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Fig.4.

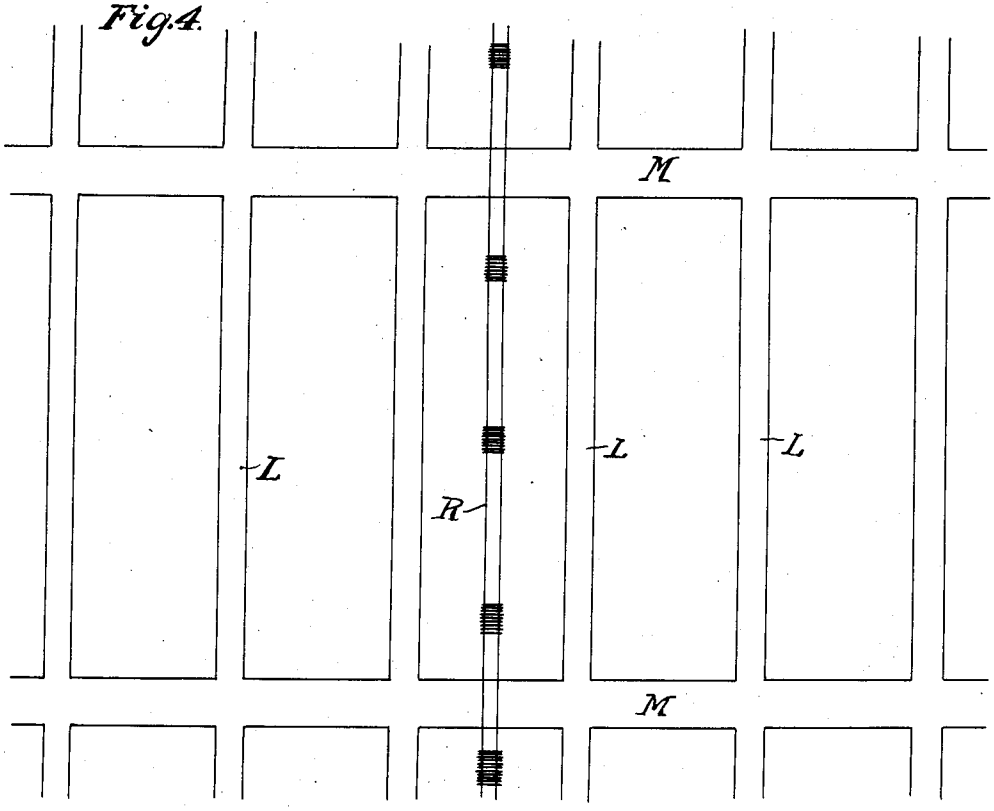


Fig.2.

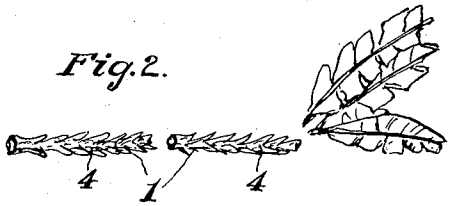


Fig.3.

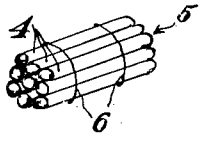
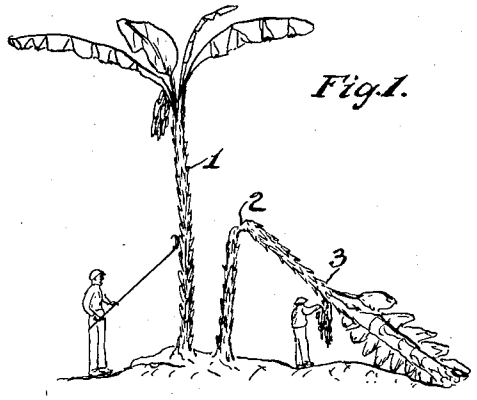


Fig.1.



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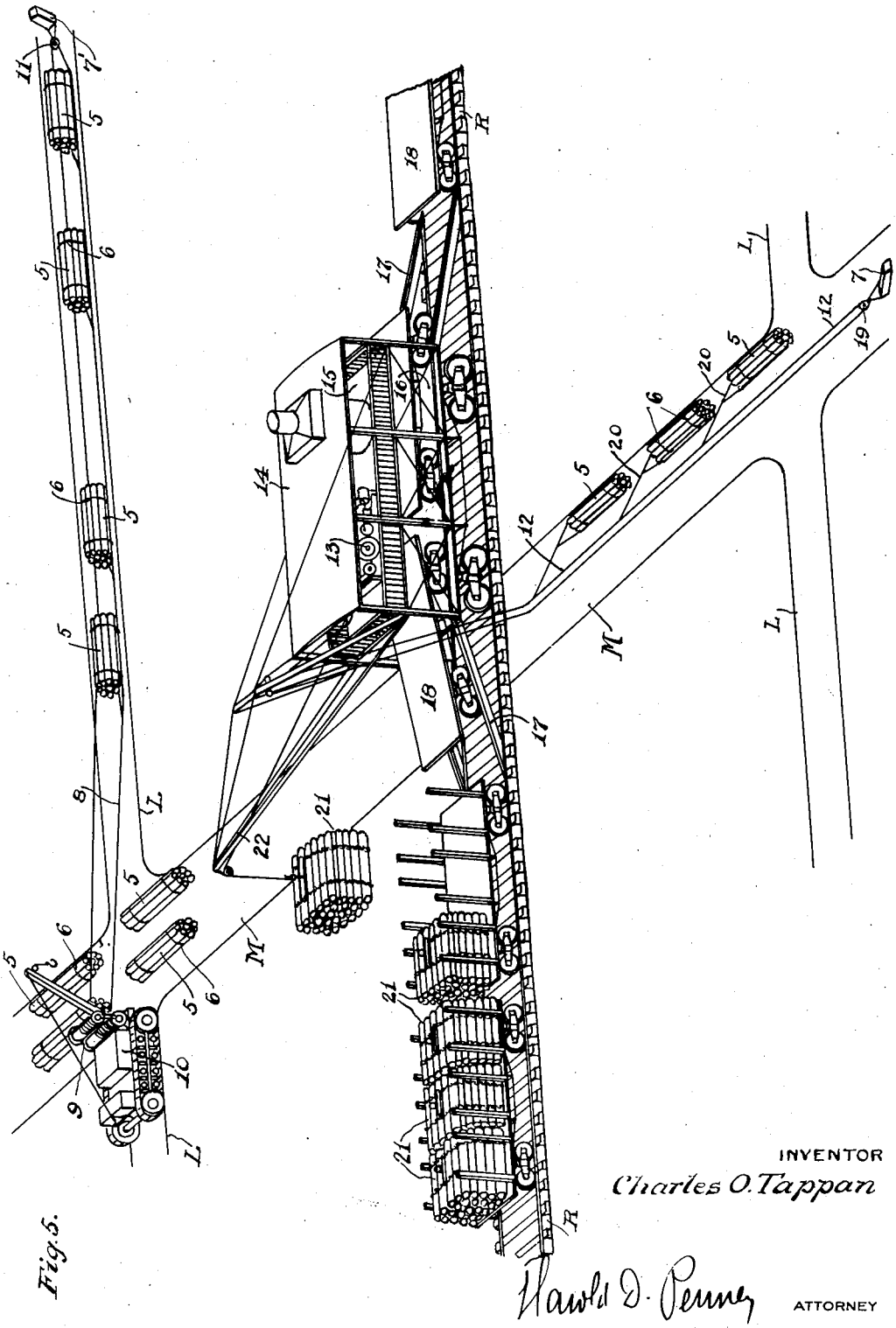

Fig. 5.

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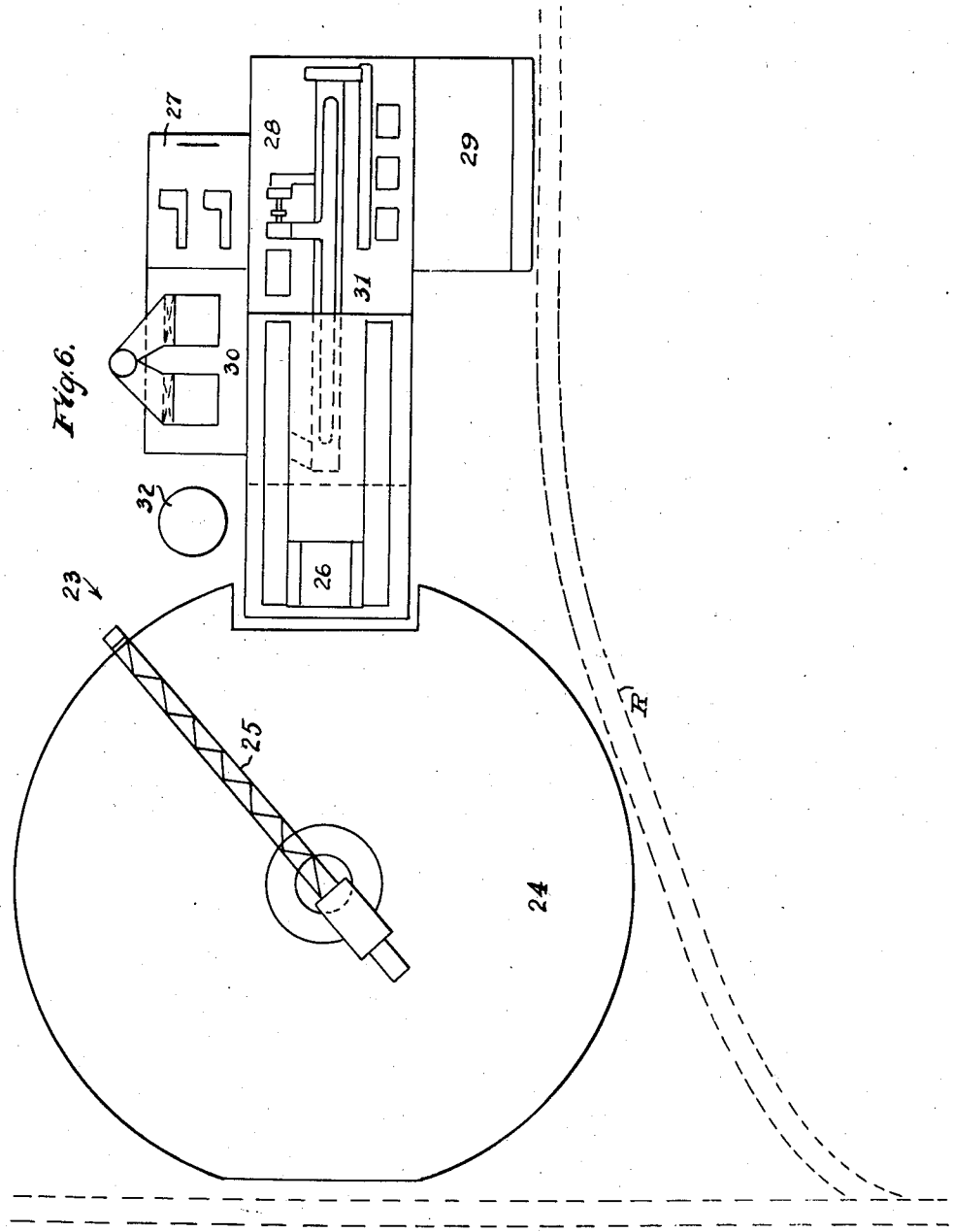
Fig. 6.



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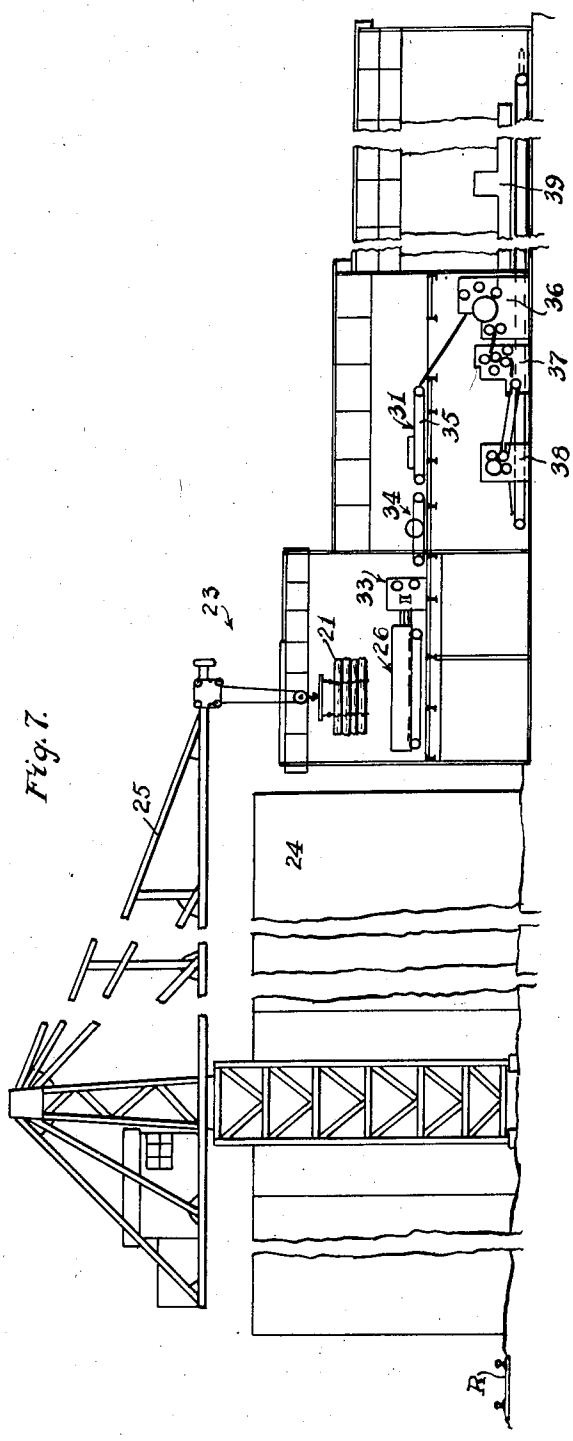

Fig. 7.

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Fig. 8.

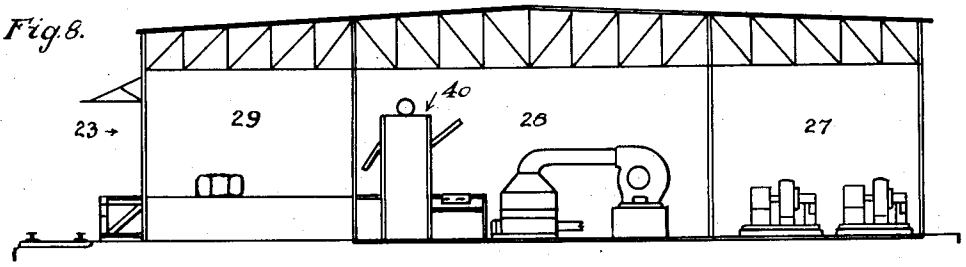


Fig. 9.

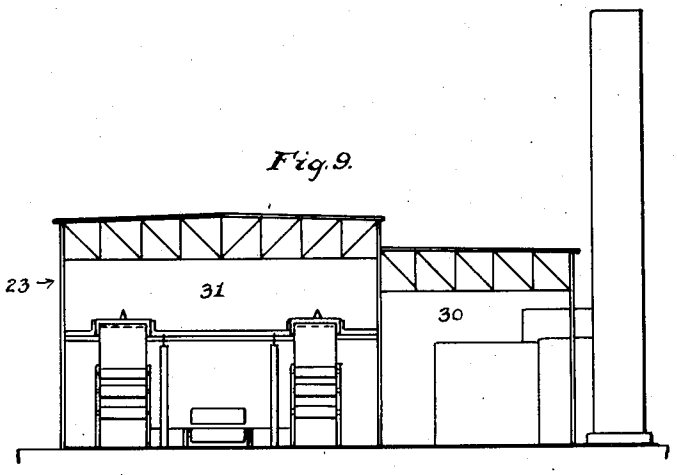
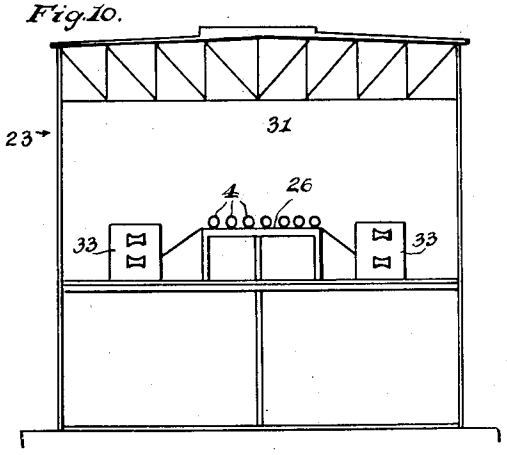


Fig. 10.



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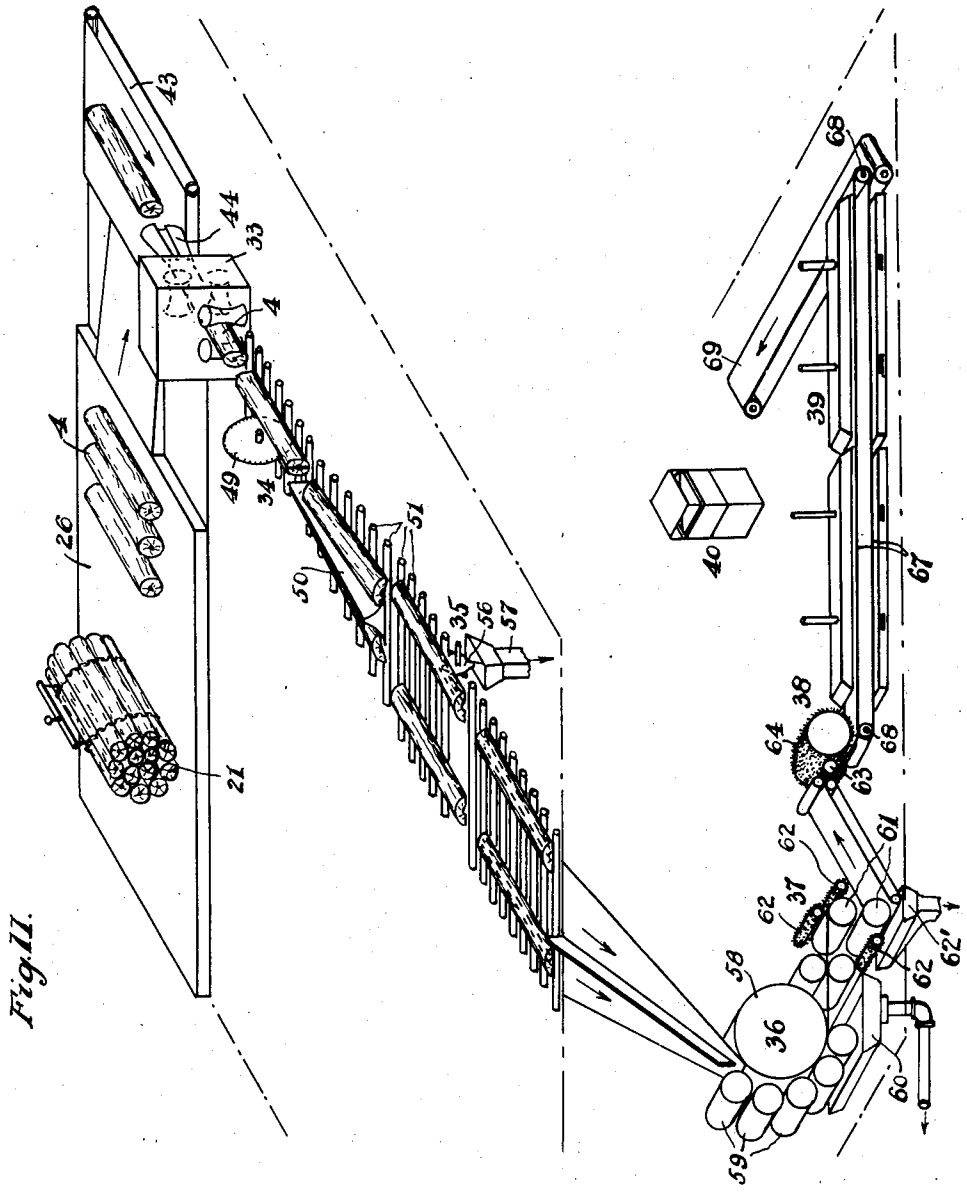

Fig. 11.

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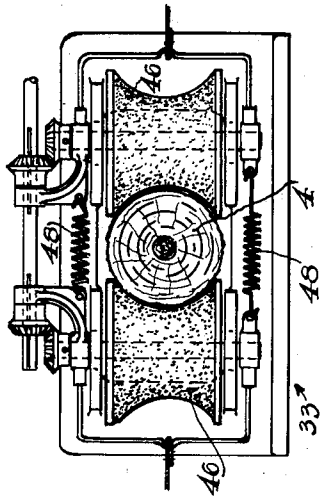

Fig. 14.

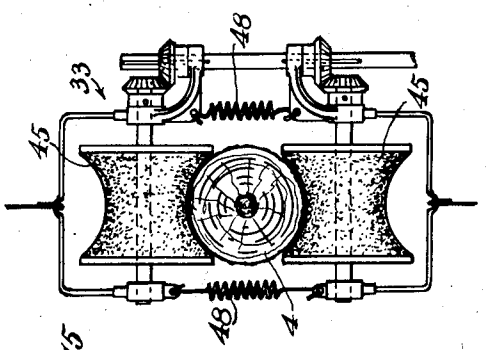

Fig. 15.

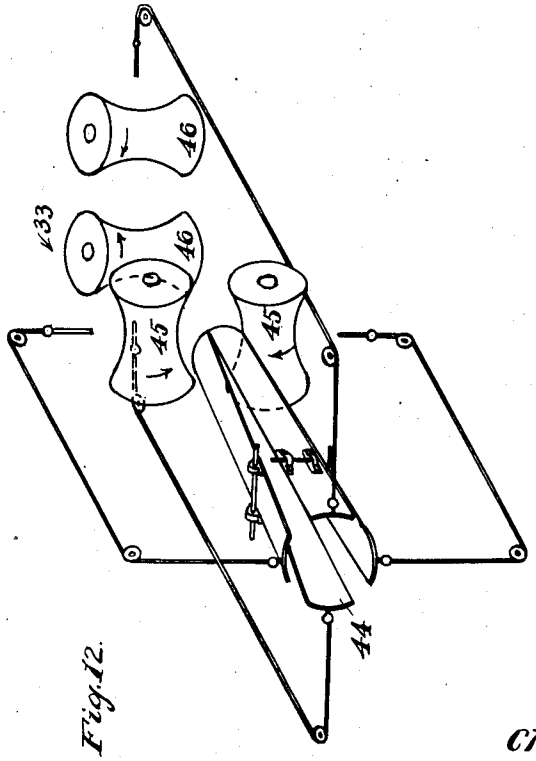

Fig. 12.

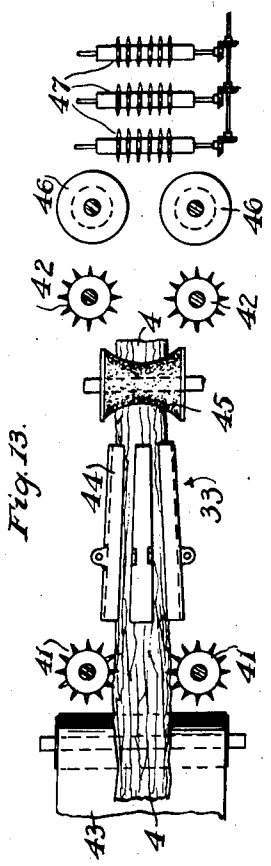

Fig. 13.

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MASS PRODUCTION OF PAPER FIBERS FROM BANANA STALKS

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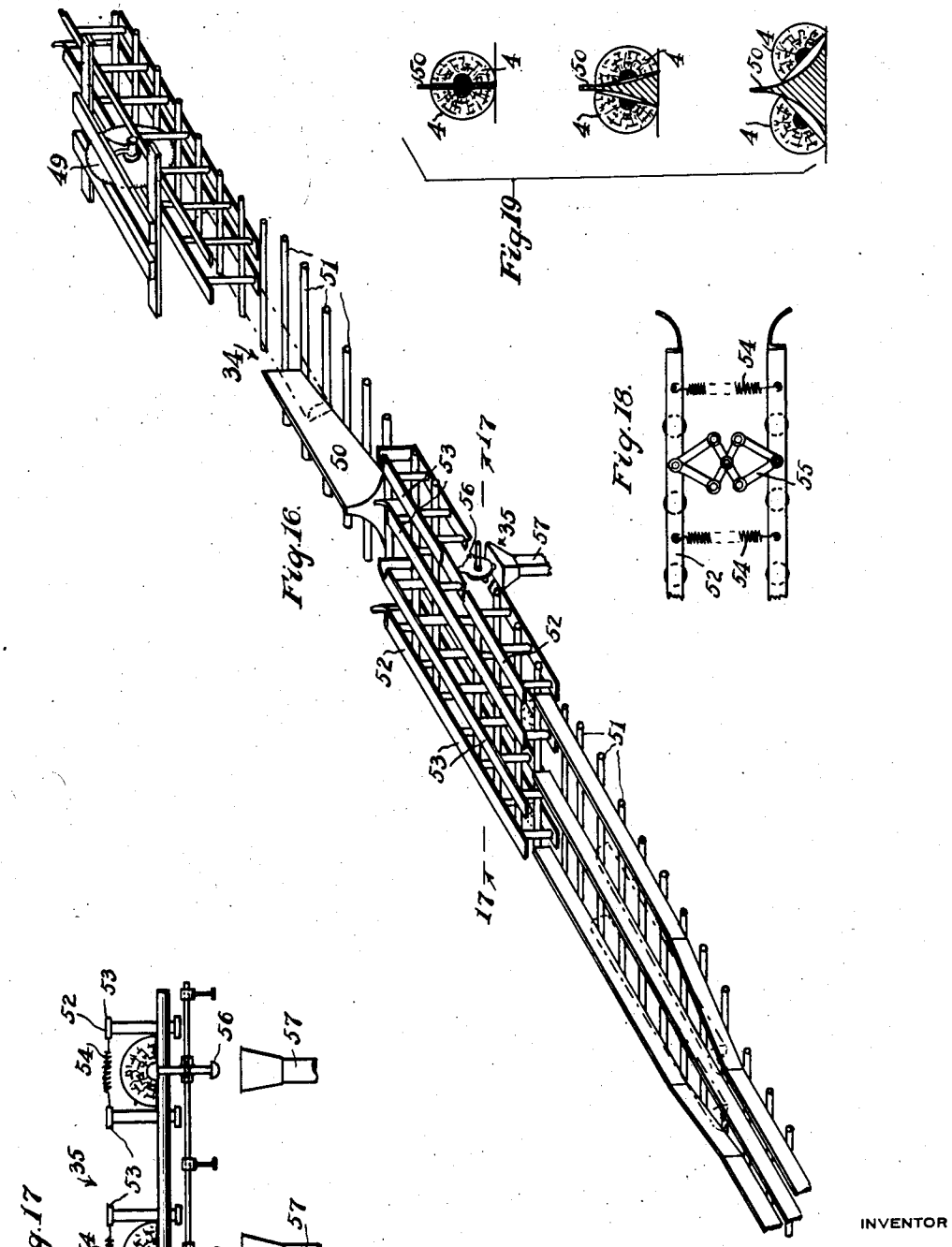

Fig. 19

Fig. 18.

Fig. 16.

Fig. 17

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MASS PRODUCTION OF PAPER FIBERS FROM BANANA STALKS

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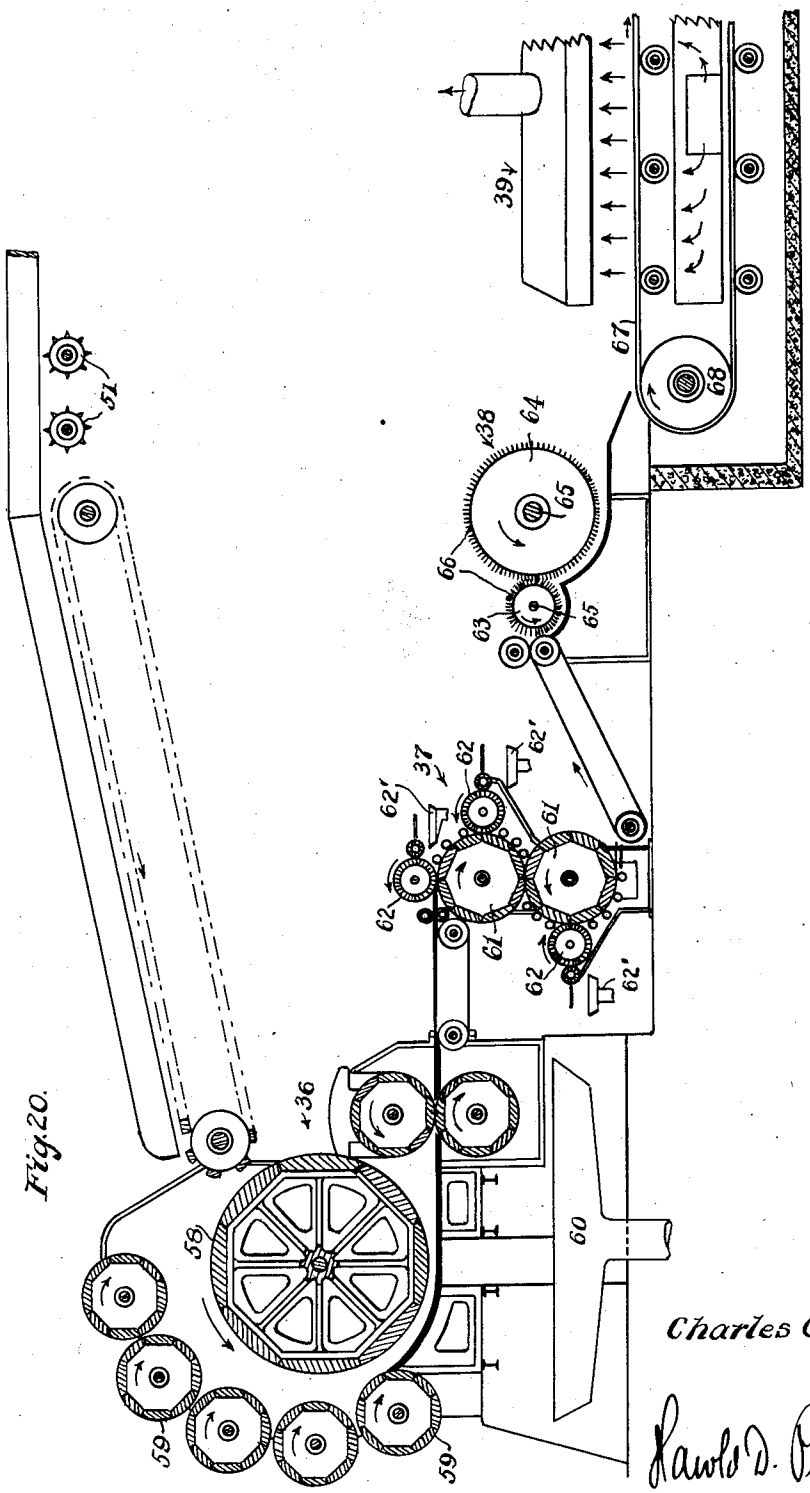

Fig. 20.

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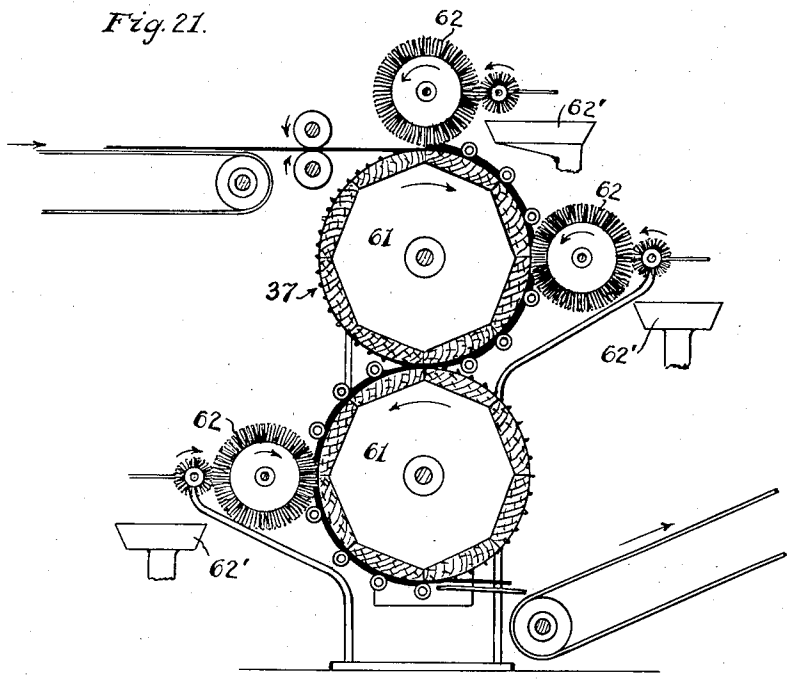
Fig. 21.



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MASS PRODUCTION OF PAPER FIBERS FROM BANANA STALKS

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Fig. 22.

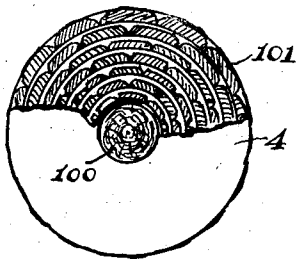
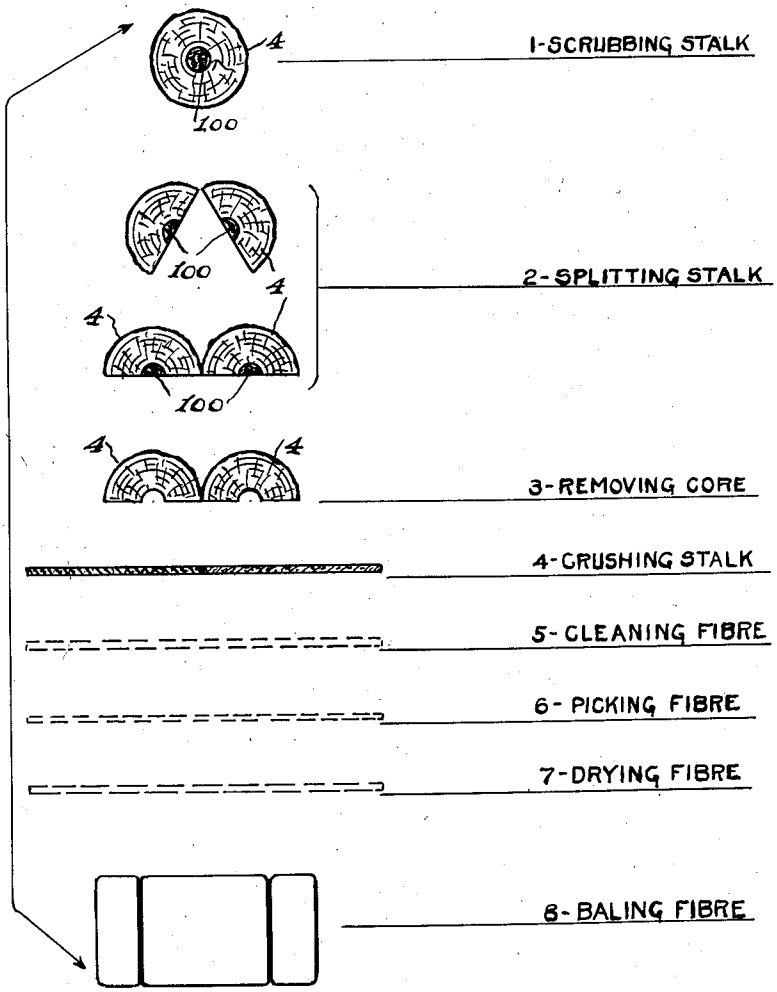


Fig. 23.

Fig. 24.



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Patented Nov. 27, 1934 1,981,883

UNITED STATES PATENT OFFICE

1,981,883

MASS PRODUCTION OF PAPER FIBERS FROM BANANA STALKS

Charles O. Tappan, New York, N. Y.

Application June 11, 1930, Serial No. 460,410
Renewed February 20, 1934

22 Claims. (Cl. 92—3)

This invention relates to mass production of paper fiber stock from fruit banana stalks or butts and other fibrous vegetation suitable for the purpose.

An important object of the invention is the provision of a method whereby exceptionally large acreages of fibrous vegetable plants may be harvested or gathered, transported, processed and delivered in baled form to the ultimate consumer, with a high degree of efficiency, economy and dispatch.

A further object of the invention resides in the provision of a method for gathering, transporting and reducing the stalks of the fruit bearing or non-fruit bearing banana tree, to a fibrous product (bagasse) of a quality suitable for use as a base and binder for better grade papers.

Another object of the invention is the provision of a method for achieving high tonnage mass production in the manufacture of high strength paper making material (bagasse) and by-products, from the stalks of the fruit bearing banana, such as for instance, *"Musa sapientum"* and *"Musa paradisiciaca"*; of the fiber producing banana, *"Musa textalis"*, and the various varieties of wild banana. These plants usually reach maturity in about one year and in a given plantation, tract or field, ripen at different times so that harvesting may be carried on continuously at intervals of about one month; and since 90% of the stalk is water and but 6% to 7% consists of a fiber (bagasse) suitable for paper making, the commercial success of the method depends entirely on fast economical high tonnage harvesting, transporting and processing.

In carrying out my method I segregate cortex and other inferior fibrous particles, from which I may obtain certain by-products, such as cellulose and other useful materials.

Generally, I may outline my improved method as follows, and will describe a complete sequence of operations, capable of practical adoption in coordination with existing plantation and railroad uses, with resulting high tonnage handling and low production cost, enabling profitable commercial exploitation without interference with existing plantation conditions.

All successful plantations, have a railroad convenient, and in carrying out my invention I preferably provide intersecting aisles or dragways formed by field clearings, arranged in lateral or cross aisles or lanes, and main aisles or lanes. The main aisles, lanes or dragways are preferably disposed at right angles to the railroad and the lateral aisles, of course, run substantially parallel therewith.

The lateral aisles parallel to the railroad would preferably be so spaced as to make the maximum distance for delivery of the stalks in the included area to the aisles feasible by hand labor, as for instance 150 feet, or 300 feet apart. The main aisles would preferably be spaced so that certain power drag devices, hereinafter described may reach to the center of the lateral aisles when operating in the main aisles at each side, as for instance about 1500 feet apart.

At the longitudinal center of each cross lane, aisle or dragway, and where required in the main aisles, I arrange posts or other anchoring devices, which may project two feet, more or less, above the ground and to which power drag devices hereinafter described, may be connected.

The full grown stalks are usually about 18 feet in height or length, to the first leaves, and have an average diameter of something like 14 inches, and weigh about 350 pounds.

Structurally the stalk consists of a central circular fruit stem or body of soft fibrous cellulose material which is enclosed by leaf stalks composed of strong fibers suitable for paper making material, the outer and inner walls of said leaf stalks consisting of cortex and other vegetable matter not suitable for paper making material and which in my method is divided out and processed for by-products.

In further carrying out my method I preferably cut each banana stalk into two substantially equal lengths or butts; these lengths are delivered to the lateral aisles by laborers, and are bundled and secured by chain slings of any suitable form; the bundles preferably, though not necessarily being made up to about 3 feet in diameter about 9 feet long and about a ton in weight.

The next step of my improved method consists in transferring, by dragging by means of power devices, all of the banana plant stalk bundles, so disposed in half of a single lateral aisle, to one of the main aisles of the plantation simultaneously.

The next step of the method consists in transferring by dragging, through power devices, a number of banana stalk bundles, from their main aisle positions, but through the main aisles, to the railroad, simultaneously and from both sides of the said railroad.

The next step of the method consists in bunching the bundles thus delivered to the railroad and

loading said bunches of bundles on suitable cars by power devices.

The next steps in sequence, in carrying out my method consists in transporting the bunched bundles thus delivered to the railroad cars to a storage and treatment plant; transferring said bunched bundles by power means, to a charging platform; breaking the said bunched bundles; transferring the individual butts successively to a conveyor and in end to end relation; scrubbing the moving butts; splitting them into longitudinal halves; decoring each half; crushing the decored halves to a fibrous mass; cleaning the mass thus produced to remove all useless matter; picking and fluffing the dry fibrous mass; drying the paper stock product or bagasse thus produced, and then baling said product.

From the foregoing, it will be clear, that in carrying out my method, I employ certain raw material handling steps and certain mechanical processing steps to achieve high tonnage mass production of high grade bagasse or paper stock from discarded by-products of banana plantations at extremely low cost; all means employed for the accomplishment of the above results being especially designed and operated to increase capacity and to minimize operating time; the raw material handling steps being the more important features of my method.

Various types of power devices may be employed for carrying out the various steps of my method, and those devices hereinafter described and shown more or less diagrammatically in the drawings are to be understood as illustrative only of power devices which may be employed to accomplish the functions hereinafter more specifically set forth.

I will now proceed to describe means for carrying out my method with reference to the drawings, in which similar reference characters are employed to designate corresponding elements or devices throughout the several views, in which:—

Fig. 1 is a pictorial view illustrating a typical banana stalk standing and another stalk cut in the usual manner, to cause the top to fall over when gathering the fruit.

Fig. 2 is a pictorial view showing a step in my method, in which the banana stalk is cut near the ground, the leaves cut off and the stalk divided at substantially its longitudinal center forming butts.

Fig. 3 is a perspective view of a bundle of banana butts forming another step in my method.

Fig. 4 is a diagrammatic plan illustrating the first step in my method, i. e., forming cleared intersecting aisles, dragways or lanes throughout the plantation and preferably arranged as shown, relative to the plantation railroad.

Fig. 5 is a general perspective view of a portion of a banana plantation indicating, diagrammatically, cleared intersecting aisles, lanes or dragways, the plantation railroad, cars and power devices for achieving certain steps of my method.

Fig. 6 is a general diagrammatic plan showing a storage and treatment plant in which certain steps of my method may be performed.

Fig. 7 is a diagrammatic longitudinal sectional elevation of the storage and treatment plant shown in Fig. 6.

Figs. 8, 9 and 10 are diagrammatic sectional views showing some treatment plant arrangements.

Fig. 11 is a general diagrammatic perspective view showing an arrangement of successively operating power devices for mechanically treating the butts in my improved method.

Figs. 12, 13, 14 and 15 are more or less diagrammatic views showing a scrubbing power device which forms part of the butt treating means.

Fig. 16 is a general diagrammatic perspective view of a runway through which the banana butts are successively conveyed, a butt splitting element and a butt decoring element being shown in operative positions.

Fig. 17 is a partially diagrammatic enlarged cross section through the runway about on the line 17—17 of Fig. 16, showing the means for decoring the butts in the mechanical treating operation.

Fig. 18 is a fragmentary plan view of the mouth or front end of a portion of a guideway, and showing means for centering a banana butt half in its passage therethrough.

Fig. 19 is a series of detail cross sections showing the action of a fixed splitter guide employed.

Fig. 20 is a partially diagrammatic central longitudinal section of crushing, cleaning, picking and drying means employed in the method.

Fig. 21 is an enlarged partially diagrammatic central vertical section of the cleaning device shown in Fig. 20.

Fig. 22 is a pictorial partial cross section showing the general appearance of a banana butt.

Fig. 23 shows a general cross section of a butt leaf.

Fig. 24 is a diagram showing the various conditions of a banana butt in the mechanical treatment steps of my method, to produce commercial paper fiber.

Referring now to Figs. 1 to 5 of the drawings, the banana stalks 1, when the fruit is ripe, in present practice are cut partially through at about mid-height as at 2, to cause the upper portion with the leaves and fruit to fall over as at 3, so that the fruit may be harvested, the cut stalk is permitted to wither and rot. A new sprout will develop from the center of the cut standing stalk which grows and again bears fruit. The cut waste is not utilized and becomes a source of annoyance and expense, and is permitted to rot as it lies, with a consequent economic loss.

In the first stalk handling field step of my method I preferably cut the stalk 1 near the ground and near the leaves and substantially midway of its length to produce two butts or lengths 4, convenient for handling. The butts or stalk sections 4 are hand carried to the nearest lateral aisles or lane of the plantation (later described) and are massed into bundles 5 of about 3 feet in diameter, about 9 feet long and about a ton in weight. These bundles are preferably secured by sling chains 6, of a suitable type and remain intact until the bundles are delivered to a treatment plant to be later described.

All large plantations should have a railroad and usually do, and in preparing a plantation for the adoption of my method, I preferably make clearings to form main aisles, lanes or dragways M, which are arranged to cross or intersect the plantation railroad R, at about a right angle and I also provide clearings to form side or lateral aisles, lanes or dragways L, arranged substantially parallel with the railroad and parallel with each other, and which intersect the main aisles M, as in Figs. 4 and 5 of the drawings. Posts or anchoring devices 7 and 7', may be provided where required in the aisles, to which hauling devices, later described, may be connected.

The bundles 5 of banana butts formed and delivered by hand as above described, to the nearest aisle, in the next step of my method, may now be connected to the inhaul reach of a cable 8, common to all, by means of the ends of the sling chains 6 on the bundles, or otherwise; the inhaul and outhaul reaches of said cable being operatively connected to appropriate power controlled drums 9, mounted with power means on a suitable rolling support, such as a tractor 10. The opposite looped end of the cable 8, may traverse a pulley 11, anchored to the post 7' at near the longitudinal center of the lateral aisle L at the top of Fig. 5 of the drawings.

To complete this field step of the method, the power means on the tractor 10 is now operated to drag, haul or draw all of the stalk bundles (each weighing about a ton) in a half longitudinal area of a particular lateral aisle, toward and into a main aisle in one operation.

To accomplish the next step in my improved method, I provide inhaul lines 12 (one only being shown in Fig. 5) which extend to opposite sides of the railroad R, from appropriate power drums 13, mounted with power means on a rolling support 14, adapted to be drawn or propelled along the railroad, when changing operating location.

This rolling support 14 may be constituted by a decker logging skidder, well known in the lumbering industry, which may comprise upper and lower decks 15 and 16; the lower deck having tracks in alinement with inclined skid tracks 17, resting on the railroad rails, whereby empty cars 18 may be pushed up on one skid track 17, over said lower deck 16 and down over the other skid track 17, to the loading position; this arrangement greatly facilitates loading operations.

The inhaul lines 12, preferably traverse pulleys 19, anchored to the posts 7, in the main aisles; said lines being connected as by chains, cables or the like 20, to the butt bundles now deposited in the main aisles within certain areas, at opposite sides of the railroad; the power is then applied to the drums 13 and the bundles thus connected are drawn singly or in groups inwardly toward the said railroad. The outhaul lines may be also used on reverse action to also draw butt bundles.

In the next step of my method, I form the bundles at the railroad into bunches of bundles 21, of a size approximating the width of the cars to be loaded, and transfer these bunches to the cars.

For performing this step of my method, I may employ a crane device 22, operated and powered from the upper deck 15 of the rolling support 14. This bunching of the banana butt bundles, further, greatly facilitates the loading operations.

The next step in the method consists in transporting the bunches of bundles to the storage and treatment plant, generally indicated by the reference character 23, (see Figs. 6 to 10 of the drawings). The plant 23, may include a storage space 24, over which a revolving crane 25 may operate to deliver bundles 5 or bunches of bundles 21, to a receiving platform 26, from which banana butts 4, may be delivered individually to a treating mechanism hereinafter described. The treatment plant arrangement may further include a generator room or space 27, a fan and blower room, or space 28, a product shipping room or space 29, a boiler room or space 30, a butt treating room or space 31 and a fuel container 32.

In the treating room or space 31 there is arranged for sequential operation, (see Figs. 7 to 21 of the drawings) a scrubbing device 33; a splitting device 34; a decoring device 35; a crushing device 36; a cleaning device 37; a picking device 38; a drying device 39, and a baling device 40.

The above devices 33 to 40 collectively constitute the mechanical means for treating the banana butts delivered from the field as described, to produce clean dry paper fiber stock for high grade commercial paper.

I shall now proceed to describe, more or less in detail, the devices for mechanically treating the banana butts to produce paper fiber stock and in the order of sequential operations thereof. The scrubbing device 33 for removing all dust, dirt and dry discolored matter produced by weather exposure may comprise (see best Figs. 12 to 15) traversing or feeding spiked rollers arranged in pairs as at 41 and 42 in suitable bearings (not shown); the pair of spiked rollers 41 being arranged near the delivery end of a conveyor 43 which feeds the butts endwise into a guide or centering device 44, constructed to adjust itself to the varying butt diameters in their passage therethrough.

The leading ends of the butts, in succession, next enter between scrubbing devices, here shown as wire brushes 45, revoluble on horizontal axes, and later the butts enter between similar scrubbing devices 46; these revoluble on vertical axes, and further on, the butts pass between or over additional traversing devices 47, to feed the butts in constant motion. The feeding and scrubbing devices just described may be driven by any approved means, and the pairs of wire brushes 45 and 46 may have tensioned cross connections as at 48 to impart a yielding scrubbing operative contact with the passing butts.

The means here shown for splitting the butts into longitudinal halves and guiding said halves for the next or decoring operation, comprises a rotary saw 49, (Figs. 11 and 16) driven as desired, and a dividing and guiding block 50, shaped with a sharp blade like forward end and backwardly diverging curved side faces for giving the butt halves a quarter turn with the sawed faces downward and resting on the roller conveyors 51.

The butt halves, thus disposed, are now passed through parallel centering guideways 52 (Figs. 16 to 18) comprising side roller carrying frames 53, the sides of each frame being cross connected by spring and toggle devices 54 and 55 respectively. These guideways and associated devices serve to center the butt half portions in their passage so that the cores thereof may be removed by rotary decoring devices 56, mounted and driven in any desired manner. Hoppers 57, may be positioned under the decoring devices 56, to gather the cut out cores for subsequent processing for by-products, said process being reserved for another application.

After the decoring operation, the butt halves are passed or fed into a crushing device 36, driven in any desired manner, and here shown as comprising a master crushing roller 58, and a series or train of smaller rollers 59, rotating oppositely to the master rollers and arranged as shown in Fig. 20. The juice extracted by the crushing action of the rollers, is gathered in a suitable pan or tank 60 for subsequent processing for by-products.

This crushing operation reduces the banana

butt halves to a thin slab, sheet, or strip of longitudinally extending fibers.

From the crushing device, the strip of fibers thus formed are fed or passed into a cleaning device 37, where unwanted cortex and inferior and unsuitable fibrous and other matter are removed and deposited in suitable hoppers for subsequent processing for by-products as hereinbefore stated.

The cleaning device 37, as here shown, may comprise (Figs. 20 and 21) vertically alined rollers 61, driven as desired, over and between which the crushed fibrous sheet is passed, and in this movement, suitable wire or other brushes 62, operate at greater peripheral speed than the rollers 61, to remove all unwanted matter or material from the fibrous strip, means 62' being provided for collecting this discarded matter for subsequent processing for by-products.

The crushed and cleaned fibrous sheet is now passed on by suitable feeding means into and through a picking and fluffing device 38, comprising, as here shown, oppositely driven drums or rollers 63 and 64 mounted on parallel horizontal shafts 65. The peripheral faces of the rollers 63 and 64 are supplied with radially extending pins or fingers 66, which may be straight, or curved in the direction of travel.

These pins or fingers on the rapidly revolving drums or rollers 63 and 64 act to further divide, comb-out and fluff-up the cleaned fibers leaving them loosely related, which condition greatly facilitates the drying operation to eliminate all possibilities of mould or other deleterious conditions forming in the product when baled for shipment or storage.

The next treatment step in my improved method above referred to, consists in drying the paper stock product thus produced and for this purpose I may employ a conveyor belt or apron 67 of open work character, such as wire mesh, through which heated air, under pressure, may pass upwardly through the fluffed up loose fibers of the paper stock product, to remove all remaining moisture therefrom, thus leaving it in a bone-dry state or condition. The drying conveyor 67 may be mounted on rollers 68, driven by any desired power means.

After the drying is completed, the paper fiber product is finally passed on, as by a conveyor 69 to a baling device or press 40, and baled, after which the paper stock produced by my method from banana stalks or butts, is ready for the market.

Figs. 22 and 23 of the drawings is intended to indicate in a general way the approximate appearance of a banana butt or stalk in cross section, which comprises a fruit stem 100 of a cellulose character and surrounding leaf stalks or leaves 101, having an outer wall layer of cortex, an inner wall layer of coarse useless fibers and a center of fibrous pulp unsuitable for paper stock, but usable for making artificial yarns of the rayon type.

In Fig. 24 of the drawings the mechanical treatment steps of the banana butts are more or less diagrammatically indicated, with corresponding indicia and which, it is thought, requires no further description.

Thus, it will be noted that I have developed a method of obtaining, by mass handling, a paper stock, from waste vegetable product, the steps of which method permit of quick and economical harvesting and evolution of the raw material in dry baled product, all of which is done at the plantation.

This mass production method does not interfere with the harvesting of the fruit crop, clears the plantation ground of undesirable débris, and produces a fine grade of fiber on an extremely economical and, therefore, commercial basis.

I claim as my invention:

1. A method of mass production of paper stock from banana stalk butts on a plantation, said method comprising manually forming the butts on the plantation into bundles having the butts thereof parallel to each other; disposing the bundles parallel to a treatment line and untying the bundle while maintaining the butts parallel to the line; moving the parallel butts successively to the treatment line; and conveying the butts throughout the treatment line for subsequent treatment.

2. A method of mass production of paper stock from banana stalk butts on a plantation, said method comprising manually forming the butts on the plantation into bundles having the butts thereof parallel to each other; dragging these bundles longitudinally to a treatment line; untying the bundle; and successively conveying the butts throughout the treatment line for subsequent treatment.

3. A method of mass production of paper stock from banana stalk butts on a plantation, said method comprising manually forming the butts on the plantation into bundles having the butts thereof parallel to each other; dragging these bundles longitudinally to a treatment line; disposing the bundles parallel to said treatment line and untying the bundle while maintaining the butts parallel to the line; rolling the parallel butts successively to the treatment line; and successively longitudinally conveying the butts, without pause and with the same end forward, throughout the treatment line for subsequent treatment, the initial manual forming of the butts in the bundles, reducing the friction of dragging, facilitating quantity handling, and facilitating the economical disposing of all of the butts in position parallel to the treatment line.

4. A method of mass transportation, to a treating plant, of banana stalk butts on a plantation having a passage space and lanes, cleared of stalks, leading to said passage space, said method comprising cutting and delivering stalk butts to said lanes and there manually forming them into bundles with the butts thereof parallel to each other; dragging these bundles longitudinally along the lanes toward a place of treatment; then transporting the bundles to said place of treatment, while maintaining the butts parallel; rolling the parallel butts successively to the treatment line and successively longitudinally conveying the butts, without pause and with the same end forward, throughout the treatment line for subsequent treatment of scrubbing, halving, decoring, flattening, combing, fluffing, drying, and delivering the flat fluffed sheets in suitable condition for baling.

5. A method of mass production of paper stock from banana stalk butts, said method comprising arranging the butts in parallel relation to each other and to a treatment line; rolling the parallel butts successively to the line and successively longitudinally conveying, without pause, the butts with the same end forward, along the entire line for successive subsequent treatments as follows: scrubbing the moving butts on all sides to remove weathered portions; splitting the moving butts into halves; cutting out the cores to form the halves into members less thick than

wide; flattening, crushing, exteriorly cleaning the halves to form moving relatively thin fibrous sheets; combing and fluffing the moving sheets; forcing heated air through the moving sheets to dry them; and delivering the flat dry sheets in suitable condition for baling.

6. A method of substantially continuous mass production of paper stock from banana stalks harvested on a plantation, said method comprising providing a passage space on the plantation and lanes to said passage space; delivering stalk butts to said lanes and there arranging and tying the stalks in parallel relation in bundles; longitudinally dragging the bundles along the lanes to said passage space; forming the bundles into large bunches with all the bundles and butts of each bunch in parallel relation with each other; transporting the bunches from said space and successively presenting them to a receiving station with the butts still all in parallel to each other and parallel to a treatment line; rolling the parallel butts successively to the treatment line and successively longitudinally conveying the butts, without pause and with the same end forward, throughout the treatment line for subsequent treatment of scrubbing, halving, decoring, flattening, combing, fluffing, drying, and delivering the flat fluffed sheets in suitable condition for baling.

7. Steps in a method of economical mass production of paper stock from banana stalks on a plantation, said steps comprising providing a passage space across the plantation; and cleaning stalks from the plantation to form main lanes transverse to said passage space, and lateral lanes transverse to the main lanes; said lanes being adapted for the transportation of stalk butts to said passage space.

8. Steps in a method of economical mass production of paper stock from banana stalks harvested on a plantation having lanes cleared therein; said steps comprising cutting and delivering stalk butts to said lanes and arranging the stalks in parallel relation in bundles and tying them into bundles to maintain the butts in parallel relation; and simultaneously longitudinally dragging by the same source of power a plurality of these bundles along the lanes toward a place of treatment.

9. A method of mass transportation, to a treating plant, of banana stalks on a plantation having a passage space across the plantation, main lanes, cleared of stalks, transverse to said passage space, and lateral lanes, cleared stalks, transverse to the main main lanes, said method comprising cutting and delivering stalks to said lateral lanes and there forming them into bundles by hand; dragging these bundles along the lateral lanes into the adjacent main lanes and leaving them in the main lanes at a plurality of intersections of the lanes; setting a source of power in said space successively at the main lanes; dragging groups of said bundles in such main lanes along the main lanes from a plurality of said intersections to said passage space by the said source of power at the same setting; and transporting the bundles along said space to a place of treatment.

10. A method of mass transportation, to a treating plant, of banana stalks on a plantation having a passage space across the plantation, main lines, cleared of stalks, transverse to said passage space, and lateral lanes, cleared stalks, transverse to the main lanes; said method comprising cutting and delivering stalks to said lateral lanes and there forming them into bundles by hand; simultaneously dragging by the same source of power a plurality of these bundles along the lateral lanes into the adjacent main lanes and leaving them in the main lanes at a plurality of intersections of the lanes; dragging groups of said bundles in the main lanes along the main lanes from a plurality of said intersections by the same source of power to said passage space; and transporting the bundles along said space to a place of treatment.

11. A method of mass transportation, to a treating plant, of banana stalks on a plantation having a passage space across the plantation, main lanes, cleared of stalks, transverse to said passage space, and lateral lanes, cleared stalks, transverse to the main lanes; said method comprising cutting and delivering stalks to said lateral lanes and there forming them into bundles by hand; simultaneously dragging by the same source of power a plurality of these bundles along the lateral lanes into the adjacent main lanes and leaving them in the main lanes at a plurality of intersections of the lanes; dragging groups of said bundles in the main lanes simultaneously along the main lanes by, the same source of power to said passage space, the same adjustment of said power serving for drawing the bundles from a plurality of the intersections; and transporting the bundles to a place of treatment.

12. Steps in a method of substantially continuous economical mass production of paper stock from banana stalks continuously harvested on a plantation having a passage space thereacross, said steps comprising forming the bundles of stalk butts into large bunches with all the butts of each bunch in parallel relation with each other; transporting the bunches along said space to a storage space and storing them in said storage place while still maintaining all the butts of each bunch in parallel relation to each other; and successively transferring said bundles or bunches to a receiving platform with the butts all parallel to a treatment line.

13. A method of mass production of paper stock from banana stalk butts, said method comprising disposing the butts in parallelism; rolling the parallel butts successively into a treatment line; successively longitudinally conveying the butts, without pause and with the same end forward, throughout the treatment line.

14. Steps in a method of economical mass production of paper stock from banana stalks harvested on a plantation, said steps comprising successively transferring said bundles or bunches to a receiving platform with the butts all parallel to a treatment line; rolling the parallel butts successively to the line and successively longitudinally conveying the butts along the line for subsequent treatment.

15. Steps in a method of economical mass production of paper stock from banana stalk round butts harvested on a plantation, said steps comprising moving the butts continuously in a treatment line with the same end continuously forward; scrubbing the moving butts, while still in the round state, simultaneously on opposite sides and on all sides to remove dirty and weathered portions.

16. Steps in a method of economical mass production of paper stock from banana stalk butts harvested on a planatation, said steps comprising conveying the butts longitudinally; vertically axially splitting the moving butts and turning the

halves on their axes to dispose the flat split face downwardly while the halves are still moving longitudinally side-by-side in substantially the same plane; and centering the moving halves over decoring locations and cutting out the cores to form the halves into members less than as thick as wide suitable for flattening and crushing.

17. Steps in a method of economical mass production of paper stock from banana stalks harvested on a plantation, said steps comprising splitting and decoring the butts; longitudinally moving the decored halves; flattening, crushing, exteriorly cleaning the longitudinally moving halves to form moving fibrous sheets; combing out and fluffing up the moving sheets; then drying the sheets by forcing heated air under presssure through the moving sheets; and delivering the flat sheets in suitable condition for baling.

18. Steps in a method of mass production of paper stock from banana stalk butts, said steps comprising successively longitudinally conveying the butts, without pause and with the same end forward, throughout a treatment line; successively scrubbing, halving, decoring, and flattening the moving butts to convert them into moving sheets.

19. A method of mass production of paper stock from banana stalk butts, said method comprising successively longitudinally conveying the butts, without pause and with the same end forward, throughout a treatment line; successively scrubbing, halving, decoring, and flattening the moving butts to convert them into moving sheets; combing, fluffing, drying the moving sheets; and delivering the flat fluffed moving sheets in suitable condition for baling.

20. Steps in a method of mass production of paper stock from banana stalk butts, said steps comprising longitudinally conveying, without pause, the butts with the same end forward, along the entire line for successive subsequent treatments as follows: scrubbing the moving butts on all sides to remove weathered portions; splitting the moving butts into halves; cutting out the cores to form the halves into members less than as thick as wide; and flattening, crushing, exteriorly cleaning the halves to form moving relatively thin fibrous sheets.

21. Steps in method of mass production of paper stock from banana stalk butts, said steps comprising conveying the butts; flattening the moving butts to convert them into moving sheets; combing, fluffing, drying the moving sheets; and delivering the flat fluffed moving sheets in suitable condition for baling.

22. Steps in a method of mass production of paper stock from banana stalk butts, said steps comprising splitting the moving butts into halves; flattening, crushing, exteriorly cleaning the halves to form relatively thin fibrous sheets; combing and fluffing the moving sheets; and forcing heated air through the moving sheets to dry them.

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