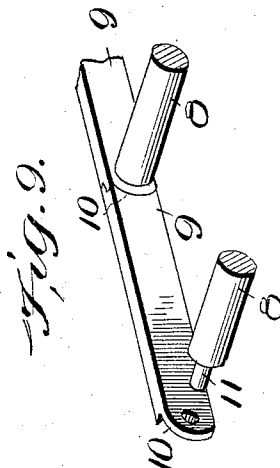
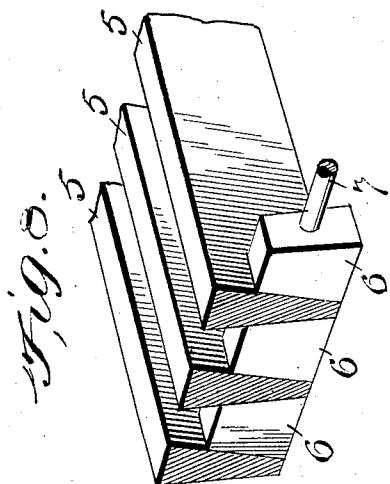
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5 SHEETS—SHEET 5.



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Fig. 7.

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UNITED STATES PATENT OFFICE.

JAMES P. HALL, OF TUSCOLA, ILLINOIS.

CLAY-PULVERIZING AND STONE-SEPARATING MACHINE.

No. 796,639.

Specification of Letters Patent.

Patented Aug. 8, 1905.

Application filed July 20, 1904. Serial No. 217,429.

To all whom it may concern:

Be it known that I, JAMES P. HALL, a citizen of the United States, residing at Tuscola, in the county of Douglas and State of Illinois, have invented certain new and useful Improvements in Clay-Pulverizing and Stone-Separating Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to machinery for pulverizing clay, soil, &c., and separating from the pulverized clay, soil, and other material any rock, stone, or other hard or foreign substance; and it consists of certain novel features of combination and construction of parts, the preferred form whereof will be hereinafter clearly set forth and pointed out in the claims.

The prime object of my invention, among others, is to provide a machine of the character specified which will not only thoroughly disintegrate or pulverize clay, soil, or other substance to fit it for use in making tile, brick, pottery, or any other clay product, but will also remove therefrom without crushing or strain upon the machinery or parts thereof, acting directly upon the clay, such foreign substance contained therein as rock, stone, gravel, roots, &c., and deliver such removed substance at one end of the machine or into a receptacle provided to receive the same.

A further object of my invention, among others, is to provide an automatic adjustability of certain cooperating parts whereby undue strain upon the machine, as in acting upon stone or other hard substance, will be wholly obviated or removed, such stone, rock, &c., being promptly separated from the mass of clay with which it is incorporated and removed in the manner above set forth.

Other objects and advantages will be hereinafter made clearly apparent, reference being had to the accompanying drawings, which are made a part of this specification, and in which—

Figure 1 shows a side elevation of my machine complete ready for use. Fig. 2 is a top plan view thereof. Fig. 3 is a sectional view of Fig. 1 on line 3 3. Fig. 4 is a sectional view of Fig. 1 on line 4 4. Fig. 5 is a longitudinal central section as indicated by line 5 5 of Fig. 2. Fig. 6 is a perspective view showing one form of yielding bearings for the crushing-rollers hereinafter referred to in de-

tail. Fig. 7 is an end elevation taken from the left-hand side of Fig. 1. Fig. 8 is a detail view showing preferred method of mounting the bars forming the sieve or table over which the endless conveyer is designed to travel. Fig. 9 is a detail view in perspective showing one of several ways of constructing and combining the parts forming my endless conveyer.

The various parts of my invention and cooperating accessories will be designated by numerals, the same numeral referring to a similar part throughout the several views.

Briefly stated, my invention consists of a suitable framework or table, the top of which is fashioned in the form of a screen or sieve provided with a plurality of closely-approximated bars which are placed in cooperation with the endless conveyer and a plurality of pulverizing-rollers, said rollers being yieldingly mounted, whereby they will rise upward and permit a stone or other hard substance to pass freely under the same without straining or injuring any of the mechanism and without crushing or pulverizing stone, rock, gravel, or other foreign substance in the clay, soil, or other material to be pulverized, it being understood that suitable driving mechanism to actuate the said endless conveyer and rollers and certain auxiliary devices for removing the pulverized clay are also provided.

Referring in detail to the various parts of my invention and cooperating elements, 1 designates the base portion of the framework of my machine, while 2 indicates uprights mounted in any preferred way upon the base-section, while 3 indicates cross-bars, said parts being properly reinforced and held together by suitable end sections 4, it being obvious that said portions of the framework may be augmented, as by cooperating bracing-sections, if deemed desirable, all of said parts being united together, as by suitable mortises, and tenons or by bolting, as preferred. Upon the framework thus or otherwise constructed I provide a top section or table which constitutes what I will term a "screen" or "sieve," and which is made by securing a plurality of longitudinal bars 5, having flat upper edges and spaced apart a uniform distance, as by the blocks 6, suitable registering apertures being provided in said blocks and bars to receive a clamping bolt or rod 7 passing through the same, whereby all of said parts will be reliably locked in operative relationship, said blocks 6 preferably being set so that their

top surface will be slightly below the top plane of the bars 5, and the said blocks 6 are beveled at each edge from their bottom side to their top side so that any stone or other foreign substance which comes in contact with the said blocks 6 will not be caught or locked there, but may slide up the bevel to the top of the blocks 6 and on down the screen to be thrown off by the conveyer into the receptacle provided therefor, the said blocks 6 presenting no obstruction to the stones, &c., by reason of the fact that said blocks are slightly below the top edge of the bars 5, as aforesaid. I wish to reserve the right to cast this screen above and hereinafter described either in one piece or in several pieces to be joined together; but in casting the screen will be substantially the same construction as when made of the separate bars—that is to say, to make the screen by casting it in one piece throughout or by casting it in sections and joining the same together so that the screen when cast will be the same construction and be used for the same purpose as though it were made up of the several separate bars. I prefer to form the bars 5 so that they will be substantially V-shaped in cross-section—that is to say, their upper edges will be broader than the lower edges, which is to insure that the pulverized clay or other material to be pulverized which drops between the upper edges of the two bars is sure to pass downward without further obstruction, which would not be the case if the sides of the bars were parallel to each other, and so that the space between the bars will not become clogged, which would be the case if the sides of the bars were parallel to each other. I call special attention to this shape or construction of the bars thus employed to form the screen, sieve, or table, and also the construction of the same, as I consider this feature a valuable and important auxiliary to a perfect clay-pulverizing and stone-separating machine. The V-shaped bars above mentioned are to be extended longitudinally with the frame of the table above mentioned, so that the stone, rock, &c., may pass from one end of the screen to the other. Over the screen or sieve-like table thus or otherwise constructed I have arranged to travel a plurality of clay-moving bars 8, which when fastened with their cooperating parts or chains, I call a carrier chain, one mode of the manufacture of which is illustrated in Fig. 9, but the preferred construction of which is to have the same constructed on the plan of the link belt—that is to say, the edges of the belt shall be constructed of links in about the center of which shall be an ear which extends toward the center of the machine from each side opposite each other, to which ear shall be attached the conveyer-bars. Another mode of constructing the said conveyer-chain is illustrated in detail in Fig. 9, the endless conveyer being made up of said

bars and link-sections 9, said link-sections being connected with each other by another link-section, the ends of which would be on the outside of the link-section before it and on the outside of the link-section following it. Through the ends of each link-section would be a hole into which the conveyer-bar is put and fastened, so that where the two link-sections are fastened to the conveyer-bar there would be two full ends of the said link-section working side by side, or the said conveyer-chain might be constructed so that the link-section 9 would be recessed at their ends, as indicated by the numeral 10, whereby they will fit into each other, and held pivotally together, as by the journal 11 on the bars 8; but this manner of construction is not the preferred one for the reason that the link-bars where they are recessed would be weak, and the conveyer-chain must be strongly constructed. The said bars 8 are held rigidly, the office of said bars being to pass in close contact with and slide upon the upper edges of the bars 5 forming the screen or sieve passing under the pulverizing-roller hereinbefore and hereinafter mentioned, so as to carry the clay, soil, or other substance to be pulverized from the hopper along the screen and under the said pulverizing-roller, so that the said clay, soil, or other substance may be pulverized, and also to assist in conveying any of the pulverized substance that has not fallen between the bars 5, so that the same will fall between the bars 5 into a trough, hereinafter mentioned, and also to assist to some degree in pulverizing the substance to be pulverized, so that it will pass between the bars 5, and also to force along stone, rocks, gravel, or other substance that is not pulverized to the end of the table to be thrown off at the end of the machine or into a convenient receptacle, and to assist in pulverizing the clay, so that it will fall between the bars 5, I provide a plurality of pulverizing-rollers 12, it being understood that any number of said rollers may be mounted in place as may be deemed productive of the best results, owing to the material to be pulverized, and each roller is provided with trunnions or journals 13, which are mounted so as to move vertically and freely in the guideway or bearing-seats 14, as by means of the sliding bearing-blocks 14". It is obvious that said bearings may be fashioned in any desired way whereby this vertical play of the journal will be made possible, and I therefore wish to comprehend the equivalent of the showing made in the drawings.

It will be observed by reference to the drawings that the weight of each roller 12 is determined by the material to be pulverized and is disposed directly upon the endless conveyer-chain and the clay or other material to be pulverized, and it follows that should there be a stone, root, or other substance incorporated in the clay such substance or substances will

be drawn under the roller, causing the said roller incidentally to rise in its bearings and automatically drop down again into place after the obstruction has passed through.

The rollers 12 may be driven in any preferred way, as by means of suitable sprocket-wheels 15, placed in coöperation with driving-sprockets 16 upon the driving-shaft 17 by means of sprocket-chains or beltings 18, a driving-sprocket belt-wheel 19 being also secured to the driving-shaft 17, whereby my complete clay-pulverizing and stone-separating machine may be placed in coöperation with the source of power.

The endless conveyer made up of the elements 8 and 9 as before explained, is designed to travel over the sprocket-wheels 20 and 21 and thence downward over a corresponding pair of sprocket-wheels 22 and 23, all of said wheels being suitably mounted upon carrying-shafts 24, disposed in bearings in the framework. At the end of the machine the upper shaft 24 is extended and has keyed thereto the gear 25, placed in mesh with the driving-gear 26 upon the shaft 17. It is therefore obvious that the endless conveyer will be caused to travel continuously when the machine is in operation.

It will be understood that the pulverizing-rollers 12 may be caused to rotate at the same speed with the travel of the endless conveyer or said rollers may be rotated at a greater speed or less speed, as may be deemed productive of the best results.

At the receiving end of the machine I locate the hopper-section 27, open at its lower end and resting on the framework over the table or screen-sieve, there being sufficient space between the screen or sieve and the hopper to permit the free passage of the endless conveyer or the conveyer-bars 8, it being understood that said bars may be round, square, or other shape in cross-section, as may be deemed most desirable.

From the foregoing description it is obvious that the clay or other material to be pulverized placed in the receiving-hopper is conveyed thence by the bars 8, passing successively under the hopper, the clay and the like being moved along over the screen or sieve-like table and under the pulverizing-rollers, the result being that the clay or other substance intended to be pulverized will be pulverized by the motion of the conveyer-bars and of the pulverizing-rollers and will fall between the bars 5, while the harder substances not pulverized and not intended to be pulverized, as stone, &c., will be moved along by the conveyer-bars 8 to the end of the machine and dropped off upon the ground or into a suitable receptacle placed therefor. It therefore follows that the clay, &c., passing between the bars 5 will fall into the receiving trough or chute 28, in which I mount in suitable bearings the worm-shaft or screw conveyer 29, which is preferably provided at one end with

a right-hand screw and at the other with a left-hand screw, whereby the contents of clay passing into the trough 28 will be directed by said worm-shaft to a central point and there discharged through a laterally-extending chute 30, leading into engagement with another conveyer, whereby it will be delivered at any desired point.

Upon the end of the shaft 29 I secure a beveled gear 31, placed in mesh with the beveled gear 32 upon the shaft 17, thereby insuring that the shaft 29 will be continuously driven during the operation of the other mechanism or machinery.

Inasmuch as any well-known form of conveying appliance may be placed in coöperation with the delivery-chute 30, I deem it unnecessary to enter into a specific description thereof.

It will of course be obvious that the return part of the endless conveyer may be disposed at a higher point than I have shown in the drawings, in which case the receiving-trough 28 may be located at the bottom of the machine, the arrangement of said parts being a matter of detail which I shall leave to the expediency of manufacture. To prevent the return part of the conveyer from unduly sagging, a suitable roller or rollers 33 may be properly mounted in the base member 1 or contiguous part of the framework, as will be obvious.

It is thought from the foregoing description, considered in connection with the accompanying drawings, that the nature of my invention will be clearly apparent, though it may be stated that the operation thereof is as follows: The clay is thrown into the hopper, where it falls upon the end of the screen or sieve-like table and in engagement with the moving bars 8. The clay is therefore caused by the endless conveyer to travel over the screen or sieve-like table and under the pulverizing-rollers 12, the result being that the clay or other substances to be pulverized will be pulverized and will fall through the screen or sieve, while other substances, as rock, stone, and the like, not intended to be pulverized will not be pulverized, the pulverizing-rollers rising in their adjustable bearings to allow the said substances to pass under without crushing, and the last-mentioned substances not pulverized and not intended to be pulverized will be moved along the said screen or sieve-like table by means of transversely-located bars 8, and finally passed off at the end of the machine opposite the hopper-section, and since the bars 5 in the cross-section are tapered at their lower edge it follows that any substance that drops between the upper edges of said bars either of its own accord or on account of the rubbing motion of the bars 8 will readily drop into the receptacle or trough-like member 28 and be delivered therefrom by the rotating worm above referred to.

While I have described the preferred combination and construction of parts deemed necessary in materializing my invention or showing a practical application thereof to use, it will be understood that I wish to comprehend in this application all substantial equivalents and substitutes as may be considered as falling fairly within the scope and purview of my intention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A clay-pulverizing and stone-separating machine comprising a frame, a screen mounted upon the frame, an endless conveyer having transverse pulverizing-bars adapted to slide upon the screen and to force hard substances to the end of the screen, and pulverizing-rollers normally supported upon the endless conveyer and adapted to work in conjunction with the pulverizing-bars and to yield to hard substances passing beneath them, as set forth.

2. A clay-pulverizing and stone-separating machine comprising a frame, a screen consisting of longitudinal, closely-arranged bars mounted upon the frame, an endless conveyer having transverse pulverizing-bars adapted to slide upon the screen and to force hard substances to the end of the screen, and pulverizing-rollers normally supported upon the endless conveyer and adapted to work in conjunction with the pulverizing-bars and to yield to hard substances passing beneath them, as set forth.

3. A clay-pulverizing and stone-separating machine comprising a frame, a screen mounted upon the frame, an endless conveyer having transverse pulverizing-bars adapted to slide upon the screen and to force hard substances to the end of the screen, guideways mounted upon opposite sides of the screen, bearing-blocks mounted in the guideways and adapted to slide freely therein, and pulverizing-rollers journaled in the bearing-blocks and normally supported upon the endless conveyer and adapted to work in conjunction with the pulverizing-bars, as set forth.

4. A clay-pulverizing and stone-separating

machine comprising a frame, a screen mounted upon the frame, an endless conveyer having transverse pulverizing-bars adapted to slide upon the screen and to force hard substances to the end of the screen, pulverizing-rollers normally supported upon the endless conveyer and adapted to work in conjunction with the pulverizing-bars and to yield to hard substances passing beneath them, means for driving the pulverizing-rollers independently of each other, and a driving-shaft common to all of the means for driving the pulverizing-rollers.

5. A clay-pulverizing and stone-separating machine comprising a frame, a screen mounted upon the frame, an endless conveyer having transverse pulverizing-bars adapted to slide upon the screen and to force hard substances to the end of the screen, pulverizing-rollers normally supported upon the endless conveyer and adapted to work in conjunction with the pulverizing-bars and to yield to hard substances passing beneath them, means for driving the endless conveyer, and means for driving the pulverizing-rollers independently of the means for driving the endless conveyer and a driving-shaft common to both of said means.

6. A clay-pulverizing and stone-separating machine comprising a frame, a screen mounted upon the frame, an endless conveyer having transverse pulverizing-bars adapted to slide upon the screen and to force hard substances to the end of the screen, pulverizing-rollers normally supported upon the endless conveyer and adapted to work in conjunction with the pulverizing-bars and to yield to hard substances passing beneath them, a receiving-trough located beneath the screen, having a laterally-extending chute, and a screw conveyer working in the trough.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES P. HALL.

Witnesses:

M. E. ROBERTSON,
ROY F. HALL.