J. ST. C. GILLIES.

DEFIBRATING MACHINE.

APPLICATION FILED NOV. 29, 1907

936,995.

Patented Oct. 12, 1909.

10 SHEETS—SHEET 1.

Fig. 1.

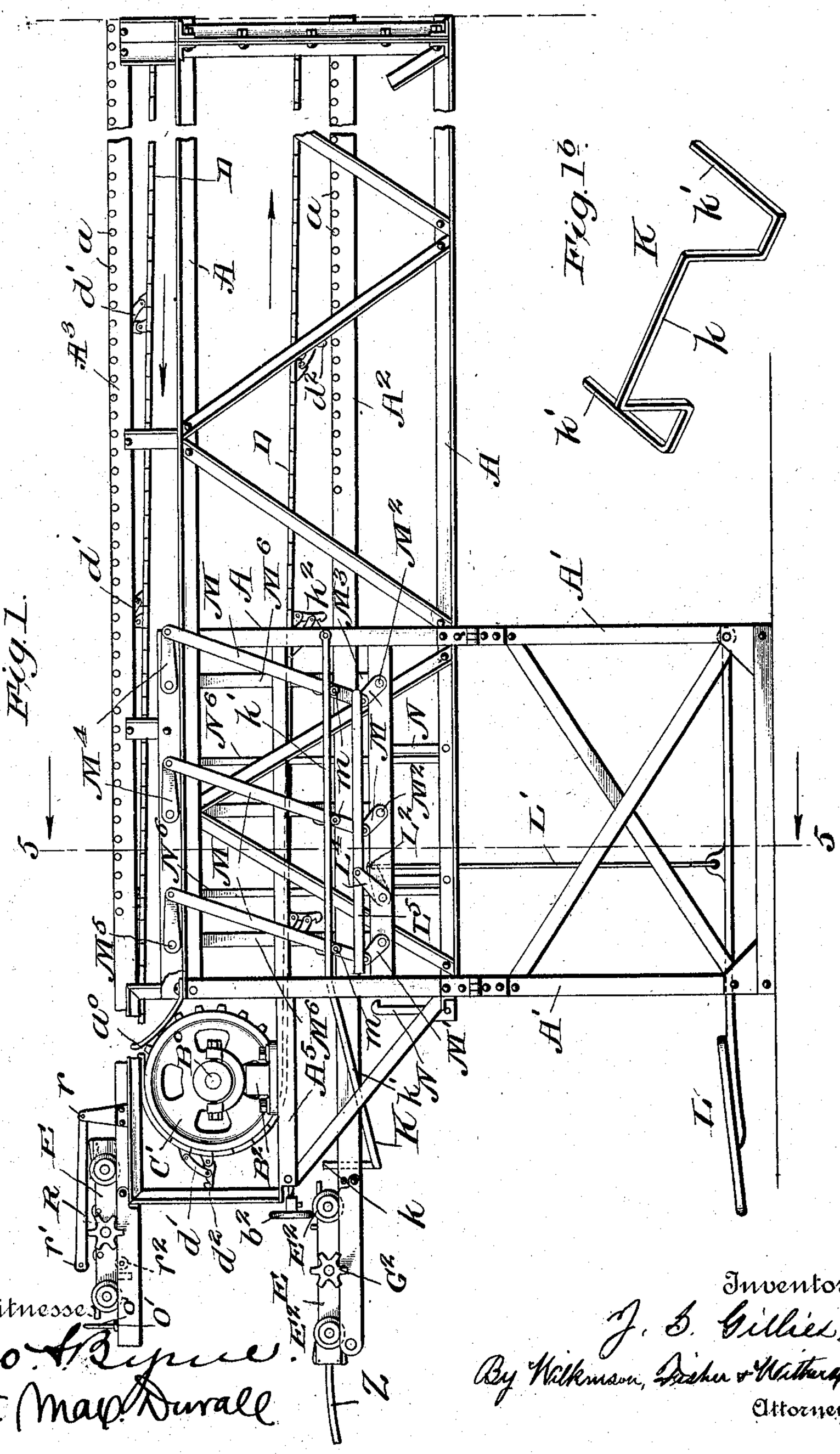


Fig. 1b.

Witnesses:

Geo. H. Graves

W. Mapl. Durall

Inventor

J. St. C. Gillies,

By Wilkinson, Fisher & Witherspoon

Attorneys.

J. ST. C. GILLIES.

DEFIBRATING MACHINE.

APPLICATION FILED NOV. 29, 1907.

936,995. Patented Oct. 12, 1909.

10 SHEETS—SHEET 2.

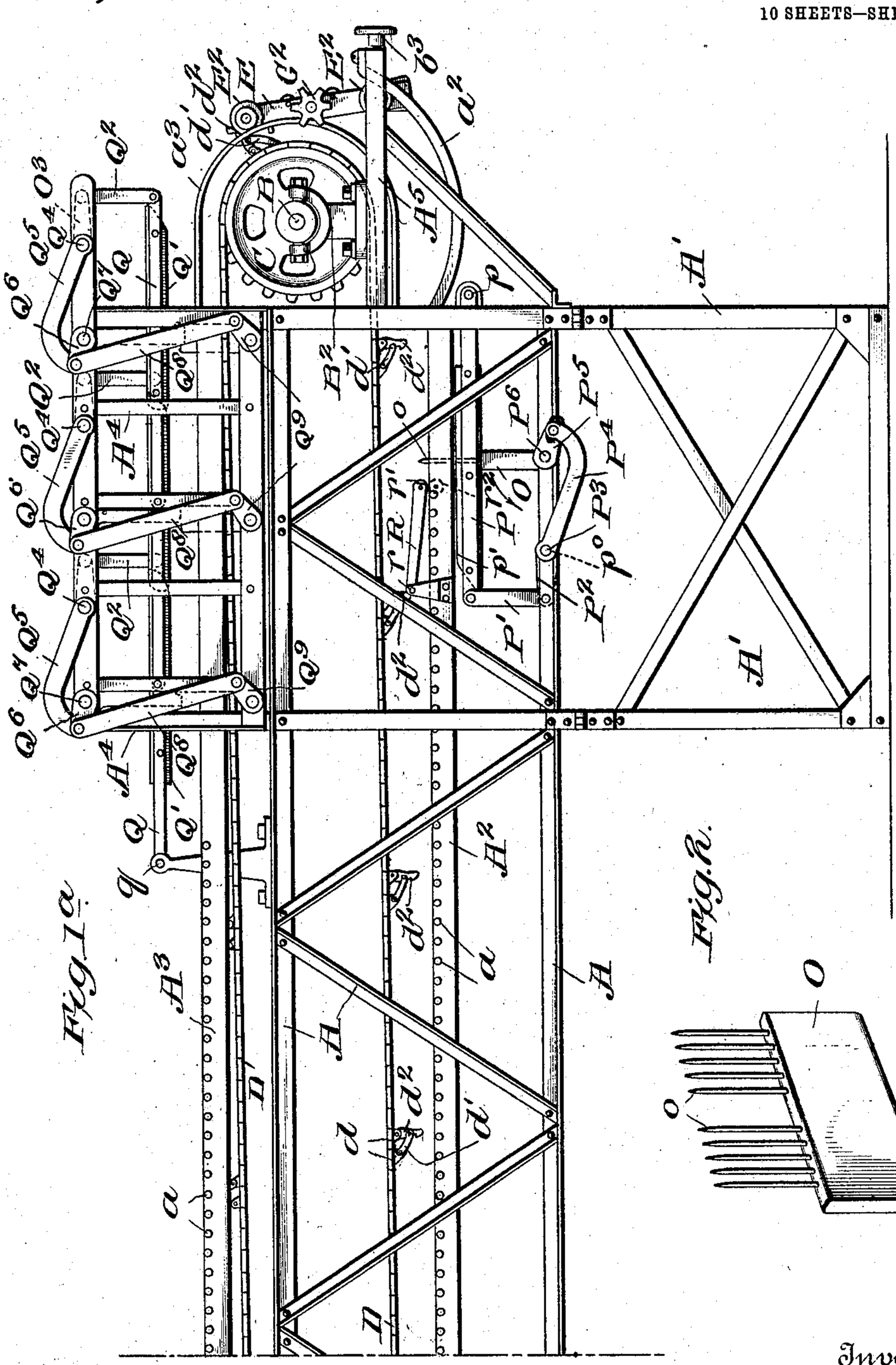


Fig. 1a.

Fig. 2.

Witnesses.

Geo. H. Graves.

Chr. Mac. Duvall.

Inventor

J. St. C. Gillies,

By Wilkinson, Dissler & Witherspoon,

Attorneys.

936,995.

J. ST. C. GILLIES.

DEFIBRATING MACHINE.

APPLICATION FILED NOV. 29, 1907.

Patented Oct. 12, 1909.

10 SHEETS—SHEET 3.

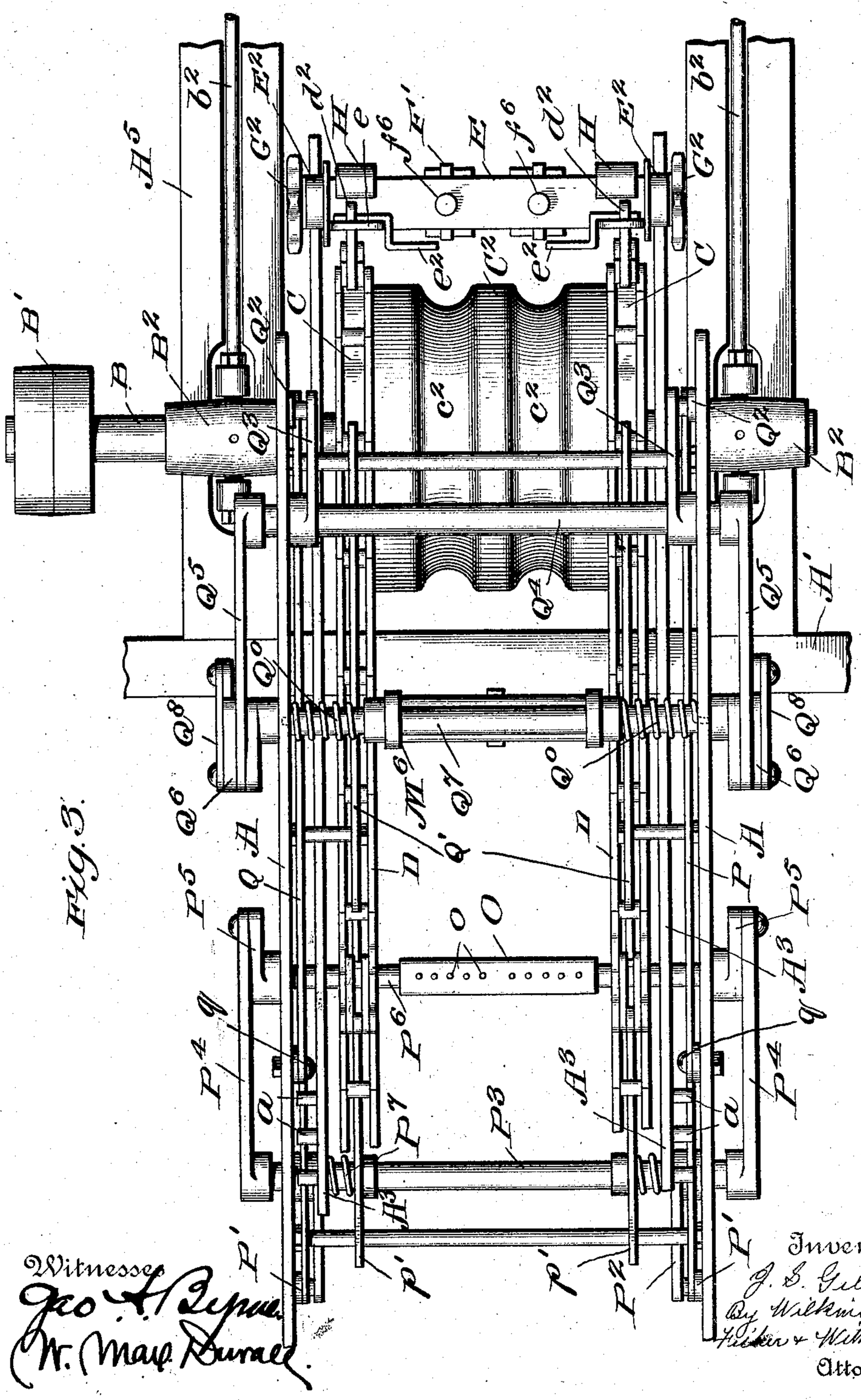


Fig. 3.

Witnesses
Geo. H. Graves.
W. Mayo Burnell.

Inventor
J. St. C. Gillies.
By Wilkinson, Fisher & Witherspoon
Attorneys

936,995.

J. ST. C. GILLIES.

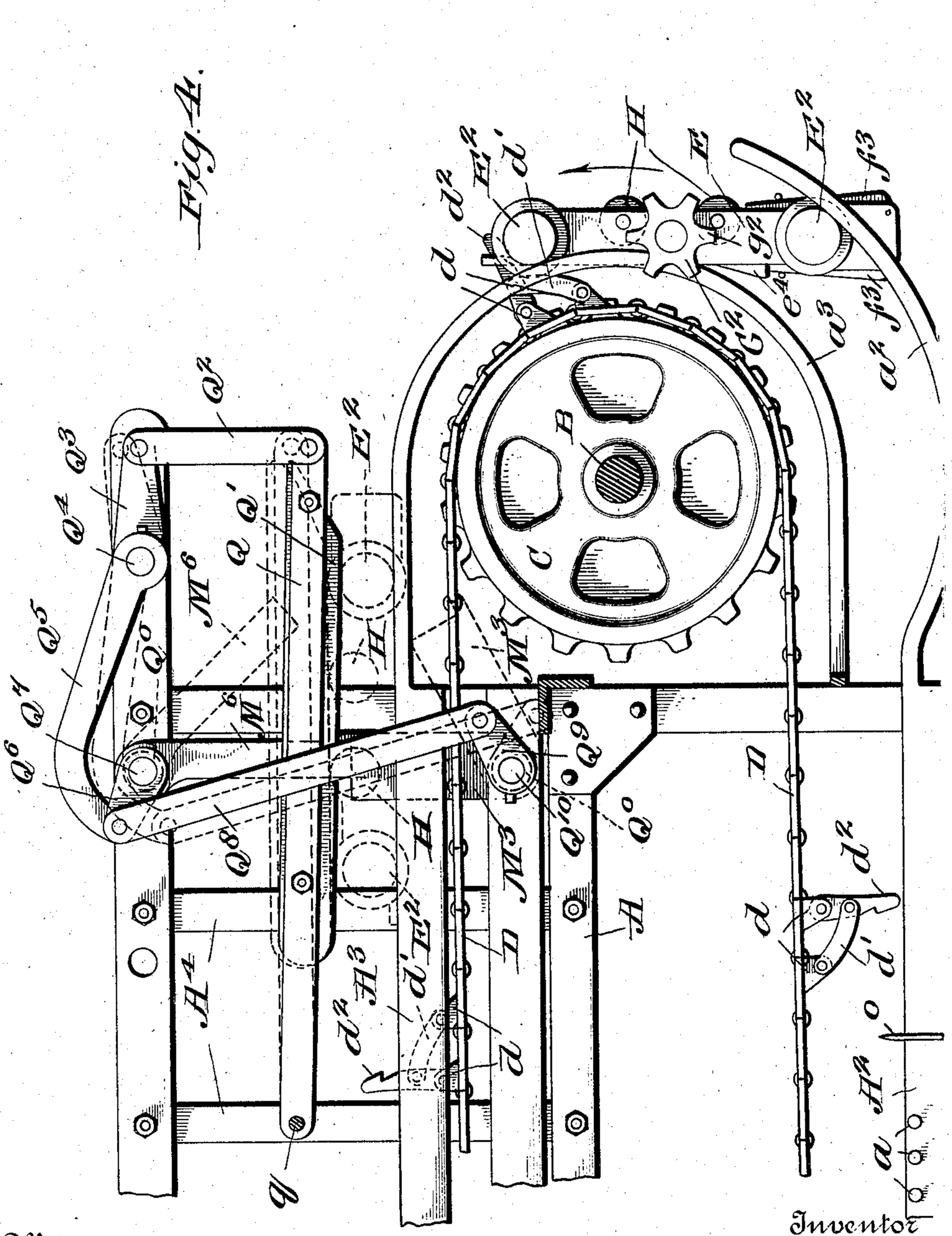
DEFIBRATING MACHINE.

APPLICATION FILED NOV. 29, 1907.

Patented Oct. 12, 1909.

10 SHEETS—SHEET 4.

Fig. 4.



J. ST. C. GILLIES.

DEFIBRATING MACHINE.

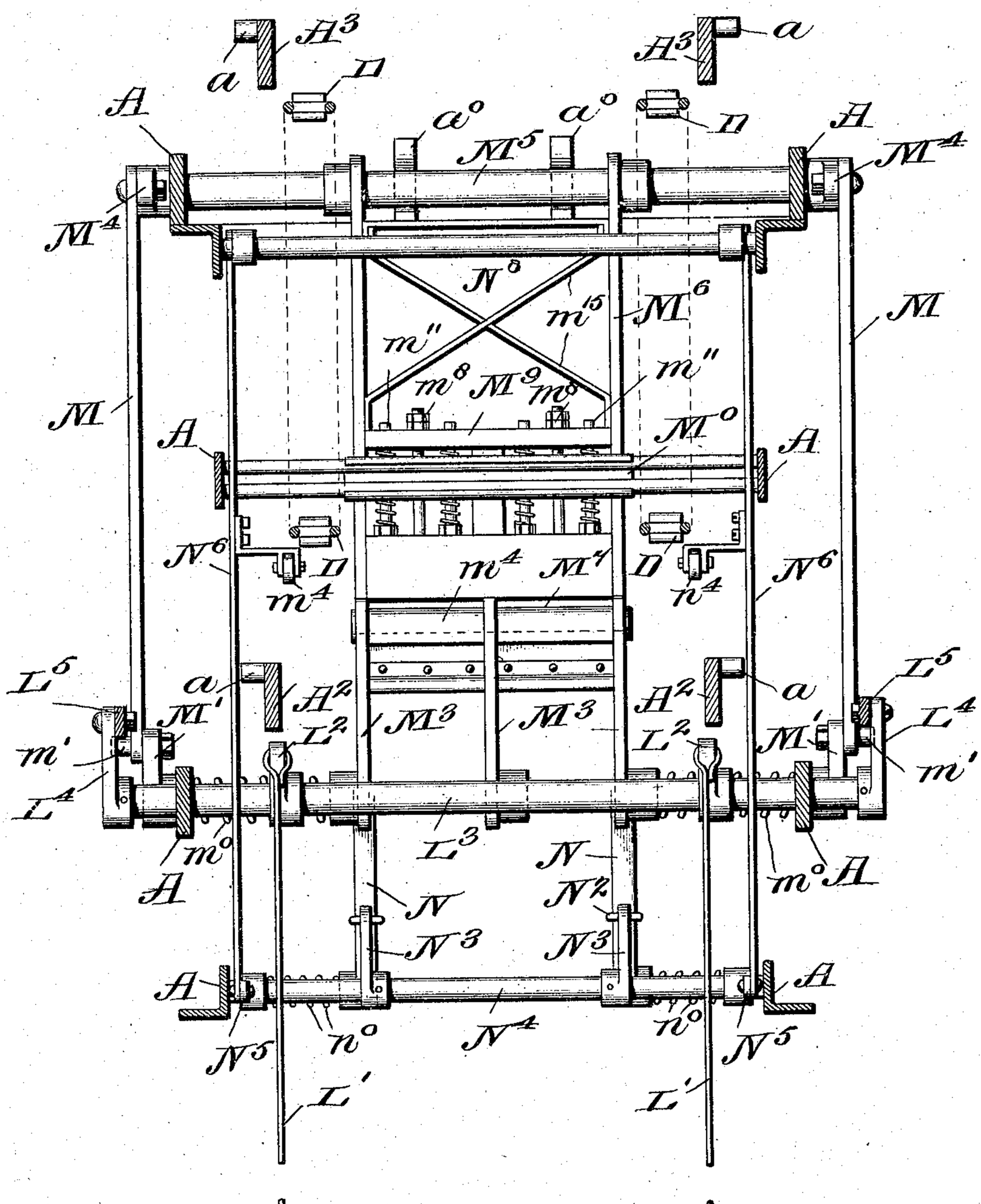
APPLICATION FILED NOV. 29, 1907.

936,995.

Patented Oct. 12, 1909.

10 SHEETS—SHEET 5.

Fig. 5.



Witnesses
Geo. H. Byrne.
W. Mac. Durell

Inventor
J. St. C. Gillies.
By Wilkinson, Fisher & Witherspoon,
Attorneys.

J. ST. C. GILLIES.

DEFIBRATING MACHINE.

APPLICATION FILED NOV. 29, 1907.

936,995.

Patented Oct. 12, 1909.

10 SHEETS—SHEET 6.

Fig. 6.

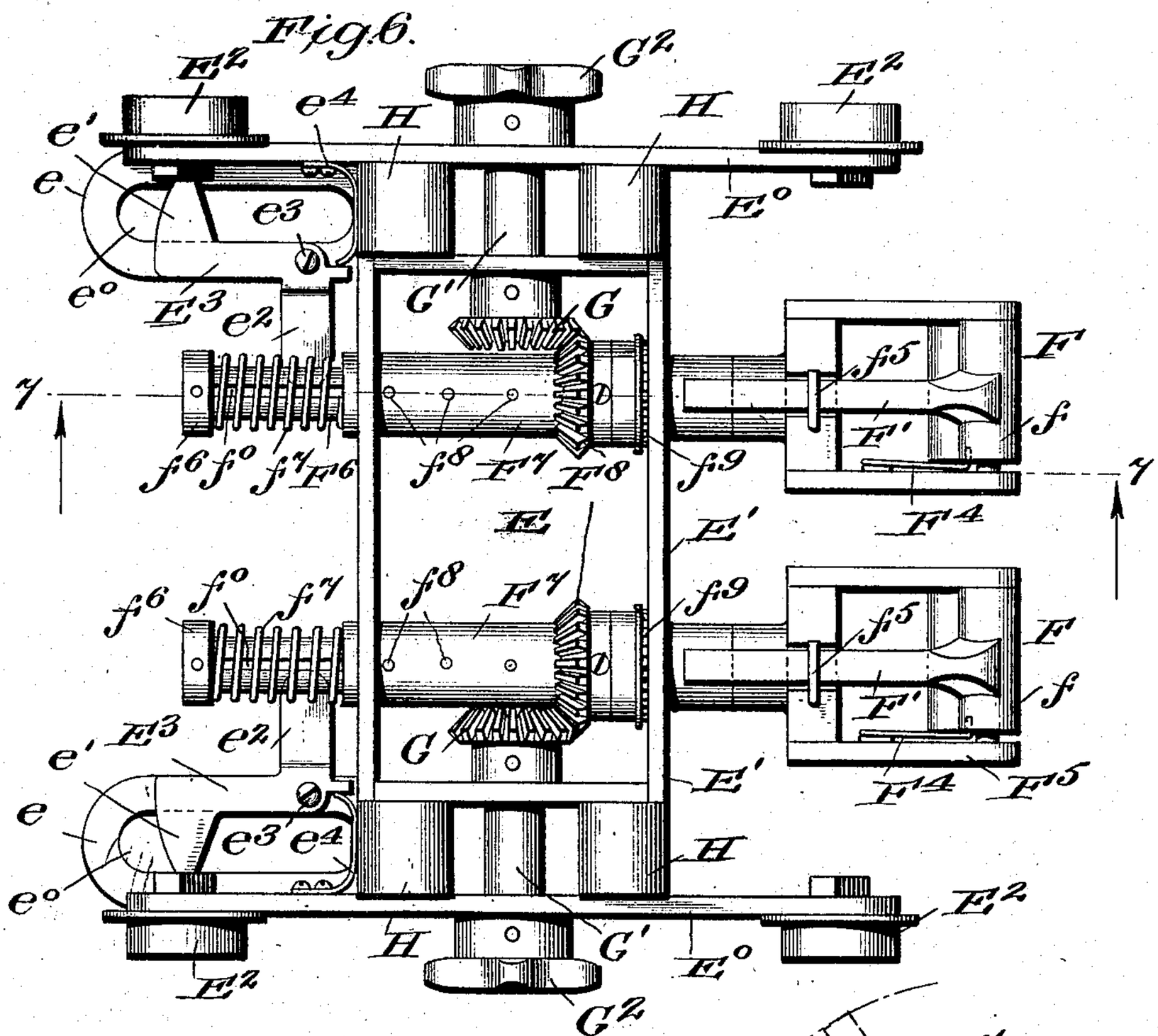


Fig. 7.

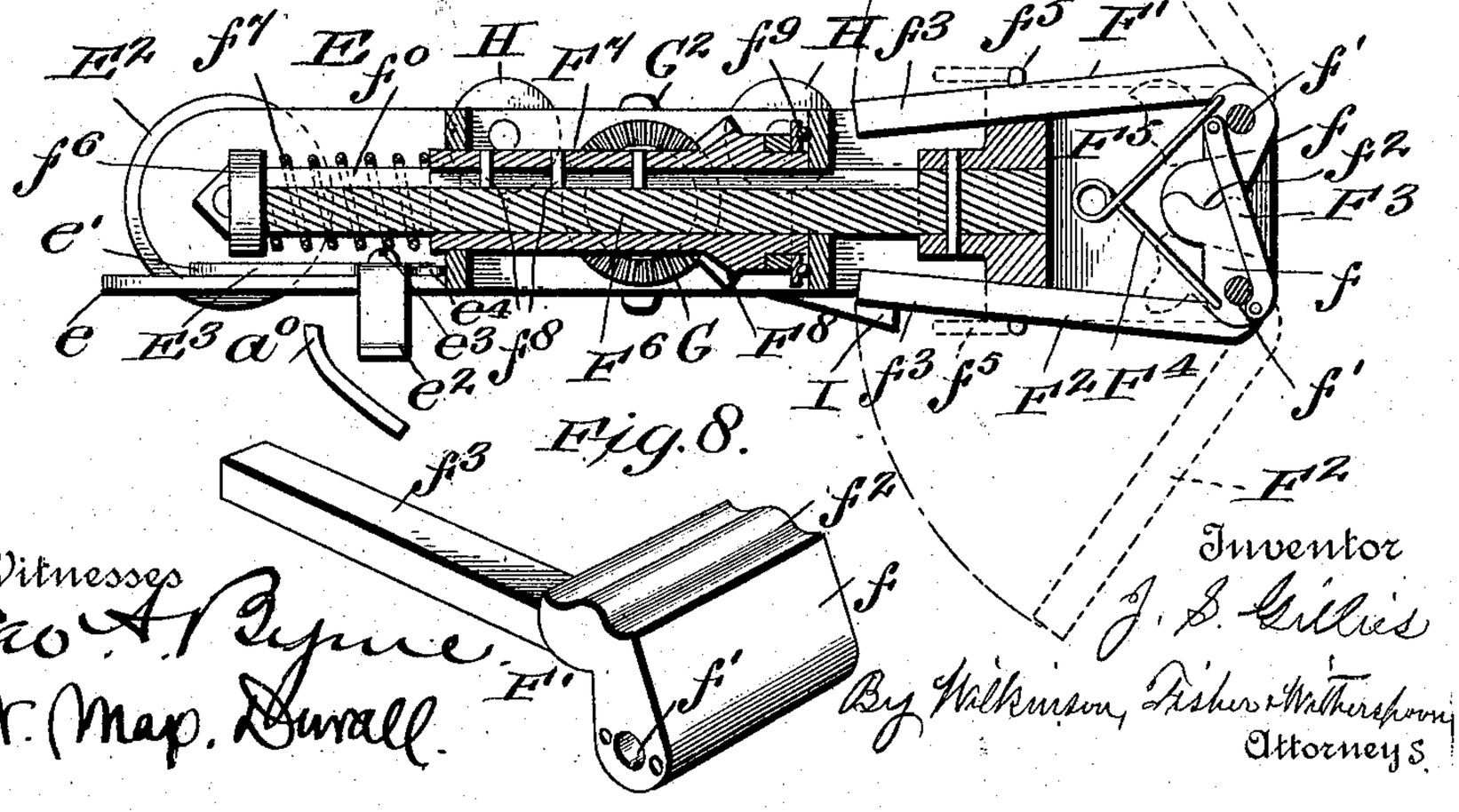


Fig. 8.

Witnesses

Geo. A. Byrne

W. Map. Duvall.

Inventor

J. St. C. Gillies

By Wilkinson, Fisher & Witherspoon

Attorneys.

J. ST. C. GILLIES.

DEFIBRATING MACHINE.

APPLICATION FILED NOV. 29, 1907.

936,995.

Patented Oct. 12, 1909.

10 SHEETS—SHEET 7.

Fig. 9.

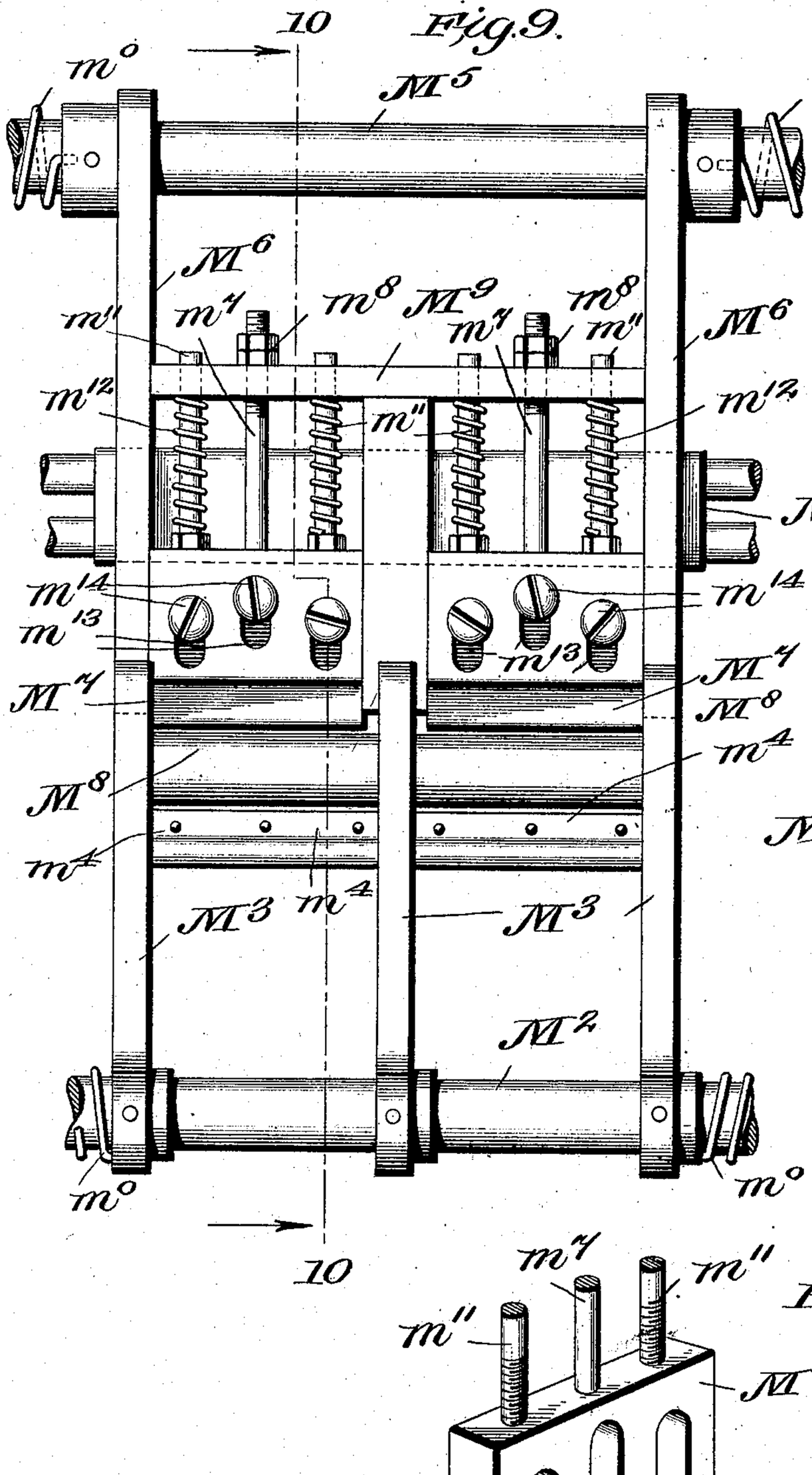


Fig. 10.

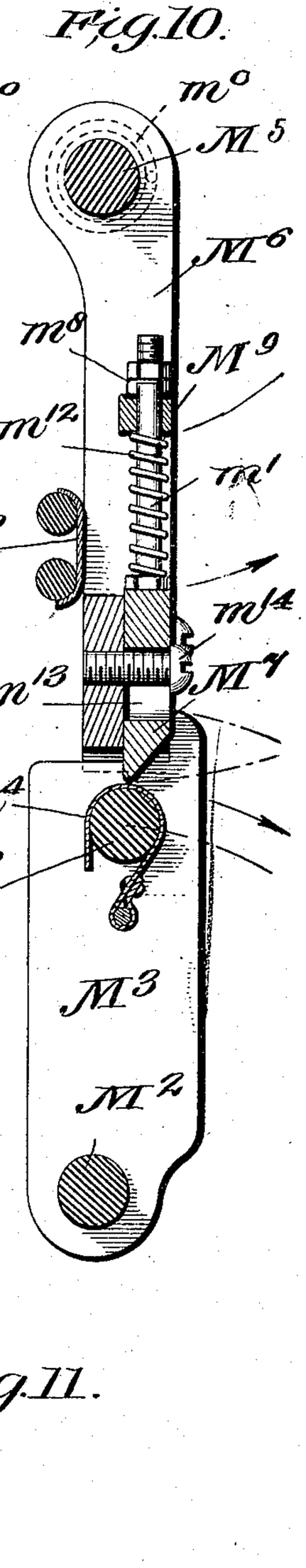


Fig. 11.

Witnesses

Jno. A. Payne.

H. May. Durell.

Inventor

J. St. C. Gillies,

By Wilkinson, Dishon & Witherspoon

Attorneys.

J. ST. C. GILLIES.

DEFIBRATING MACHINE.

APPLICATION FILED NOV. 29, 1907.

936,995.

Patented Oct. 12, 1909.

10 SHEETS—SHEET 8.

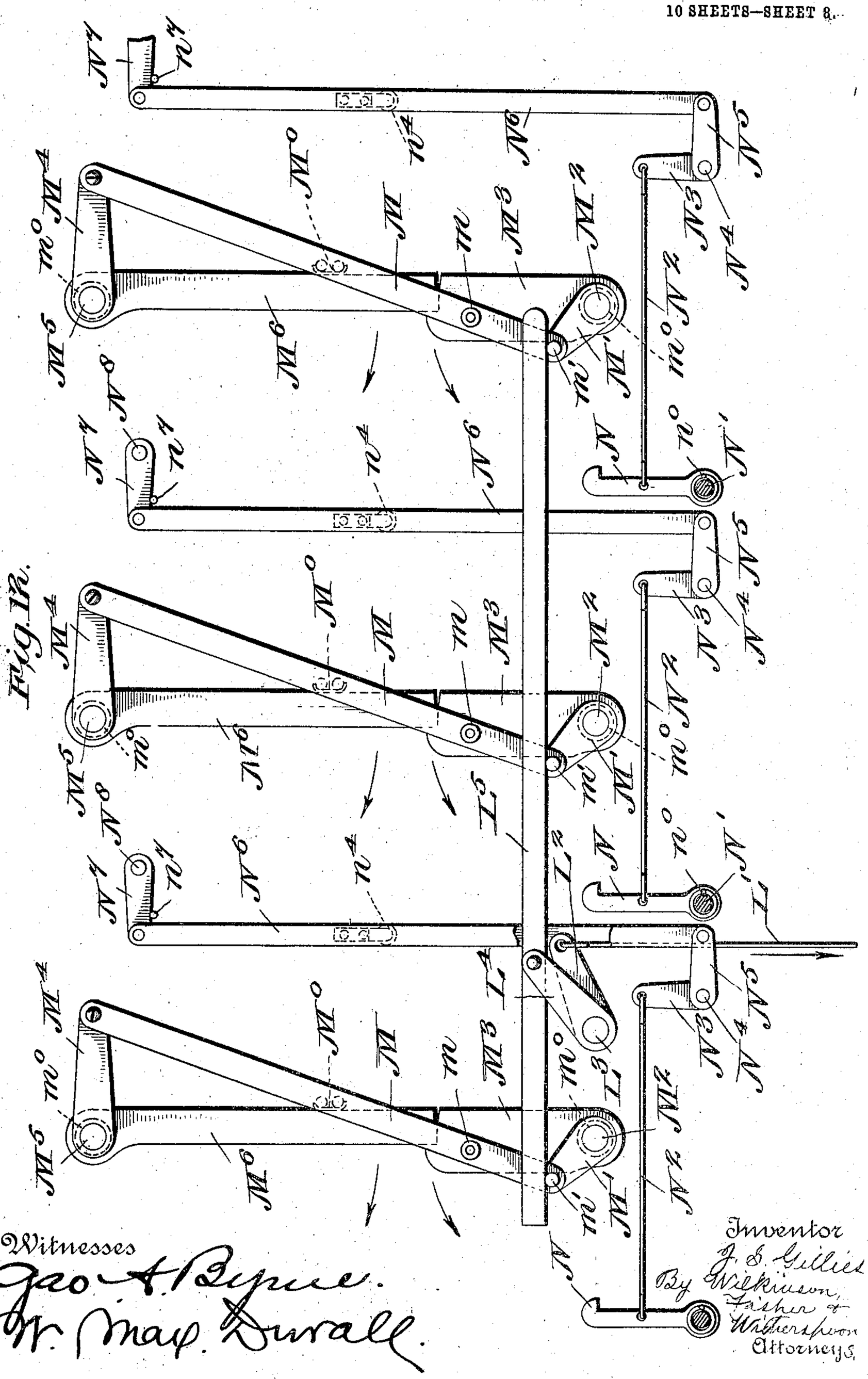


Fig. 12.

Witnesses

Geo. A. Byrne.

H. Mapl. Durell.

Inventor

J. St. C. Gillies

By Wilkinson, Fisher & Witherspoon

Attorneys.

J. ST. C. GILLIES.

DEFIBRATING MACHINE.

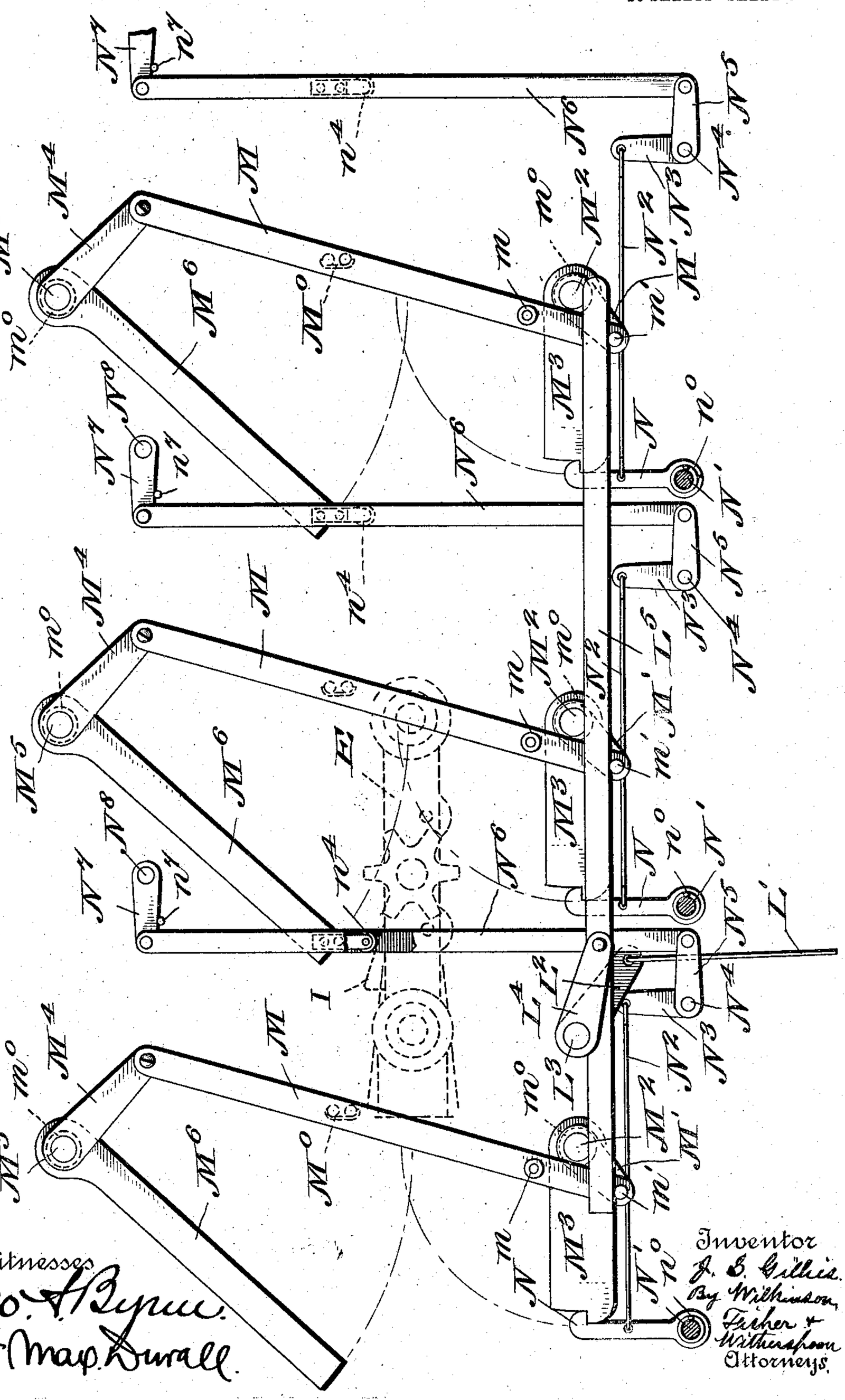
APPLICATION FILED NOV. 29, 1907.

936,995.

Patented Oct. 12, 1909.

10 SHEETS—SHEET 9.

Fig. 13.



Witnesses
Geo. A. Byrne.
W. Map. Durell.

Inventor
J. St. C. Gillies.
By Wilkinson, Fisher & Withenshaw
Attorneys.

J. ST. C. GILLIES.

DEFIBRATING MACHINE.

APPLICATION FILED NOV. 29, 1907.

936,995.

Patented Oct. 12, 1909.

10 SHEETS—SHEET 10.

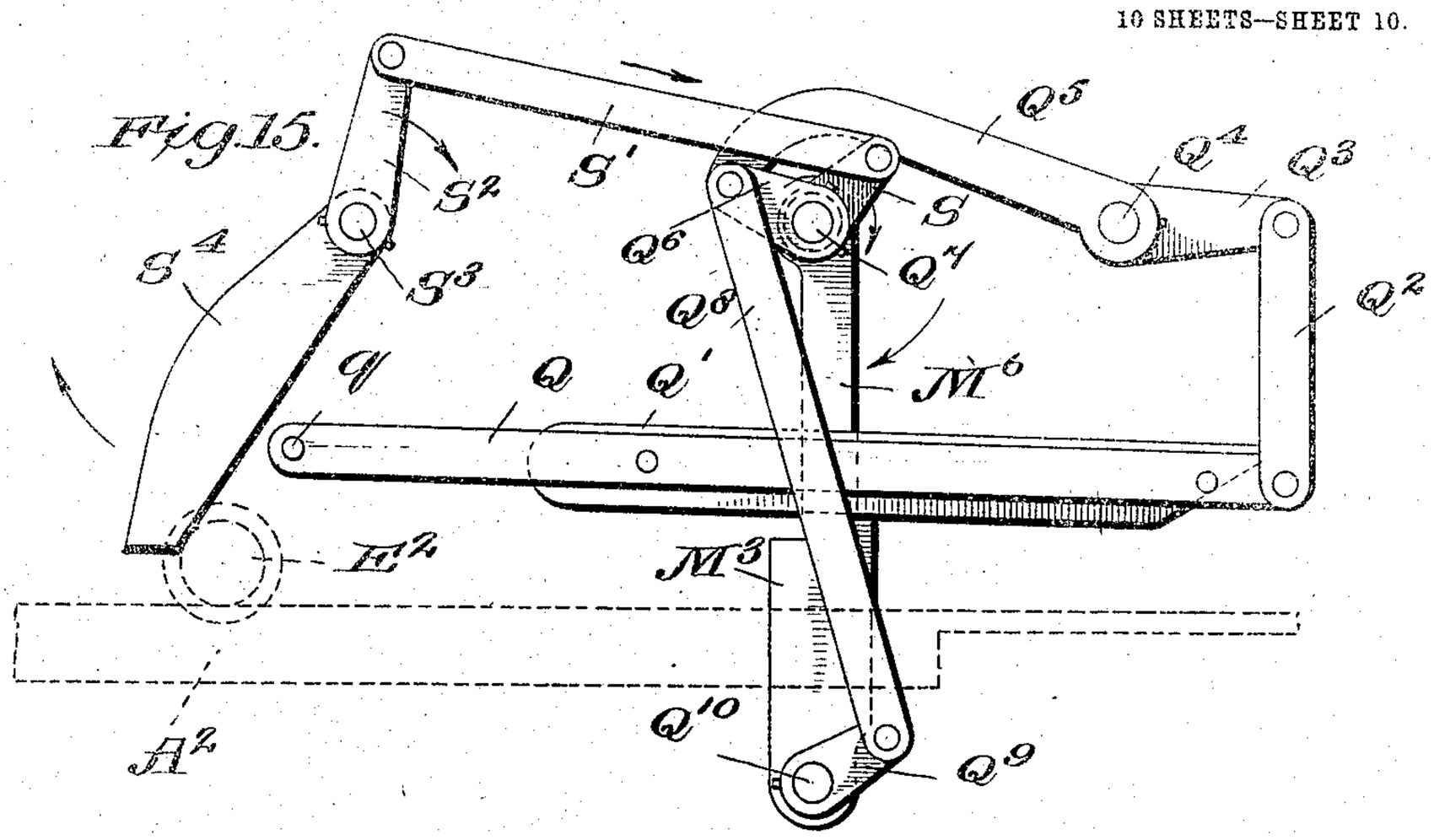


Fig. 14.

Fig. 16.

Fig. 15.

Witnesses

Geo. H. Bruce.

W. Mapl. Durall.

Inventor

J. St. C. Gillies,

By Wilkinson, Fisher & Witherspoon

Attorneys.

UNITED STATES PATENT OFFICE.

JOHN ST. CLAIR GILLIES, OF MANILA, PHILIPPINE ISLANDS, ASSIGNOR TO PHILIPPINE HEMP MACHINE COMPANY, OF MANILA, PHILIPPINE ISLANDS, A CORPORATION OF THE PHILIPPINE ISLANDS.

DEFIBRATING-MACHINE.

936,995. Specification of Letters Patent. Patented Oct. 12, 1909.

Application filed November 29, 1907. Serial No. 404,402.

To all whom it may concern:

Be it known that I, JOHN S. GILLIES, a citizen of the United States, residing at Manila, in the Island of Luzon, Philippine Islands, have invented certain new and useful Improvements in Defibrating-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 improvements in machines for removing the fiber from plants of various kinds, and is more especially intended to provide a machine for removing the fiber from the abaca or hemp plant.

According to my invention, the leaves of the abaca are cut into strips, and two or more of these strips are connected to a carriage, which carriage is drawn along an endless belt with the segments of the plant leaf trailing behind, and these segments are subjected to the scraping action of a series of knives, which tend to scrape the pulpy matter from the fiber, and the partly cleaned fiber is twisted into strands, and is passed through a series of combs, as will be hereinafter more fully described.

My invention will be understood by reference to the accompanying drawings, in which the same parts are indicated by the same letters throughout the several views.

Figures 1 and 1ª show the entire machine in side elevation, parts being broken away. Fig. 1ᵇ is a perspective view of the guard at the front end of the machine. Fig. 2 is a detail, showing one of the combs detached from the machine. Fig. 3 is a plan view on a larger scale, of the rear end of the machine, parts being omitted for the sake of clearness in the drawings, and parts being broken away. Fig. 4 is a side elevation of that part of the apparatus shown in Fig. 3, but with the side frame cut away to show the parts behind the same. Fig. 5 shows a section along the line 5—5 of Fig. 1, and looking in the direction of the arrows. Fig. 6 is a plan view of the carriage in the position shown on the upper track, as indicated at the upper, left-hand corner of Fig. 1. Fig. 7 shows a section through the carriage, along the broken line 7—7 of Fig. 6, and looking in the direction of the arrows. Fig. 8 is a detail showing in perspective one of the holding jaws for holding the end of the segment of the leaf to be treated. Fig. 9 shows, on a larger scale, one of the pairs of knives and supporting blocks or tables, which together constitute the scraping mechanism, there being a number of such pairs in the machine. Fig. 10 shows a section along the broken line 10—10 of Fig. 9, and looking in the direction of the arrows. Fig. 11 is a perspective view of one of the scraping knives. Fig. 12 shows diagrammatically the mechanism for swinging the knives and tables to permit the passage of the carriage between the two, the knives and tables being shown in the closed or operative position in this figure. Fig. 13 shows the apparatus of Fig. 12, except that the knives and tables are swung apart to permit the passage of the carriage, which carriage is shown in dotted lines in Fig. 13. Fig. 14 shows on an enlarged scale, the roller and comb arrangement shown at the upper, left-hand corner of Fig. 1. Fig. 15 shows a modification of the arrangement shown in Fig. 1ª and Fig. 4, whereby a positive and quick movement of the scraping mechanism is effected. This figure shows a unit of the series of scraping mechanisms, the others being precisely similar. Fig. 16 is a detail, showing a modified form of apparatus for arresting the twisting motion of the fiber holder located at the rear end of the machine.

The machine is preferably mounted upon a metal frame A, supported on the hinged supporting frame A′. Running lengthwise of the frame are two tracks A² and A³, each provided in a portion of its length with rack teeth *a*. At the rear end of the machine, the frame is extended upward as at A⁴; and at each end of the main frame, there is an end frame A⁵. At the rear end of the machine, the lower track A² is extended and curved as at *a*², see Figs. 1ª and 4. The upper track A³ has a semi-circular extension *a*³, and these two curved tracks *a*² and *a*³ guide the carriage E as it passes from the lower track to the upper.

B represents the drive shaft, preferably located at the rear end of the machine, which is driven by the pulley B′, or in any other convenient way. This shaft is mounted in adjustable bearings B², which may be moved forward or backward by means of the adjusting rods *b*² and hand wheels *b*³, as

shown in Figs. 1ª and 3. At the other end of the machine, a similar shaft B^0 is arranged, mounted in similar bearings, and adjusted in a similar way.

Mounted on the shaft B are two sprocket wheels C, which carry between them a curved shell C^2, forming a drum, which is corrugated, and is provided with channels c^2, see Fig. 3, to guide the trailing ends of the fiber, as will be hereinafter described. On the shaft B^0 at the other end of the machine, are two similar sprocket wheels C'. Extending between the sprocket wheels C and C', are two endless sprocket chains D, which can be kept taut by adjusting the bearings B^2, as hereinbefore described. Each of these sprocket chains carries a plurality of hooks, which are preferably connected to the sprocket chain as shown in Fig. 4, in which *d* represents two attachments, carried by two adjoining links of the chain. d^2 represents a hook pivoted to one of these attachments, and *d'* represents a combined link and brace tying the hook to the other attachment; thus a strong, but flexible connection is provided between the hook and the chain. These hooks are used for dragging the carriage.

The carriage E is shown in detail in Figs. 6 to 8, and it comprises a rectangular frame E' connected to end plates E^0, to which are journaled the flanged wheels E^2. The carriage is provided with webs *e* slotted as at e^0 to receive one of the hooks d^2, and the hook is held in place by the latch *e'* at one end of the plate E^3, which plate is pivoted as at e^3 to the carriage, and is provided with a downwardly extending curved arm e^2, which is adapted to strike the tripping arm a^0 carried near the front end of the upper track, as shown in Fig. 7. This arm a^0 trips the pivoted plate E^3 and releases the latch *e'*, and thus allows the carriage to be withdrawn from engagement with the chain. It will be obvious that these arms e^2 may be made long enough to overlap and to be actuated simultaneously by a single tripping arm. This latch is normally held in the engaging position by means of the spring e^4, see Figs. 5, 6 and 7, which spring yields when the wedge shaped point of the hook d^2 is inserted in the recess in the latch plate rearward of the latch *e'*, and snaps the latch into engagement with the notch of the hook when the hook has been shoved home. Thus, it will be seen that the carriage may be securely connected to the chain, and may be automatically released therefrom at the end of its travel.

The plant segments are held in a chuck F, which consists of two pivoted members F' and F^2, which are pivoted to the head F^5 and journaled on the spindle F^6. These two pivoted members each consists of two gripping jaws *f* provided with curved gripping surfaces f^2, and these jaws are normally held together by the spring F^4, and are also connected together by the link F^3. These two members F' and F^2 have tail pieces f^3, which are locked in the chuck head F^5 by means of U shaped holding wires f^5, which are pivoted in said head, and may be turned across or parallel with the said tail pieces f^3, and thus may prevent the gripping jaws from swinging open, or may release same, as desired.

In order to insert the segment of the plant in the gripping jaws, they may be swung open by pressure on the parts *f*, the locking wires f^5 being out of engagement; or, by lifting on one of the tail pieces f^3, the link F^3 will cause the other jaw to swing open, and the jaws may be thrown apart to the position indicated in dotted lines in Fig. 7.

The two chucks are driven by bevel gears F^8 carried by the sleeves F^7, which sleeves have spline pins f^8 projecting into the spline groove f^0 in the spindle F^6. These bevel gears F^8 mesh with bevel gears G on the shaft G', driven by the star wheels G^2, which mesh with the rack teeth *a*. A thrust bearing f^9, preferably a ball antifriction bearing, is provided.

In order to furnish longitudinal elasticity to the chuck, the spindle F^6 is provided with a cap f^6, holding under compression the spring f^7, one end of which abuts against the sleeve F^7. This spring will yield to excessive pressure when such pressure is brought on the chuck, as in combing out the fiber, and will thus furnish a yielding resistance to obstructions to the travel of the carriage, incident to the treatment of the plant. The carriage also carries certain tripping rollers H and cams I, whose function will be hereinafter described.

K, see Figs. 1 and 1ᵇ, represents a guard, which is pivoted, as at k^2 to the frame-work of the machine, and has side members *k'* passing over the rollers *m*, and is bent downward and projects upward in the path of the carriage, as shown at *k*.

L represents a pedal, which operates the rods L', connected to the cranks L^2 on the shaft L^3, which is journaled transversely of the frame A, and is provided at its ends with cranks L^4 connected to the side bars L^5, which bars rest on lugs *m'*, near the ends of the side bars M, which side bars M are connected at their lower ends to the cranks M', carried by the shafts M^2, which shafts carry the abutment frames M^3 carrying bearing bars or abutments M^8, see Figs. 5, 12 and 13.

The side bars M are pivoted at their upper ends to the cranks M^4 on the shafts M^5, which carry the frames M^6 for the knives. These abutment frames M^3 and knife frames M^6 are normally held in the engaging position shown in Fig. 12, by coil springs m^0, and the angular motion of the frame M^6 is

checked by the stop M^0, which preferably consists of one or more bars extending across the machine. (These bars, are shown with a curved plate on one side thereof.)

It will be seen that pressing down on the treadle L will pull down on the side bars L^5, which, acting on the pins m', will rock the abutment frames M^3, and the knife frames M^6 from the closed position, shown in Fig. 12, to the open position shown in Fig. 13. These parts are held in the open position by means of latches N, which engage the notched ends of the abutment frames M^3, as shown in Fig. 13. The spring n^0 normally tends to press the latch N into the engaging position. Each latch N is loosely mounted on the shaft N', to which it is connected by the coil spring n^0, which coil spring tends to press the latch in the engaging position, as before stated.

To disengage the latch, I provide a rod N^2 connected to an arm N^3 on the shaft N^4, which carries an arm N^5 connected to the side rod N^6, which is pivoted to the arm N^7 on the shaft N^8. The travel of this arm N^7 is limited by the stop n^7. The side rod N^6 is provided with a roller n^4 adapted to engage the cam I on the carriage, see Fig. 13, so that after the carriage passes any pair of abutment frames M^3 and knife frames M^6, these are released, and under the action of their springs m^0, swing upward from the open position shown in Fig. 13, to the closed position shown in Fig. 12. This closing motion may be positively and rapidly effected by the automatic arrangement shown in Fig. 15, which will be hereinafter described.

The frames M^6 carry the knives M^7; and the abutment frames M^3 carry the bearing bars on abutments M^8 against which the knives act, as shown in Figs. 9 to 11. The frames M^6 carry a cross bar M^9, through which the rods m^7 and m^{11} project, which rods are secured to the back of the knives, as shown in Fig. 11, and the normal distance of the edge of the knive from the bearing block, is adjusted by means of lock nuts m^8 on the rod m^7. Braces m^{15} are preferably provided, located between the cross bar M^9 and the frames M^6. The knife is pressed toward the bearing block by means of springs m^{12}. Limited play is permitted to the knife by having the screws m^{14} passing through slots m^{13} in the head of the knife, so that they hold the knife in place, but permit the same to yield upward. The bearing bar M^8 connecting the sides of abutment frames M^3, is preferably protected by a replaceable wear plate m^4, as shown in Fig. 10.

A hinged comb O, having teeth o, is provided near the rear end of the machine, as shown in Fig. 1^a and Fig. 2. This comb is rigidly mounted on the shaft P^6, having at its ends, cranks P^5 connected by curved arms P^4 to the shaft P^3, which shaft carries arms P^2 connected by links P' to the bars P, pivoted as at p, and carrying cam plates p', adapted to be struck by the rollers H on the carriage. When the first roller H reaches this cam plate p' it forces down the links P', rocks the arms P^2 and P^4 about the shaft P^3 and rocks the arm P^5, swinging the comb O toward the forward end of the machine, as indicated by the arrow, thus getting the comb out of the way of the carriage. After the carriage has passed, the rollers H run off of the cam plates p', and the coil springs P^7 on the shaft P^3, see Fig. 3, automatically restore the comb to the initial or raised position shown in Fig. 1^a, in which it will engage the fiber. The fiber is held in engagement with the comb, between the roller r' carried by the bars R pivoted at r, and the roller r^2, journaled on the frame-work A, see Figs. 1^a and 14. The front pair of wheels E^2 of the carriage pass under the bars R, and lift the roller r', as shown in dotted lines in Fig. 14, thus permitting the passage of the carriage between the rollers r' and r^2.

Near the forward end of the machine, a comb O' is provided, (see Figs. 1 and 14) having teeth o', which comb, mounted on the shaft O^2, is normally held in the engaging position by the coil spring o^2. This comb also carries arms o^3, which come in contact with the carriage E; thus, the carriage swings the comb out of the way, in the direction of the arrow shown in Fig. 14, and the comb rights itself to engage the fiber after the carriage has passed under the action of the springs o^2. After the carriage has passed, from the lower track A^2 to the upper track A^3; to the position shown in dotted lines in Fig. 4, the rollers H strike cam plates Q' carried by side bars Q, pivoted at one end q, and connected at the other end to links Q^2, which are pivoted to the arms Q^3 on the shaft Q^4, which shaft carries the curved arms Q^5, pivoted to the cranks Q^6 on the shaft Q^7, carrying the knife frames M^6. These cranks Q^6 are connected by the links Q^8 to the cranks Q^9 on the shaft Q^{10} carrying the tables M^3, and thus, if the side bars Q are lifted by the rollers H, the knife frames M^6 and the abutment frames M^3 will be swung apart, as indicated in dotted lines in Fig. 4. After the rollers H pass clear of the cam plate Q, the knife frames M^6 and the abutment frames M^3 will be swung back to the closed position, shown in full lines in Fig. 4, by means of the springs Q^0, see Fig. 3. Thus, the carriage passes each set of knives successively, and each knife is automatically returned to the engaging position after the carriage has passed.

In order to insure a quick and positive return of the knives to the engaging position, an actuating device for the knife frames M^6 and abutment frames M^3 may be provided, such, for instance, as that shown in Fig. 15,

in which the shaft Q^7 carries an extra crank S connected by the link S′ to the arm S^2 on the shaft S^3, which shaft carries an arm S^4 adapted to engage one of the front rollers E^2 of the carriage shown in dotted lines in Fig. 15. When this roller strikes the arm S^4, it will rock the arm S, and with it the shaft Q^7 and will restore the knife frame M^6 and the abutment frames M^3 to the initial or closed position.

In order to automatically lock the chuck F from rotation at the rear end of the machine while the fiber is being combed out, an angle iron T may be provided, having a face *t* adapted to simultaneously engage a pair of teeth g^2 of the star wheel G^2, as shown in Fig. 16, and while the pair of teeth are in engagement with this edge *t* of the angle plate T, the wheel cannot revolve. The number of rack teeth *a* on the lower track A^2 is so adjusted that the teeth g^2 of the star wheel G^2 may pass off the rack and be locked by the angle plate T at the time when the strip or "tape" of fiber is horizontal, and thus the fiber may be drawn forward in flat tape-like strips.

The operation of the device is as follows: A strip of fibrous material Z is inserted in one of the chucks F, and is held beneath the holding jaws by the convoluted surfaces *f* of the chuck. The carriage is then placed on the end of the lower track A^2, as seen at the left of Fig. 1. The carriage cannot be pressed forward as long as the guard *k* is in the raised position shown in Fig. 1, but by pressing on the treadle L, the first series of knives are opened, and the lowering of the rollers *m* will allow the guard *k* to drop by gravity out of the way of the carriage, and the carriage may be pushed forward and snapped on to a pair of hooks d^2 of the moving chains D. These chains will then drag the carriage forward on the lower track D^2, beneath the open knives, as soon as it passes the first knife, the carriage will automatically release the first set of knife frames and abutments, causing the two to swing together and engage the fibrous material. After the carriage has passed the second knife, that knife will also be thrown into action, and so on with the other knives. Each knife will tend to squeeze more or less of water, pulpy matter, etc., out of the plant, leaving the fiber; and to prevent this fiber from being broken by the successive action of the knives, it is twisted into strands by the chuck before being entirely drawn through all the knives of the first series, which winding is caused by the engagement of the star wheels G^2 with the rack teeth *a*. By twisting the fiber into a strand, and by easing the pressure on the chuck by the springs f^7, as already described, very little of the fiber is broken or lost. The springs back of the knives will also yield when the strain becomes excessive, thus affording another factor of safety against the breaking of the fiber. After reaching the rear end of the machine, the star wheel G^2 runs off of the rack teeth *a* and the rotation of the chuck ceases, which rotation, or any reverse rotation, is positively stopped by means of the arrangement shown in Fig. 16. After the rotation ceases, the ribbon engages the comb O′ and is combed out, and the loosened strand is drawn over the corrugated drum C^2. The fiber is held in engagement with the comb by means of rollers r' and r^2, see Fig. 1ª. The carriage now passes between the curved tracks a^2, and a^3 and reaches the upper track A^3, where the carriage passes successively beneath the knives in the frame A^4 and each knife is successively brought to play on the ribbon. After the carriage passes the last knife, the fiber is twisted into a strand, as before, by the engagement of the star wheels A^2 with the rack teeth *a*, and finally, when the carriage reaches the front end of the machine again, the carriage is detached by means of the tripping arm a^9; and the attendant, seizing the carriage, draws it beneath the bars R, causing the fiber to pass between the rollers *r* and *r*′, see Fig. 1 and Fig. 14, and draws the said fiber through the teeth *o*′ of the comb O′. The untreated part of the material, held in the jaws of the chuck, is now cut off, thrown away, and the fiber is removed.

While I have shown the knives arranged in pairs across the machine, and have shown three sets of knives near each end of the machine, with one comb after each set of knives, it will be obvious that the number and arrangement of the knives and combs may be varied indefinitely.

It will be obvious that various modifications might be made in the herein described apparatus, which could be used without departing from the spirit of my invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States is:

1. In a defibrating machine, the combination of a supporting frame, spring pressed knives for scraping the material under treatment, swinging abutments coöperating with said knives, means for supporting and moving the material under treatment, automatic means for twisting said material and mechanism for automatically opening and closing said knives and abutments, permitting the passage therebetween of the fiber carrying means, substantially as described.

2. In a defibrating machine, the combination of spring pressed knives, swinging abutments coöperating therewith, a movable carriage holding the material under treatment, automatic means for twisting said material, means for opening a passage between said knives and their corresponding abut

ments to permit the passage of the carriage, and means for positively restoring said knives and said abutments to their original position, substantially as described.

3. In a defibrating machine, the combination of a supporting frame, a carriage movable along said frame for carrying the material under treatment, spring pressed knives on said frame adapted to be moved aside to permit the passage of the carriage, and swinging abutments coöperating with said knives, mechanism for preventing the carriage from being inserted in the machine unless the knives are clear of said abutments. substantially as described.

4. In a defibrating machine, the combination of a supporting frame, means adapted to hold the fiber and arranged to travel along said frame, means for causing said carrying means to twist the fiber at the proper time, and a positive lock near the back end of the machine to prevent the operation of the twisting means, substantially as described.

5. In a defibrating machine, the combination of a supporting frame, a carriage, provided with means for holding the material under treatment, arranged to travel along said frame, a series of spring pressed knives and swinging abutments coöperating therewith, arranged at each end of the machine, said knives and abutments being adapted to be separated from each other to permit the passage of the carriage, substantially as described.

6. In a defibrating machine, the combination of a supporting frame, a carriage arranged to travel along said frame and provided with means for holding the material under treatment, automatic means for twisting said material, a plurality of spring pressed knives arranged to scrape the material, a swinging abutment corresponding to each knife and coöperating therewith, means for moving each knife and its corresponding abutment away from each other to permit the passage of the carriage, and means for bringing said knives into operative relation to their corresponding abutments after the carriage has passed, substantially as described.

7. In a defibrating machine, the combination of a supporting frame, a carriage arranged to travel along said frame and provided with means for holding the material under treatment, automatic means for twisting said material, a series of spring pressed scraping knives, a swinging abutment corresponding to each scraping knife, means for swinging said knives and their corresponding abutments away from each other to permit the passage of the carriage, and means for restoring said knives and abutments to their original position, so that the knives will act upon the material under treatment, after the carriage has passed, substantially as described.

8. In a defibrating machine, the combination of a supporting frame, a carriage arranged to travel along said frame and provided with means for holding the material under treatment, automatic means for twisting said material, a series of spring pressed scraping knives, a swinging abutment corresponding to each scraping knife, means for swinging said knives and their corresponding abutments away from each other to permit the passage of the carriage, and means for automatically and positively restoring said knives and said abutments to their original position after the carriage has passed, substantially as described.

9. In a defibrating machine, the combination of a supporting frame, a carriage adapted to travel along said frame and provided with means for holding the material under treatment, a plurality of scraping knives, a swinging abutment coöperating with each knife, means for swinging said knives and abutments away from each other to permit the passage of the carriage, means for temporarily locking said knives and abutments in their separated position to permit the passage of the carriage, and devices for releasing said locking means after the passage of the carriage, substantially as described.

10. In a defibrating machine, the combination of a supporting frame, a carriage adapted to travel along said frame and provided with devices for holding the material under treatment, automatic means for twisting said material, a series of knives, a swinging abutment coöperating with each knife, means for swinging said knives and their corresponding abutments away from each other to permit the passage of the carriage, means for locking said abutments and knives in their separated position, and means for releasing said locking means, said last named means being operated by the travel of the carriage along the frame, substantially as described.

11. In a defibrating machine, the combination of a supporting frame, a carriage adapted to travel along said frame and provided with devices for holding the material under treatment, a scraping knife, an abutment cooperating with said knife, said knife and abutment being pivotally supported, connections between the pivotal supports of said knife and said abutment, means for swinging said abutment and said knife away from each other to permit the passage of the carriage, means for locking said abutment and said knife in their separated position, and means operated by the movement of the carriage for releasing said locking means, substantially as described.

12. In a defibrating machine, the combination of a supporting frame, a carriage ar-

ranged to travel along said frame and provided with devices for holding the material under treatment, automatic means for twisting said material, a pivotally mounted knife, a pivotally mounted abutment coöperating therewith, connections between said knife and said abutment, means for swinging said knife and said abutment away from each other to permit the passage of the carriage therebetween, locking devices arranged to hold said abutment, and said knife out of the path of said carriage, and means operated by the carriage in its forward movement to release said locking means after the carriage has passed between said knife and said abutment, substantially as described.

13. In a defibrating machine, the combination of a supporting frame, a carriage arranged to travel along said frame and provided with devices for holding the material under treatment, a pivotally mounted knife, a pivotally mounted abutment coöperating therewith, connections between said knife and said abutment, means for swinging said knife and said abutment away from each other to permit the passage of the carriage therebetween, locking devices arranged to hold said knife out of the path of said carriage, means operated by the carriage in its forward movement to release said locking means after the carriage has passed between said knife and said abutment, and means for returning said knife and said abutment to their original position after the carriage has passed, substantially as described.

14. In a defibrating machine, the combination of a supporting frame, a carriage arranged to travel on said frame and provided with means for holding the material under treatment, a pivotally mounted knife, a pivotally mounted abutment coöperating therewith, devices for swinging said knife and said abutment away from each other to permit the passage of the carriage therebetween, and means preventing the insertion of the carriage into the frame of the machine before said knife and said abutment have been moved away from each other, substantially as described.

15. In a defibrating machine, the combination of a supporting frame, a carriage arranged to travel on said frame and provided with means for holding the material under treatment, automatic means for twisting said material, a pivotally mounted knife, a pivotally mounted abutment coöperating therewith, devices for swinging said knife and said abutment away from each other to permit the passage of the carriage therebetween, and a guard preventing the insertion of the carriage into the frame of the machine before said knife and abutment have been moved away from each other, substantially as described.

16. In a defibrating machine, the combination of a supporting frame, a carriage arranged to travel on said frame and provided with means for holding the material under treatment, a pivotally mounted knife, a pivotally mounted abutment coöperating therewith, devices for swinging said knife and said abutment away from each other to permit the passage of the carriage therebetween, a guard pivoted on the frame of the machine and preventing the insertion of the carriage into the frame of the machine before said knife and abutment have been moved away from each other, and means for returning said knife and abutment to their original position, substantially as described.

17. In a defibrating machine, the combination of a supporting frame, a carriage arranged to travel thereon and provided with devices for holding the material under treatment, a pivotally mounted knife, a pivotally mounted abutment coöperating therewith, means for swinging said knife and said abutment away from each other to permit the passage of the carriage therebetween, and a guard pivotally mounted on the frame of the machine and having a portion normally projecting in the path of travel of said carriage, said guard being supported upon the means for swinging the knife and the abutment coöperating therewith, so that said carriage cannot be inserted into the machine until said knife and said abutment have been moved away from each other, thereby permitting the guard to be moved out of the path of travel of the carriage, substantially as described.

18. In a defibrating machine, the combination of a supporting frame, a carriage arranged to travel thereon and provided with devices for holding the material under treatment, a plurality of pivotally mounted knives, a plurality of pivotally mounted abutments coöperating therewith, means for swinging said knives and said abutments away from each other to permit the passage of the carriage therebetween, a guard pivotally mounted on the frame of the machine and having a portion normally projecting in the path of travel of said carriage, said guard being supported upon the means for swinging the knives and the abutments cooperating therewith, so that said carriage cannot be inserted into the machine until said knives and said abutments have been moved away from each other, thereby permitting the guard to be moved out of the path of travel of the carriage, substantially as described.

19. In a defibrating machine, the combination of a supporting frame, a carriage arranged to travel along said frame and provided with means for holding the material under treatment and a cam, a knife and a swinging abutment coöperating therewith, means for moving said knife and said abut-

ment away from each other to permit the passage of the carriage therebetween, locking devices for holding said table and said knife away from each other, and means for releasing said locking devices, said releasing means being operated by the cam on the carriage as it travels along the frame, substantially as described.

20. In a defibrating machine, the combination of a supporting frame, a carriage adapted to move along said frame and carrying the material under treatment, automatic means for twisting said material, a knife adapted to scrape the material under treatment, a swinging abutment coöperating with said knife, means for moving said knife and said abutment away from each other to permit the passage of the carriage therebetween, means for returning said knife and said abutment to their original position, and a stop for preventing said knife and abutment from moving too far in the return movement, substantially as described.

21. In a defibrating machine, the combination of a supporting frame, a carriage adapted to travel along said frame and carrying the material under treatment, automatic means for twisting said material, a scraping knife, a swinging abutment frame, an abutment carried by said frame and coöperating with said knife and provided with a notched portion, means for swinging said knife and said abutment away from each other to permit the passage of the carriage therebetween, connections between said knife and said abutment frame, a latch for engaging the notched portion of said abutment, thereby holding said abutment and said knife in their separated position to permit the passage of the carriage therebetween, and means for disengaging said latch from said abutment after the carriage has passed, substantially as described.

22. In a defibrating machine, the combination of a supporting frame, a carriage adapted to travel therealong and to carry the material under treatment, a pivotally mounted knife, a pivotally mounted abutment frame carrying an abutment engaging said knife, connections between said knife and said abutment frame, means for swinging said abutment frame and said knife away from each other to permit the passage of the carriage therebetween, a latch for engaging said abutment frame and holding said knife and said table in their separated position, means for disengaging said latch from said abutment frame, and a stop limiting the movement of said disengaging means in one direction, substantially as described.

23. In a defibrating machine, the combination of a supporting frame, a carriage adapted to travel therealong and to carry the material under treatment, said carriage being provided with a cam, a knife for scraping the material, a swinging abutment cooperating with said knife, means for moving said abutment and said knife away from each other to permit the passage of the carriage therebetween, a latch for holding said abutment and said knife in their separated position, and means for releasing said latch, said means including a roller adapted to be struck by the cam on said carriage, substantially as described.

24. In a defibrating machine, the combination of a supporting frame, a carriage adapted to travel therealong and carry the material under treatment, a pivotally mounted knife for scraping the material, a pivotally mounted abutment coöperating with said knife, pivotal connections between said knife and said abutment, means for swinging said knife and said abutment away from each other to permit the passage of the carriage therebetween, and means for restoring said knife and said abutment to their initial position after the passage of the carriage therebetween, substantially as described.

25. In a defibrating machine, the combination of a supporting frame, a carriage adapted to travel therealong and provided with means for holding the material under treatment, automatic means for twisting said material, a pivotally mounted knife, a pivotally mounted abutment coöperating therewith, connections between said knife and said abutment, means for moving said abutment and said knife away from each other, and means for positively returning said knife and said abutment to their original position after the passage of the carriage, substantially as described.

26. In a defibrating machine, the combination of a supporting frame, a carriage adapted to travel therealong provided with means for holding the material under treatment, automatic means for twisting said material, a spring pressed knife, a swinging abutment coöperating therewith, means for moving said knife and said abutment away from each other to permit the passage of the carriage therebetween, and automatic means for returning said knife and said abutment to their original position, said means including an operating spring, substantially as described.

27. In a defibrating machine, the combination of a supporting frame, a carriage adapted to travel therealong and carry the material under treatment, a knife, a swinging abutment coöperating therewith, means for moving said knife and said abutment away from each other to permit the passage of the carriage therebetween, and means for returning said abutment and said knife to their original position after the passage of said carriage, said means including a spring and connections positively operated by the carriage in its travel to restore said knife

and said abutment to their initial position, substantially as described.

28. In a defibrating machine, the combination of a supporting frame, a carriage adapted to travel therealong and carry the material under treatment, a movable knife, an abutment coöperating therewith, means for moving said abutment and said knife away from each other to permit the passage of the carriage therebetween, and means positively operated by the carriage in its travel to return said knife and said abutment to their initial position after the passage of the carriage, substantially as described.

29. In a defibrating machine, the combination of a supporting frame, a carriage adapted to travel therealong and carry the material under treatment, said carriage being provided with projecting rollers, a movable knife, an abutment coöperating therewith, means for moving said knife and said abutment away from each other to permit the passage of the carriage therebetween, and means for positively restoring said knife and said abutment to their original position, said means including an arm adapted to be struck by the rollers on said carriage, substantially as described.

30. In a defibrating machine, the combination of a supporting frame, a carriage adapted to travel therealong and carry the material under treatment, said carriage being provided with projecting rollers, a scraping knife, a swinging abutment coöperating therewith, means for moving said abutment and said knife away from each other to permit the passage of the carriage therebetween, means for positively returning said knife and said abutment to their initial position after the carriage has passed, said last named means including a pivoted arm adapted to be struck by the rollers on the carriage, and connections between said arm and said knife and abutment, substantially as described.

31. In a defibrating machine, the combination of a supporting frame, a carriage adapted to travel therealong and carry the material under treatment, said carriage being provided with projecting rollers, a pivoted knife, a pivoted abutment coöperating therewith, means for moving said knife and said abutment away from each other to permit the passage of the carriage therebetween and to positively return said knife and said abutment to their initial position after the carriage has passed, said means including a pivoted arm provided with a cam adapted to be struck by the rollers on said carriage, connections between said arm and said knife, connections between said knife and said abutment, a pivoted arm adapted to be struck by said rollers after said carriage has passed between the knife and the abutment, and connections between said arm and said knife, substantially as described.

32. In a defibrating machine, the combination of a supporting frame, a carriage adapted to travel therealong and carry the material under treatment, said carriage being provided with projecting rollers, a pivoted knife, a pivoted abutment coöperating therewith, means for moving said knife and said abutment away from each other to permit the passage of the carriage therebetween and to positively return said knife and said abutment to their initial position after the carriage has passed, said means including a pivoted arm provided with a cam adapted to be struck by the rollers on said carriage, connections between said arm and said knife, connections between said knife and said abutment, a pivoted arm adapted to be struck by said rollers after said carriage has passed between the knife and the abutment, connections between said arm and said knife, and a spring acting to return said knife and said abutment to their initial position, substantially as described.

33. In a defibrating machine, the combination of a supporting frame, provided with a track, sprocket wheels and chains thereon, said chains being provided with hooks, and a carriage adapted to move along said track and provided with spring actuated latches for engaging said hooks, substantially as described.

34. In a defibrating machine, the combination of a supporting frame, a track thereon, sprocket wheels and chains, said chains carrying hooks, a carriage adapted to move along said frame and provided with spring-actuated latches engaging said hooks, and disengaging means for said latches mounted on the frame, substantially as described.

35. In a defibrating machine, the combination of a supporting frame, tracks thereon, sprocket wheels and chains, the latter being provided with hooks, a carriage adapted to travel on said tracks and provided with spring-actuated latches for engaging said hooks, said latches being provided with extending arms, and disengaging means carried on the frame of the machine for striking said arms, whereby said latches are released at the proper time, substantially as described.

36. In a defibrating machine, the combination of a supporting frame, a track thereon and a carriage adapted to travel on said track, said carriage being provided with supporting wheels, projecting rollers, cams, means for holding the material under treatment, and devices for rotating said holding means, substantially as described.

37. In a defibrating machine, a carriage for holding the material under treatment including a supporting frame, wheels, rollers and cams thereon, clamping jaws for hold-

ing the material, gearing, and sprocket wheels for rotating said jaws, substantially as described.

38. In a defibrating machine, a carriage for holding the material under treatment, including a frame, wheels, cams and rollers mounted thereon, a spindle carrying clamping jaws for holding the material under treatment, means for rotating said spindle, and resilient means allowing said spindle to yield when unusual strain is brought upon the material under treatment, substantially as described.

39. In a defibrating machine, a carriage for holding the material under treatment, including a frame, wheels, cams and rollers mounted thereon, gripping jaws for the material under treatment, a rotatable spindle on which said jaws are mounted, means for rotating said spindle, and a spring for normally holding said jaws closed, substantially as described.

40. In a defibrating machine, a carriage for holding the material under treatment, including a frame, wheels, rollers and cams mounted thereon, a spindle slidably mounted on said frame, means for rotating said spindle, a spring surrounding said spindle and allowing it to yield when unusual strain is brought upon the material under treatment, a pair of pivoted gripping jaws pivotally mounted on said spindle, a spring for normally holding said jaws closed, and additional means for preventing said jaws from opening, substantially as described.

41. In a defibrating machine, the combination of a supporting frame, a track provided with teeth mounted thereon, a carriage adapted to travel on said track and having toothed wheels adapted to engage said teeth, gripping jaws carried by said carriage, gearing for rotating said jaws by the movement of said sprocket-wheels as the carriage advances, and means located near the discharge end of the machine for locking said wheels against rotation, thereby preventing further twisting or untwisting of the fiber strand, substantially as described.

42. In a defibrating machine, the combination of a supporting frame, a toothed track carried thereby, a carriage adapted to travel on said track and provided with toothed wheels engaging said teeth, a rotatable chuck carried by said carriage gearing adapted to cause the rotation of said chuck by the rotation of said sprocket wheels, and a curved plate at the end of the machine so arranged as to engage two adjacent teeth of the sprocket wheels, thereby preventing the rotation of said wheels, substantially as described.

43. In a defibrating machine, the combination of a supporting frame, a toothed track carried thereby, a carriage adapted to travel on said track and provided with toothed wheels engaging said teeth, a rotatable chuck carried by said carriage, gearing adapted to cause the rotation of said chuck by the rotation of said sprocket wheels, and a curved plate at the end of the machine so arranged as to engage two adjacent teeth of the sprocket wheels, thereby preventing the rotation of said wheels, and a comb, whereby the flat portion of the fiber strand next to the chuck is presented in a horizontal direction to the teeth of the comb, substantially as described.

44. In a defibrating machine, the combination of a main frame, shafts mounted therein, a corrugated drum mounted on each shaft, adjustable bearings for said shafts, sprocket wheels mounted on said shafts, sprocket chains connecting said sprocket wheels and a carriage adapted to be moved along the frame of the machine, said sprocket chains carrying means for engaging said carriage, substantially as described.

45. In a defibrating machine, the combination of a supporting frame, bearings adjustably mounted on said frame, shafts mounted in said bearings, a corrugated drum mounted on each shaft, sprocket wheels mounted on said shaft outside of said drum, sprocket chains connecting said sprocket wheels, and a carriage provided with means for holding the material under treatment and adapted to travel along the frame, and hooks carried by said sprocket chains for engaging said carriage, substantially as described.

46. In a defibrating machine, the combination of a supporting frame, bearings adjustably mounted on said frame, shafts mounted in said bearings, a corrugated drum mounted on each shaft, sprocket wheels mounted on said shaft outside of said drum, sprocket chains connecting said sprocket wheels, and a carriage provided with means for holding the material under treatment and adapted to travel along the frame, hooks carried by said sprocket chains for engaging said carriage, and means on the frame for disengaging said hooks from said carriage, substantially as described.

47. In a defibrating machine, the combination of a supporting frame, adjustable bearings thereon, shafts, each provided with a corrugated drum and with sprocket wheels mounted thereon, sprocket chains connecting said wheels and provided with hooks and a carriage adapted to be engaged by said hooks and provided with means for holding the material under treatment, and rollers for guiding the material under treatment supported by the frame of the machine, substantially as described.

48. In a defibrating machine, the combination of a supporting frame, shafts mounted therein, each shaft being provided with a corrugated drum and with two sprocket

wheels near the ends of said drum, respectively, sprocket chains connecting the sprocket wheels on the opposite shafts, and a carriage adapted to travel along the frame, means carried by said sprocket chains for engaging said carriage, devices on said carriage for holding the material under treatment between which rollers said carriage passes, substantially as described.

49. In a defibrating machine, the combination of a supporting frame, shafts carried thereby, each shaft being provided with a corrugated drum and a sprocket wheel at each end of said drum, sprocket chains connecting the sprocket wheels on the opposite shafts and provided with hooks, a carriage provided with means for holding the material under treatment and adapted to be engaged by said hooks, and sets of guide rollers supported by the frame of the machine, and a pivoted supporting arm for one roller of each set, whereby said carriage may pass between said guide rollers, substantially as described.

In testimony whereof, I affix my signature, in presence of two witnesses.

JOHN ST. CLAIR GILLIES.

Witnesses:

MOSES ELY,

CHARLES TULLY.