(No Model.)

6 Sheets—Sheet 1.

A. L. KITSELMAN.

WIRE FABRIC MACHINE.

No. 504,984. Patented Sept. 12, 1893.

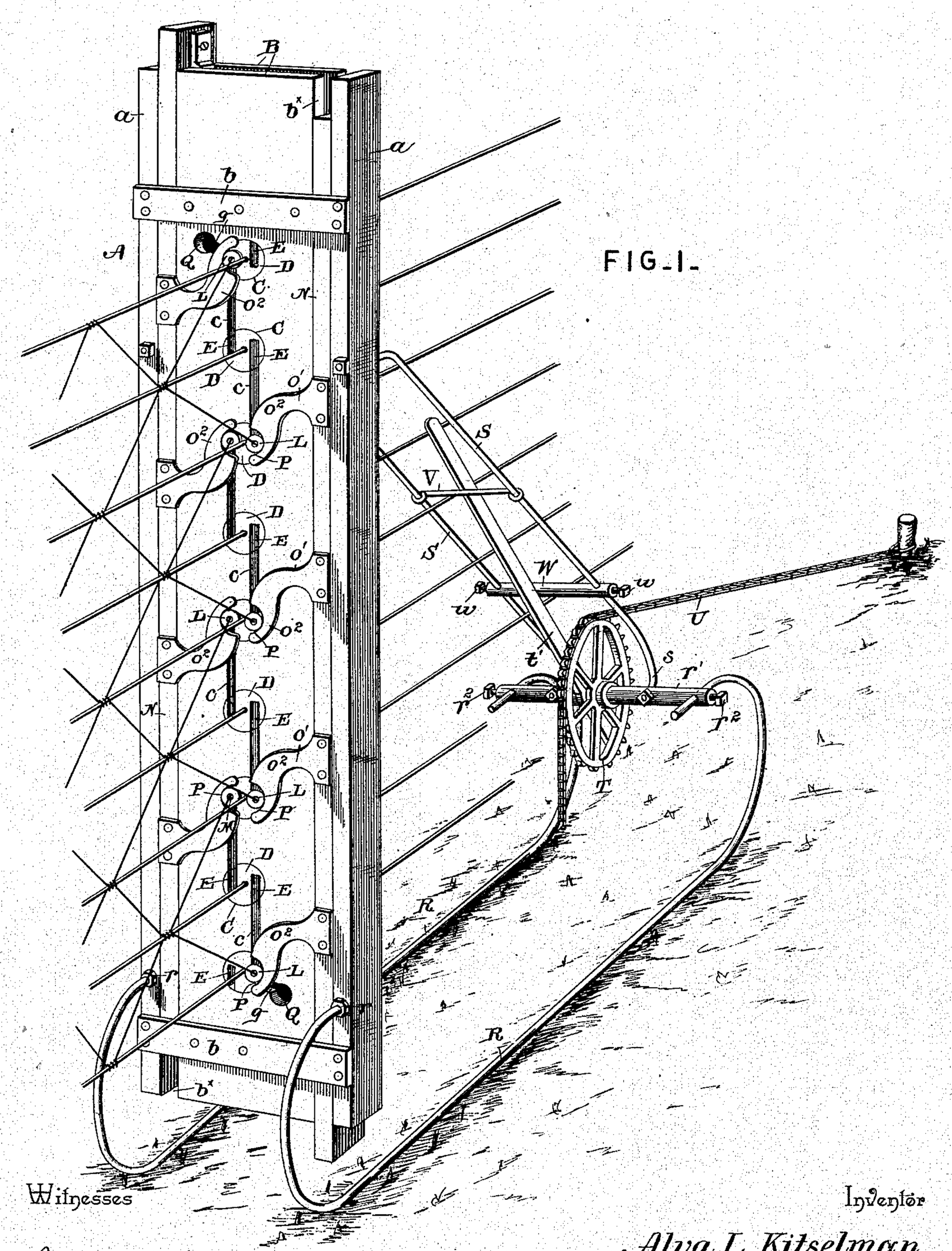

FIG. 1.

Witnesses

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D. P. Walhampton

Inventor

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By his Attorneys,

C. A. Snow & Co.

(No Model.) 6 Sheets—Sheet 2.

A. L. KITSELMAN.

WIRE FABRIC MACHINE.

No. 504,984. Patented Sept. 12, 1893.

FIG_2.

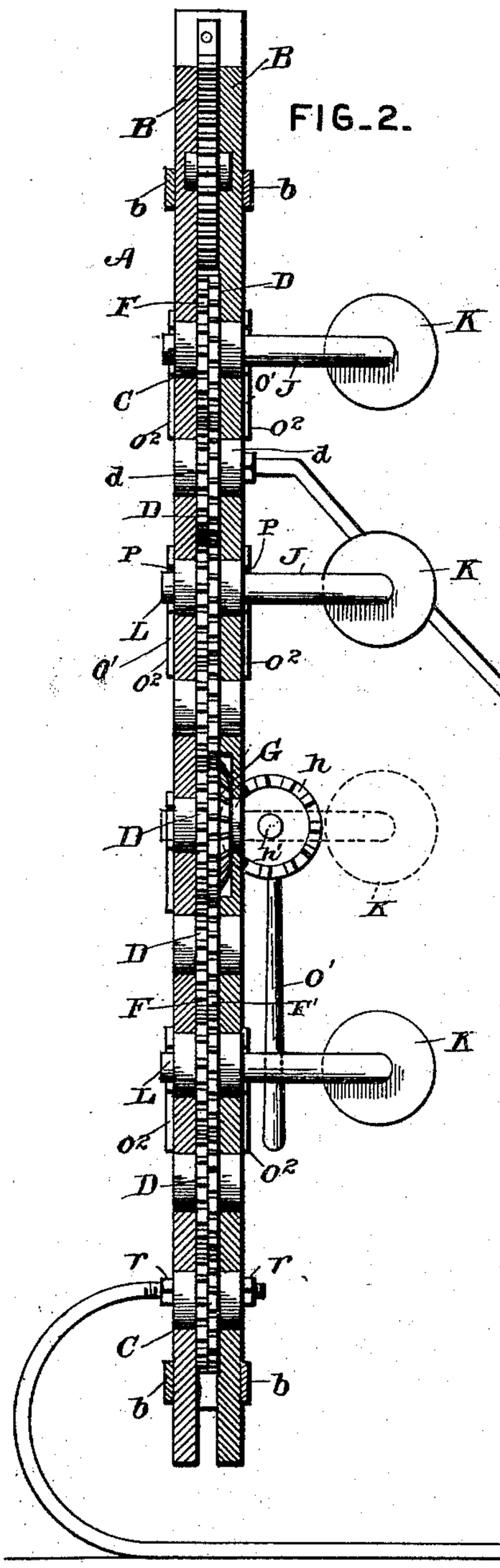
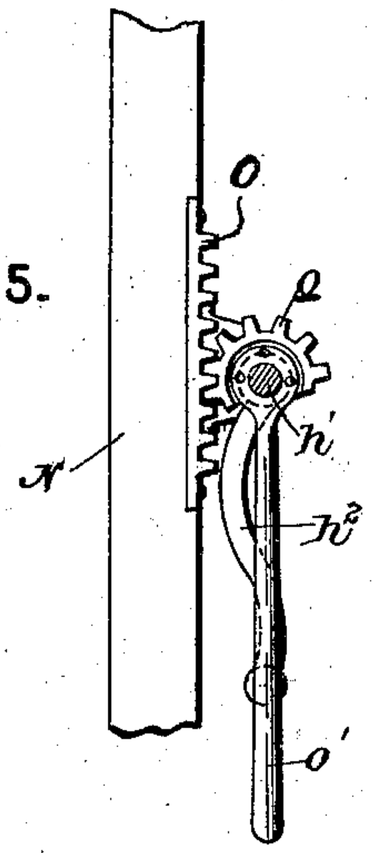


FIG_5.



Witnesses

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(No Model.)

6 Sheets—Sheet 3.

A. L. KITSELMAN.

WIRE FABRIC MACHINE.

No. 504,984. Patented Sept. 12, 1893.

FIG. 3.

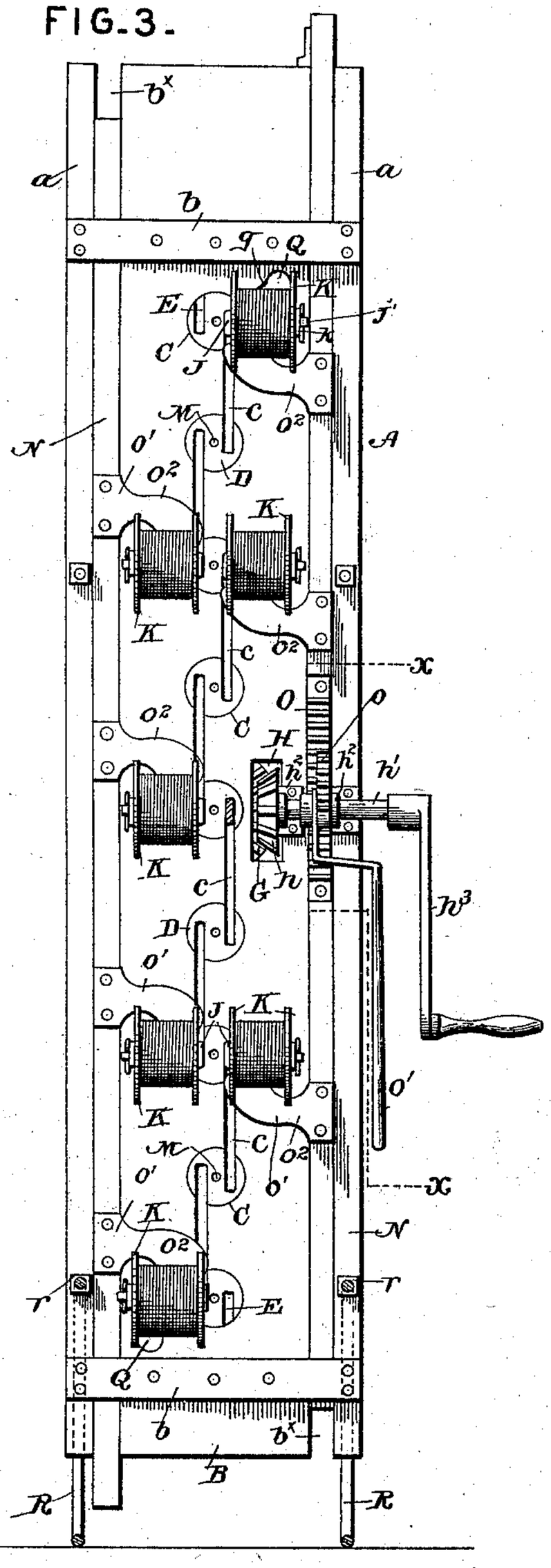
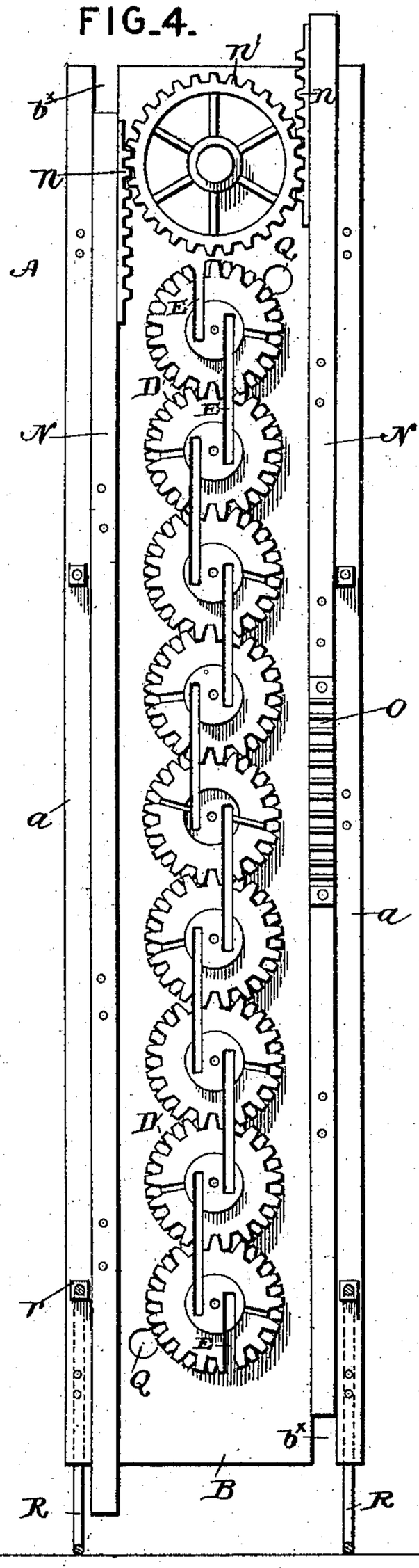


FIG. 4.



Witnesses

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6 Sheets—Sheet 4.

A. L. KITSELMAN.

WIRE FABRIC MACHINE.

No. 504,984. Patented Sept. 12, 1893.

FIG. 6.

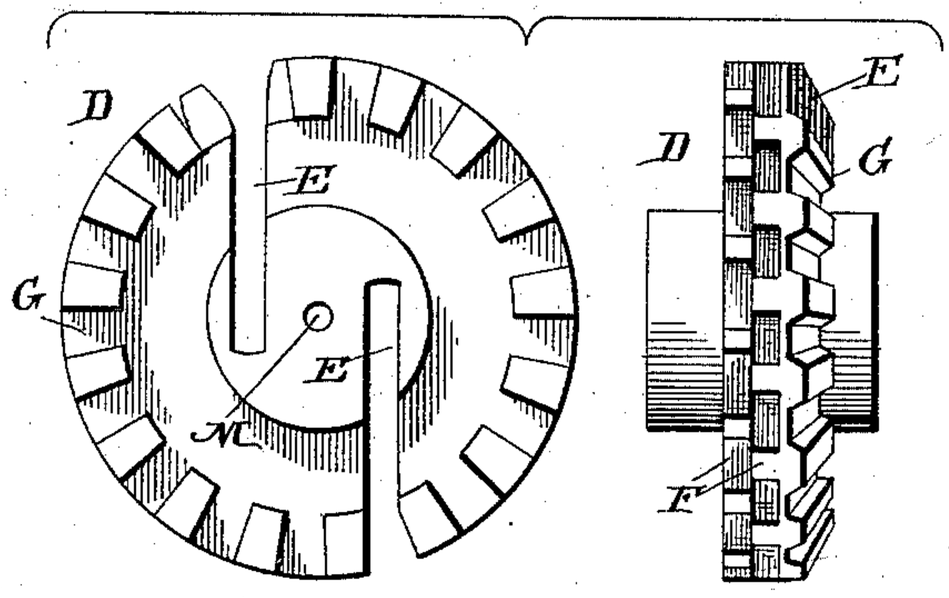


FIG. 7.

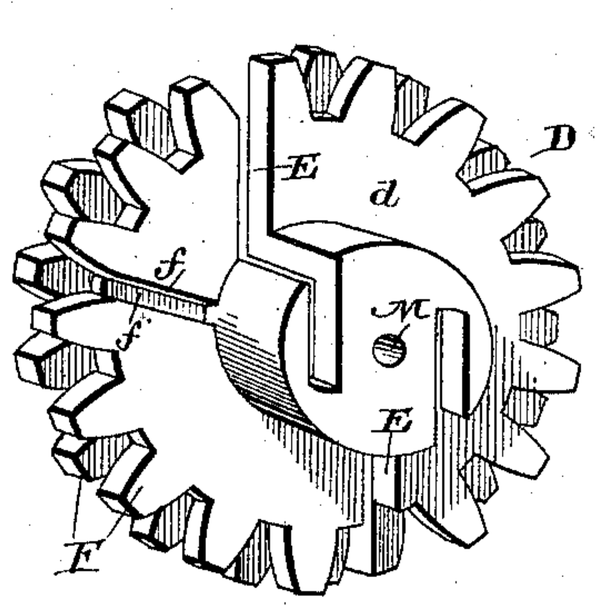


FIG. 8.

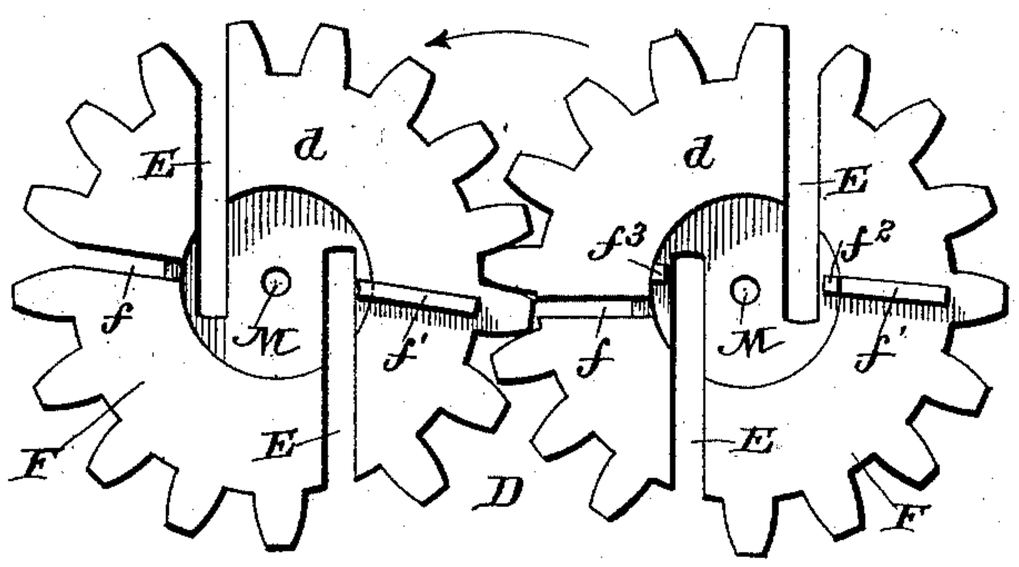
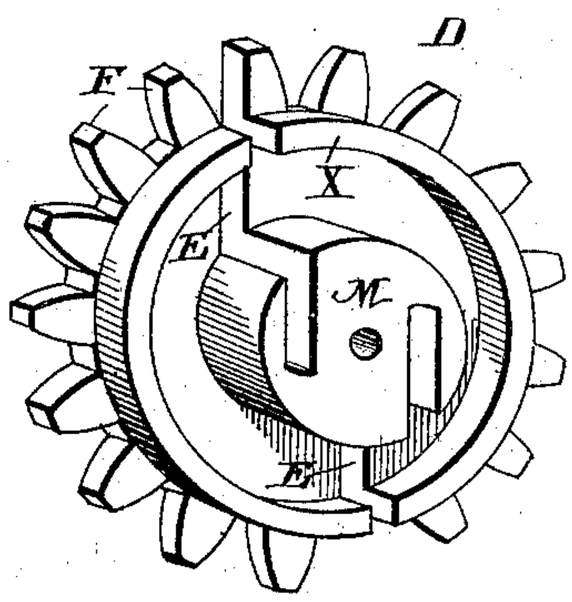


FIG. 18.



Witnesses

Jas. S. McCathran

D. C. Wolhaupter.

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Alva L. Kitselman

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(No Model.)

6 Sheets—Sheet 5

A. L. KITSELMAN.

WIRE FABRIC MACHINE.

No. 504,984. Patented Sept. 12, 1893.

FIG. 10.

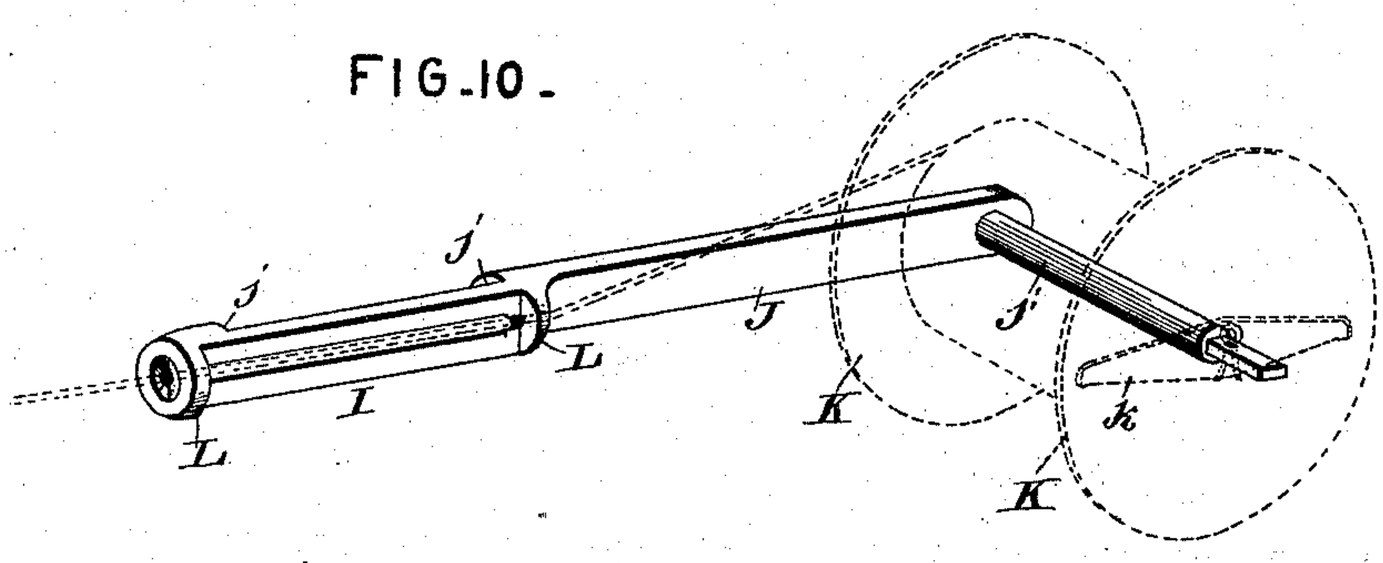


FIG. 12

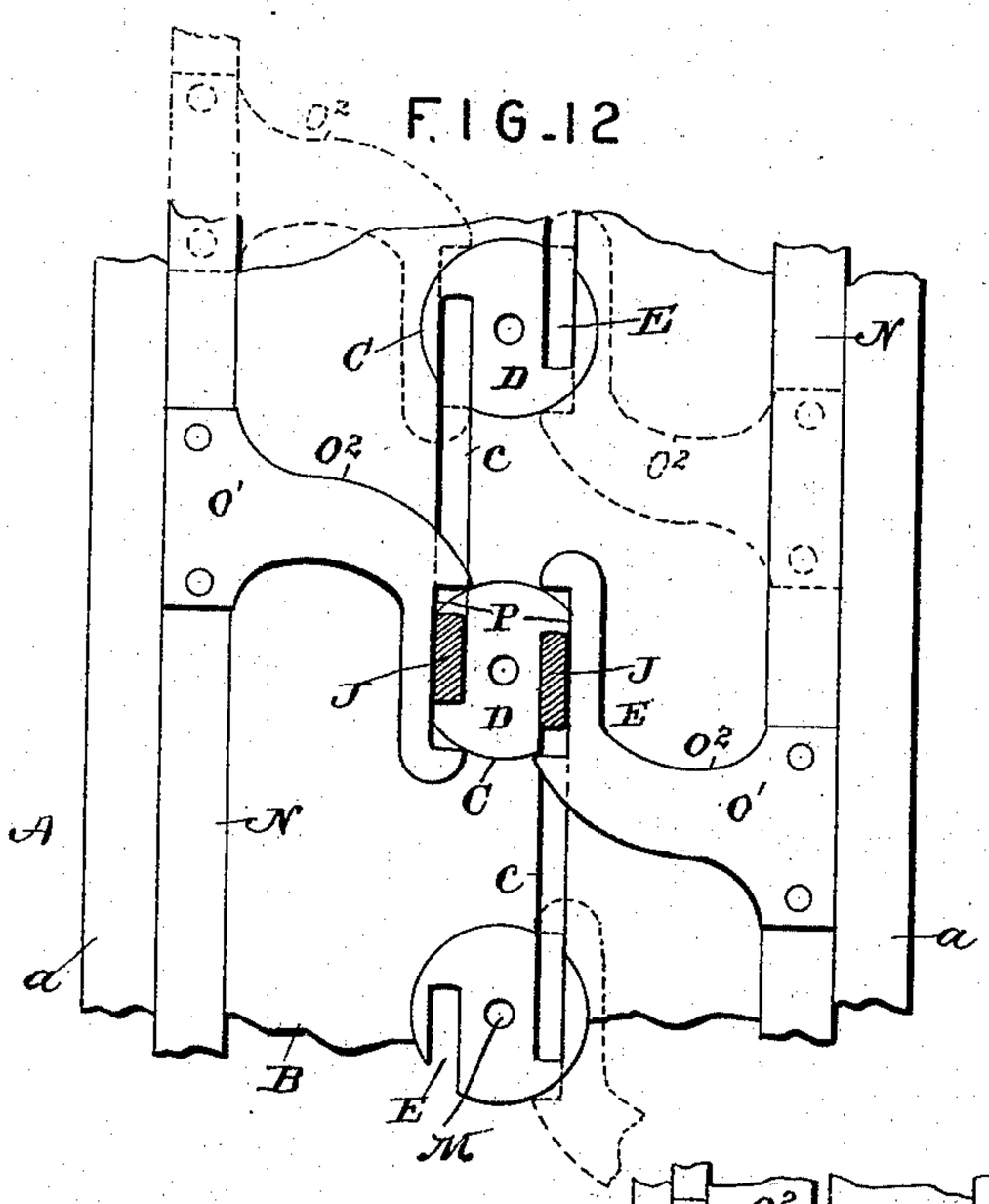
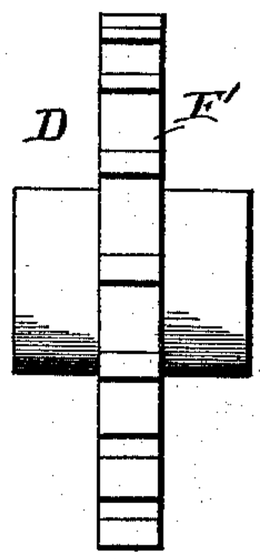


FIG. 9.



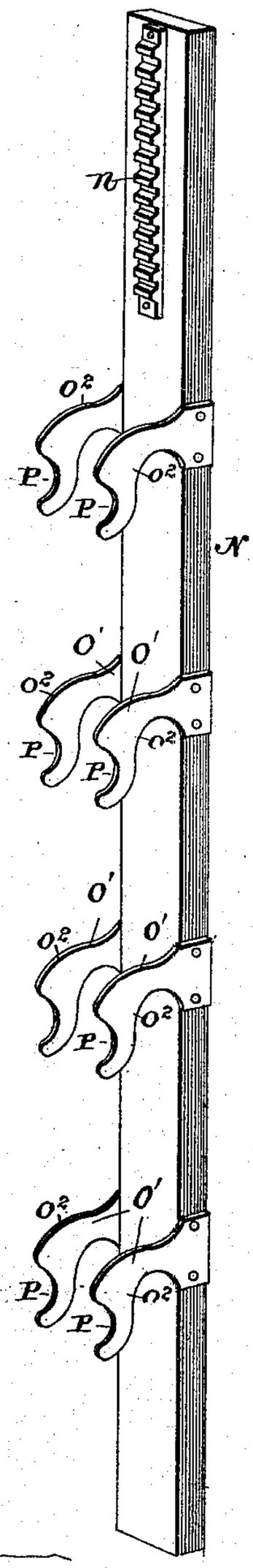
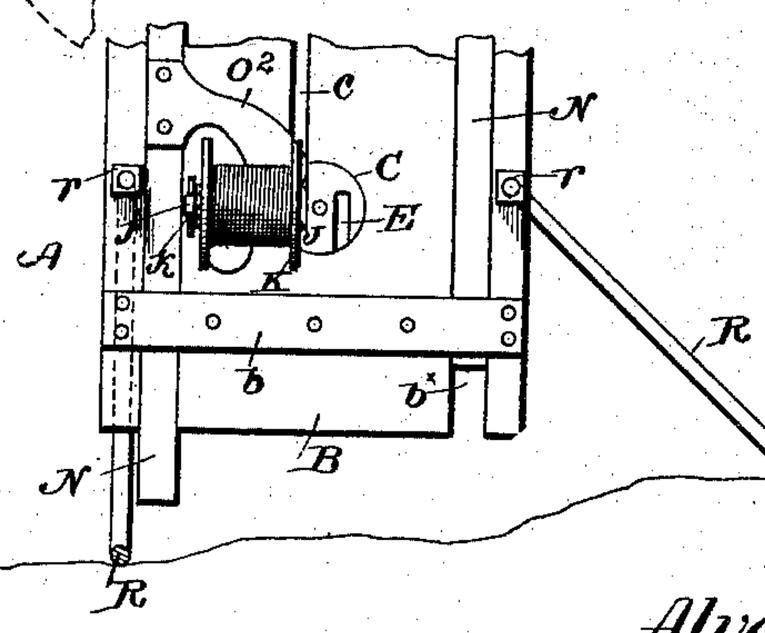


FIG 14.



Witnesses

Jas. K. McCalfran

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(No Model.)

6 Sheets—Sheet 6.

A. L. KITSELMAN.

WIRE FABRIC MACHINE.

No. 504,984

Patented Sept. 12, 1893.

FIG. 13.

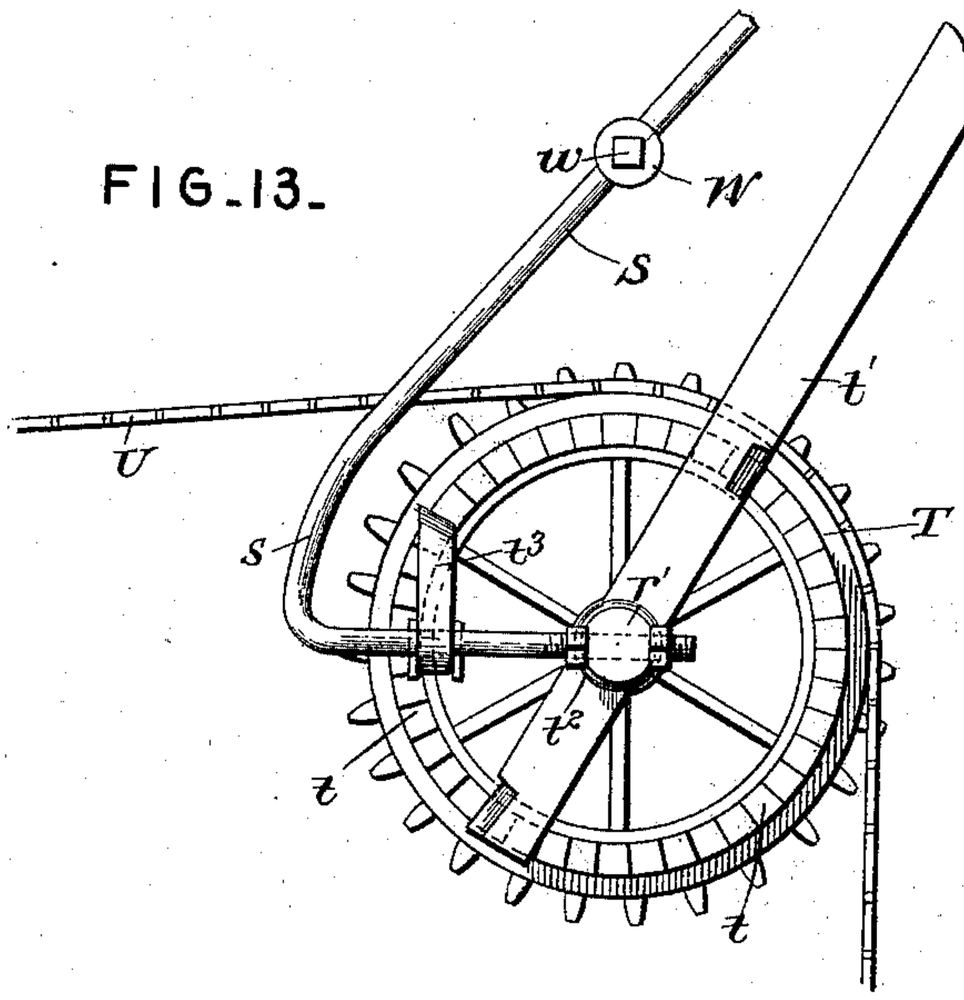


FIG. 15.

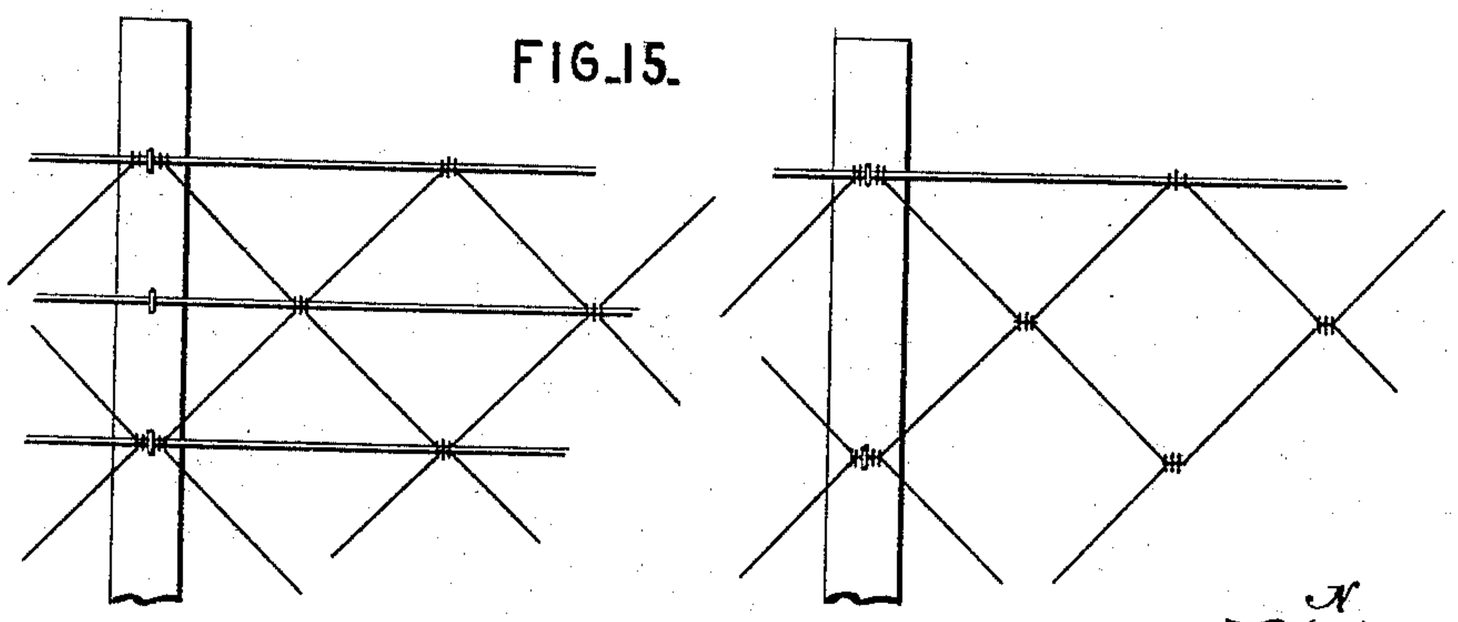


FIG. 16.

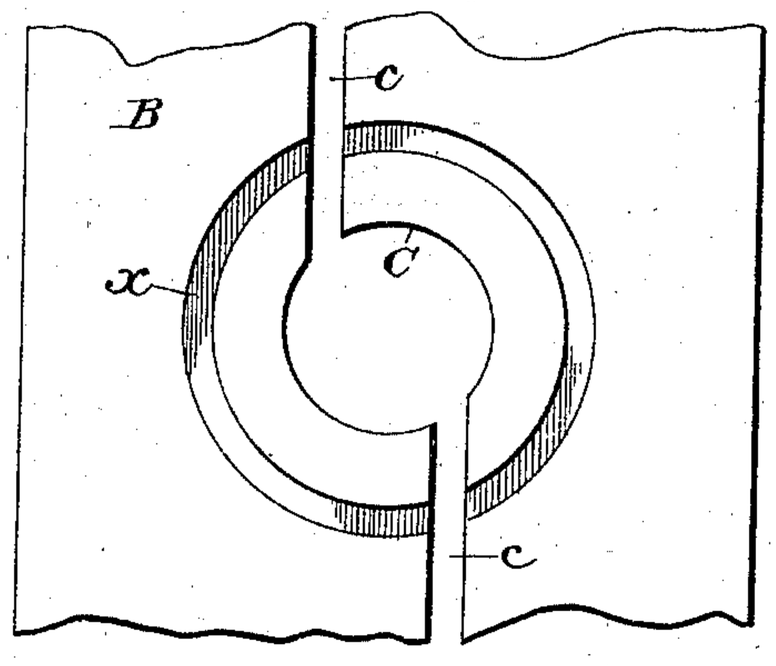
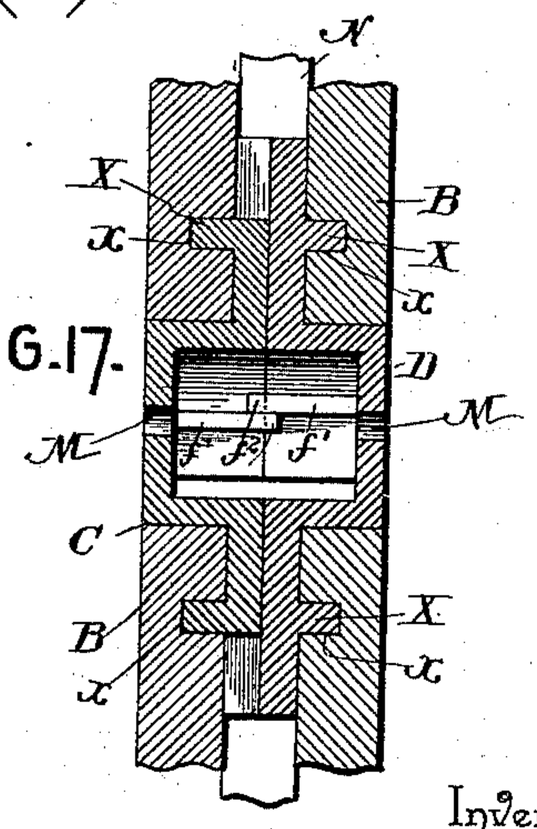


FIG. 17.



Witnesses

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S. P. Hollingsworth.

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UNITED STATES PATENT OFFICE.

ALVA L. KITSELMAN, OF RIDGEVILLE, INDIANA.

WIRE-FABRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 504,984, dated September 12, 1893.

Application filed January 19, 1893. Serial No. 458,897. (No model.)

To all whom it may concern:

Be it known that I, ALVA L. KITSELMAN, a citizen of the United States, residing at Ridgeville, in the county of Randolph and State of Indiana, have invented a new and useful Wire-Fabric Machine, of which the following is a specification.

This invention relates to wire-fabric machines; and it has for its object to provide certain improvements in machines of this character, whereby, while securing a machine which will be efficient in operation, at the same time is comparatively inexpensive and easy to operate.

To this end the main and primary object of the invention is to provide a portable fabric-making machine, which can be readily employed for manufacturing a line of woven wire fence, or which may be employed for manufacturing wire fabrics adapted for other uses.

With these general objects in view, and all others which fairly fall within the scope of the invention, the same consists in the novel construction, combination and arrangement of parts, hereinafter more fully described, illustrated and claimed.

In the accompanying drawings, Figure 1 is a perspective view of a wire fabric machine constructed in accordance with my invention, shown in position for weaving a fence. Fig. 2 is a central vertical longitudinal sectional view of the same. Fig. 3 is a front elevation of the machine showing the position of the spool bobbins. Fig. 4 is a view similar to Fig. 3 showing the bobbin devices removed, and also the front board or plate of the machine removed. Fig. 5 is a detail vertical sectional view on the line *x*—*x* of Fig. 3. Fig. 6 is an enlarged detail elevation and edge view of the central or drive twister. Fig. 7 is a perspective of one of the other twisters. Fig. 8 is an enlarged detail in plan of one of the sectional twisters, the parts thereof being separated from each other. Fig. 9 is a detail in perspective of the modified form of the twister. Fig. 10 is an enlarged detail in perspective of one of the shifting spool or bobbin carrying arms. Fig. 11 is a detail in perspective of one of the shifting slides with the shifting plates attached thereto. Fig. 12 is an enlarged detail elevation of one portion of the machine showing a slightly modified construction of shifting plate and more clearly the method of shifting the spool or bobbin carrying arms. Fig. 13 is an enlarged detail view of one side of the combined drag and mesh regulating mechanism. Fig. 14 is a detail elevation of the lower portion of the machine showing the same set in position on uneven ground. Fig. 15 is a small detail view showing two forms of fabric which are preferably manufactured. Fig. 16 is a detail modification. Fig. 17 is a detail sectional view of the modification. Fig. 18 is a detail in perspective of one member of the twisters having a retaining flange.

Referring to the accompanying drawings, A represents the frame or casing of my improved fabric making machine. The frame or casing A comprises the opposite vertical side strips *a*, between which are arranged the front and rear bearing boards or plates B. The bearing boards B, and the opposite side strips *a*, are suitably braced and connected together by means of the upper and lower pairs of connecting strips *b*, so as to hold the framework rigid, while at the same time providing a simple casing to inclose the main working parts of the machine. At this point it may be noted that the width of the boards B, is less than the space between the opposite side strips *a*, in order to leave between the opposite edges of said bearing boards and said side strips vertical guides or ways $b^{\times}$, for the accommodation of shifting slides N to be hereinafter particularly referred to and described.

The bearing boards B, are provided with a vertical series of circular bearing openings C, the bearing openings in one board being in alignment with the corresponding openings in the opposite board, in order to provide a perfect bearing for the twisting devices of the machine, and from the bearing openings in said bearing boards lead the shifting slots *c*. The shifting slots *c*, are arranged out of line with each other in vertical series, as is clearly illustrated in the drawings and for the purposes hereinafter set forth, said slots being designed to provide means for shifting the weaving devices from one set of openings

to another, as will be well understood by those skilled in the art.

The vertical series of bearing openings C, in the bearing boards accommodate and form bearings for the vertical series of intermeshing twister wheels D which are thus mounted to have a rotation on their axes while in relatively fixed positions. The said twister wheels D are preferably made sectional and comprise the separate superposed hollow members *d*, which, when aligned with each other, are designed to have their outer edges snugly register with the circular bearing openings in the bearing board, and their outer faces flush with the outer faces of such boards so as to not interfere with the free movement of the shifting devices employed in the machine. Each member or half *d*, of the twister wheels is provided with the oppositely disposed and parallel squared notches or slots E, cut in from opposite edges of the disks forming the members or halves, and arranged in substantially parallel planes, the squared notches or slots of each section or member being designed to align with the corresponding notches or slots of the opposing members, so as to complete a single twister wheel having notches or slots let in from opposite sides of its periphery and parallel with each other. The relative position of the notches or slots E to each other in the twister wheels, may be clearly understood from the fact that one notch or slot in a twister wheel is designed to align with one of the shifting slots leading from the bearings in which the wheel moves, while the other notch or slot aligns with the other upper or lower, as the case may be, shifting slot leading from the same bearings in which such wheel moves. Now with this general construction in mind, the other features of the twister may be referred to. Each of the sections *d*, is provided at its inner edge with the cog flange F, which is designed to rest flat against the corresponding flange of the opposite section or member, and the teeth of the meeting cog flanges are preferably out of line with each other, or in staggered arrangement, so that lost motion will be prevented by the teeth, meshing therewith, skipping the notches or slots E. The inner meeting edges of the twister sections *d*, are provided with the notches *f*, which receive locking lugs *f'*, in the opposing sections, and one of said locking lugs is further provided with a projecting lip f^2, projecting beyond the notch in the opposite section, so as to prevent the two sections slipping out of alignment with each other, and one of said sections is also further provided with a pin f^3, which is arranged opposite the lip f^2, and serves as an auxiliary stop to prevent the twister sections from slipping out of alignment on that side. The sectional construction just described can be slightly modified as illustrated in Fig. 9 of the drawings, in which the twister wheel is a single piece or casting having the notches or slots E, as described, but instead of the two cog flanges, has a single central peripheral cog flange F'. Although I have described this modified construction, nevertheless the sectional construction is preferable owing to the fact that I not only secure lightness, which is quite desirable, but I also secure a staggered arrangement of teeth to prevent lost motion.

The vertical series of twister wheels D, are arranged one above the other in any desired number, at the option of the manufacturer, and the cog flanges of each wheel intergear or mesh with the corresponding cog flanges of the wheels above and below the same, so that all of the twister wheels are rotated simultaneously, and therefore provide means whereby the notches or slots E, of the several wheels can be simultaneously aligned with the shifting slots in the bearing boards.

Now having determined the specific construction of the twister wheels, and the specific manner of connecting the same together to provide for simultaneous movement, we will next consider the means for imparting motion to the same. The central, or any convenient, twister wheel is further provided on one of the sections thereof outside of the cog flange with a supplemental bevel cog ring G, the outer edges of the teeth of which are a distance in from the outer edge of the twister wheel section on which it is formed, so that such bevel cog ring can be arranged inside of the bearing board adjacent thereto, while at the same time allowing the portion of the twister wheel beyond the teeth to still have its bearing in the board. This construction does not interfere with the shifting devices to be described. At one side of the twister wheel just described, which may be quite properly termed the drive twister wheel, the front bearing board is provided with a slot H, which is designed to receive a portion of the bevel pinion *h*, which projects therein and meshes with the bevel cog ring of the twister wheel so as to impart motion thereto. The bevel pinion *h*, is mounted on one end of the stub or crank shaft *h'*, journaled in suitable bearings h^2, and has connected to the other end thereof the crank handle h^3, by means of which the shaft can be readily turned by the operator. As motion is communicated to the said crank shaft, it will be readily seen that simultaneous motion will be given to the entire vertical series of twister wheels.

The squared notches or slots E, in each twister wheel are designed to accommodate the flattened ends I, of the shifting spool or bobbin carrying arms J. The arms J, are made in suitable lengths, and are provided at their flattened ends with the opposite shoulders *j*, which are disposed on opposite sides of the twister wheels, so that the said arms are prevented from being withdrawn therefrom, and at the opposite ends of the arms are arranged the right-angularly disposed jour-

nals j', on which are mounted the wire spools or bobbins K. The said wire spools or bobbins K, carry the weft wires used in weaving the fence, and the tension of said spools or bobbins, to check the feed thereof, is conveniently secured by means of the tension spring k, clamped against one end of the spool or bobbin, as clearly indicated in the drawings. The flattened ends of the arms J, which rest in the notches or slots of the twister wheels are further provided with the opposite perforated guide lugs L, through which the weft wire passes and which serve as guides for leading the wire through the twister wheels and entirely independent thereof, said twister wheels being alone provided with the central wire perforations M, extending entirely therethrough, and accommodating the longitudinal stringer or warp wires around which the wefts are twisted.

In connection with the spool or bobbin carrying arms, it is well to observe that the vertical width of the flattened ends of the arms J, is equal to the depth of the notches or slots in the twister wheels, or at least the portions of said notches or slots which work in the circular bearings for the wheels, so that the edge of the circular bearings, in the bearing boards, serves to hold the spool or bobbin carrying arms snugly in the twister wheels while the same revolves and thereby prevent any lateral play or wabbling. (See Fig. 12.)

It is now thought that the general operation of the machine will be apparent. It was stated that each alternate twister wheel accommodates two of the wire carrying devices at the same time, except the top and bottom wheels, which at each alternate twist carry one of the wire carrying devices as is clearly shown in Fig. 1 of the drawings.

In order to provide for weaving the weft wires from warp to warp, or for forming a diamond shape fabric as shown in Fig. 15, I employ certain means for shifting the spool carrying arms alternately from one twister to another at each alternate operation, and these means will now be described. Arranged to reciprocate or slide between the opposite edges of the bearing boards and the opposite side strips a, within the vertical guides or ways $b^{\times}$, are the oppositely moving shifting slides N. The shifting slides N, carry at their inner upper ends the racks n, which mesh with opposite sides of the upper spur wheel n'. The upper spur wheel n', is journaled in the upper ends of the boards B, and provides means whereby the two slides are reciprocated simultaneously in opposite directions, and one of said slides carries at a suitable point a second rack bar O, with which meshes a suitably arranged operating toothed segment o, controlled by the handle lever o'. By moving the lever up and down, the segment o, causes the slide directly behind the same to move in one direction, while through the medium of the upper spur wheel n', an opposite movement is imparted to the other slide as will be clearly understood. Secured to both sides of each of the shifting slides N, are the arm shifting plates O'. The arm shifting plates O', are secured at their outer ends to said oppositely reciprocating slides, and are each provided with the extended arms o^2, disposed at about right angles to the attaching end of said plates, and provided with a squared or circular shifting notch P, which is designed to embrace the portions L of the spool-carrying arms projecting beyond each side of the twister wheels, so as to provide means whereby the spool carrying arms can be shifted from one wheel to another, and also to close the shifting slots connecting the several bearings, so that as the twisters revolve, the spool carrying arms are confined therein between the notched arms of the shifting plates secured to the opposite shifting slides. When the notches in the shifting plate arms are made circular as clearly shown in Fig. 11, it will be seen that the edges of said shifting plates will form auxiliary bearings for the projecting ends of the spool carrying arms, so as to take the wear off of the bearing openings although it will be quite apparent that a squared notch provides shoulders whereby the raising and lowering of the spool carrying arms can be more easily effected. The shifting plates are so arranged, that in one operation when the weft is not being twisted on the upper and lower wires, such plates stand directly opposite to each other to form pairs embracing the projecting ends of the spool carrying arms of every alternate twister wheel. As the position of the slides is changed, one shifting plate on each side is carried to the upper and lower twisting wheels, as is indicated in dotted lines in the drawing Fig. 12.

Now it is thought that the operation of weaving a wire fabric will be apparent to those skilled in the art. Assuming that the machine is to weave the weft wires, carried by the spools, in diamond shape onto the longitudinal warp wires passing centrally through the perforations in each twister wheel, we have the shifting plates arranged directly opposite each other embracing the projecting ends of the two spool carrying arms in every alternate twisting wheel, except the uppermost and lowermost. In this position by causing the twisting wheels to turn as described, the weft wires are twisted on every alternate warp wire except the top and bottom wire. After this twist, the shifting lever is grasped, and the spool carrying arms, by means of the shifting plates, are carried out of the twisting wheels in which they were first revolved, and into the other alternate twisting wheels which were in the first instance inactive. This shifting also carries one spool carrying arm into the uppermost and lowermost twister wheels, so as to twist

the weft onto the upper and lower wires of the fence or fabric. It is of course understood that when the twister wheels are turned so that their notches align with the slots between the wheel bearings, each spool carrying arm of each twister wheel is carried into a different wheel, one arm being taken up into the wheel directly above while the other arm is carried below into the lower wheel, and as the weaving proceeds are shifted back and forth. By omitting the longitudinal warp wires between the upper and lower wires, a diamond-shaped fabric is manufactured similar to that shown in Fig. 15. This will be clear to those skilled in the art.

In order to provide for introducing the spool carrying arms into the twister wheels and working the same into their proper positions, the bearing boards are bored with the filling perforations Q, from which lead laterally into the upper and lower bearings, the slots *q*. By means of these filling perforations or openings and the slots leading therefrom, the flattened ends of the spool carrying arms can be inserted into the uppermost and lowermost twister wheels and worked into their proper positions in the other twisters. The spool carrying arms can be taken out in the same manner.

The machine just described is of course especially adapted to manufacture a standing line of fence and is if therefore necessary to provide means for moving the same along as the weaving proceeds. In order to provide for this, the machine is mounted on the adjustable slide runners R. The runners R, are curved upwardly and inwardly at each end and are adjustably connected at one threaded end by means of the binding nuts *r*, to the lower ends of the opposite side strips or to the body of the machine itself, while the other extremities of the runners pass through the opposite perforated end of the stationary shaft *r'*, and are adjustably held therein by means of the set screws r^2, passing through opposite ends of said shaft and impinging on the runner ends. The advantages of such an attachment of the runners will be apparent from the illustration of Fig. 14, in which it is shown that the runners are capable of an outward swinging movement so that they can adapt the machine to hills, and by spreading out or contracting both of the runners, the machine can be raised or lowered as may be required. Parallel brace rods S, are connected to a suitable point of attachment above the center of the machine, and are connected at their lower ends to the stationary shaft *r'*, between its ends. Said brace rods S, are provided with lower curved ends *s*, which extend above and follow the curvature of the chain wheel T, loosely mounted on the shaft *r'*. The said chain wheel T is provided with a ratchet face *t*, at one side, against which is normally pressed the operating pawl lever *t'*. The operating pawl lever *t'*, is held against the ratchet face of the chain wheel by means of the spring t^2, arranged alongside of the same on the shaft *r'*. A gravity check pawl t^3, is loosely mounted on one of the brace rods S, and also engages the ratchet teeth of the chain wheel and not only holds the same steady while the pawl lever is obtaining a new grip on the ratchet, but also prevents any slip whatever. A chain U, engages the upper portion of the chain wheel and is anchored a suitable distance in advance of the machine, to provide for the propulsion of the machine as well as to regulate the mesh of the fabric being woven. Now it will be seen that the chain and chain wheel serve important functions. By moving the pawl lever back and forth, the machine is not only propelled or dragged along, but at the same time the mesh of the fabric being woven is regulated by the play of the pawl lever. The pawl lever plays between the fixed stop V, connecting the brace rods at a suitable point above the chain wheel, and the adjustable regulating stop bar W. The regulating stop bar W, is provided with perforated ends sliding over the lower curved ends *s*, of said brace rod, and in close proximity to the top of the chain wheel, and is held in any adjusted position by means of the set screws *w*, passing through the ends thereof and impinging on the brace rod. By adjusting this regulating stop bar, the play of the pawl lever is thereby lengthened or shortened, so that the drag of the machine is lengthened or shortened in order to regulate the length of the mesh of the fabric being woven.

In a modification illustrated in Figs. 16, 17, and 18 it will be observed, that if found necessary, I shall provide means for preventing the bearing boards spreading away from the twisting wheels held therein by reason of the necessary twisting strain. Such spreading, in high machines, would likely occur and therefore loosen up the bearings, because the bearing boards are practically provided with a vertical slot from near their upper to their lower ends. To secure this result certain of the twister wheels are provided at one side of the cog flange with a circular retaining or strengthening rib X, interrupted of course at the notches or slots, and adapted to work inside of a corresponding groove *x*, in the inside face of the bearing boards and concentric with the bearing openings therein.

Although the machine herein described is specially adapted for running a line of woven wire fence, still it is just as capable of use in the factory or shop in any suitable position for weaving wire fabric for all uses, therefore adapting the machine to stationary indoor use, and I will have it understood that changes in the form, proportion and the minor details of construction may be resorted to without sacrificing any of the principles of my invention.

Having thus described my invention, what

I claim, and desire to secure by Letters Patent, is—

1. In a wire fabric machine, a series of inter-geared twisters mounted for fixed rotation and having central perforations adapted to receive the warp wires and also parallel notches at each side of the central perforations adapted to be aligned with each other, and weft wire carriers mounted in the notches of said twisters and adapted to be shifted from one to the other when said notches are aligned, substantially as set forth.

2. In a wire fabric machine, a series of inter-geared twisters having separate parallel notches or slots adapted to align respectively with the corresponding notch or slot of the twister directly above and below, weft wire carriers registering in said notches of the twisters, and adapted to move in separate vertical planes and means for shifting said carriers, substantially as set forth.

3. In a wire fabric machine, the combination of a series of directly intercommunicating slotted twister wheels mounted for a fixed rotation and provided with cog flanges formed integrally on the periphery thereof, said cog flanges meshing with the flanges of the adjacent wheels and being interrupted at the slots, and shiftable single-arm weft wire carriers adapted to be carried in the slots of said twister wheels, and provided with weft wire guides, substantially as set forth.

4. In a wire fabric machine, the combination with a frame or casing having a series of bearing openings and a vertical series of slots connecting the same, and out of alignment with each other a series of twister wheels mounted in said bearings of the frame or casing and having separate parallel notches or vertical series of disconnected slots adapted to align with the slots connecting the bearings, weft wire carriers registering with the notches in the twisters, and shifting devices for said carriers, substantially as set forth.

5. In a wire fabric machine, the opposite adjacent frame boards or plates having an aligned series of circular bearing openings, and slots connecting such bearing openings, a series of shaftless twister wheels mounted for a fixed rotation between the frame boards or plates and provided with integral peripheral cog flanges meshing directly with the flanges of the adjacent wheels, the hub portions at both sides of said cog flanges being journaled in said circular bearing openings of the frame boards or plates, and weft wire carriers mounted in said twister wheels and adapted to be shifted from one to the other, substantially as set forth.

6. In a wire fabric machine, a series of sectional twisters comprising separate superposed halves having oppositely arranged notches or slots, and meeting cog flanges interrupted at said notches or slots, and weft wire carriers arranged to be carried in the notches or slots of the twisters and adapted to be shifted from one twister to another, substantially as set forth.

7. In a wire fabric machine, the sectional twisters comprising separate superposed halves having notches or slots and meeting cog flanges, the teeth of one flange being out of line with those of the other flange, the weft wire carriers adapted to be carried in the notches or slots of said twisters, and means for shifting the carriers, substantially as set forth.

8. In a wire fabric machine, a series of sectional twisters comprising separate superposed hollow sections provided with aligned oppositely disposed notches or slots, meeting cog flanges registering with the corresponding flanges of the adjacent twisters, said superposed sections also having at their meeting edges inter-locking notches and lugs, the shiftable weft wire carriers arranged in the notches of the twisters, and means for shifting the said carriers, substantially as set forth.

9. In a wire fabric machine, the frame having a series of connected bearing openings, a series of sectional twisters mounted in said bearing openings and having separate oppositely disposed and parallel notches or slots, meeting cog flanges interrupted at said notches or slots, and locking devices for holding the two sections together, shiftable weft wire carriers and guides registering with the notches or slots in said twisters, and means for shifting the carriers from twister to twister, said twisters being inter-geared, substantially as set forth.

10. In a wire fabric machine, the combination of the opposite frame bearing boards provided with a series of circular bearing openings, intermediate slots connecting said openings with each other, and upper and lower filling slots, a series of inter-geared twisters, mounted for fixed rotation in said circular bearing openings and provided with central perforations to receive the warp wires, and separate oppositely disposed and parallel notches or slots adapted to align at the same time with the two slots leading from the bearing openings, combined weft wire carriers and guides mounted for rotation with the twister wheels, and means for shifting the carriers and guides above and below its twister at the same time, substantially as set forth.

11. In a wire fabric machine, opposite frame boards or plates having bearings and slots connecting the bearings, a series of twister wheels mounted for fixed rotation in said bearings and provided with oppositely disposed notches or slots adapted to align with those of the frame boards or plates, warp wire perforations, and inter-meshing peripheral cog flanges, one of said twister wheels being further provided with a supplemental bevel cog ring inside of the adjacent frame board or plate, a suitably arranged operating crank shaft, a pinion on said shaft projecting

through a slot in one of the frame boards or plates and meshing with said bevel cog ring, and the shiftable weft wire carriers, substantially as set forth.

12. In a wire fabric machine, a series of inter-geared twisters mounted for fixed rotation and each having separate oppositely disposed and parallel notches or slots adapted to align with the corresponding notches or slots of the twisters above and below it, weft wire carrier arms provided with flattened wire guide ends registering with the notches or slots in said twister wheels, so as to be carried therewith, weft wire spools or bobbins mounted for rotation on one end of said arms, and means for shifting the arms through the aligned slots, substantially as set forth.

13. In a wire fabric machine, the combination with the inter-geared and inter-communicating notched or slotted twisters; of the shiftable combined weft wire carriers and guides, comprising a single arm having flattened shouldered ends adapted to fit in the notches of the twisters, the shoulders being disposed at both sides of the twisters perforated guide lugs at such shouldered ends to receive and guide the weft wire and a right-angularly disposed journal or spindle at the opposite end adapted to receive the spool or bobbin of weft wire, substantially as set forth.

14. In a wire-fabric machine, the combination with the frame, a series of inter-meshing and inter-communicating twisters mounted for fixed rotation in the frame, and weft wire carriers adapted to be arranged for movement with the twisters; of oppositely moving slides, and shifting plates attached to both sides of said slide on both sides of the frame and embracing the projecting ends of said weft wire carriers, substantially as set forth.

15. In a wire-fabric machine, the combination with the inter-communicating twister wheels and the shiftable weft wire carriers; of the oppositely moving shifting slides carrying notched shifting plates embracing the projecting ends of the carriers and adapted to move the same from twister to twister, substantially as set forth.

16. In a wire fabric machine, the combination with the frame having opposite vertical guides or ways, a series of notched inter-meshing and inter-communicating twisters mounted in the frame, weft wire carriers registering with the notches in the twisters and projecting beyond opposite sides of the same, oppositely moving slides arranged to work in said vertical guides or ways and having at their upper inner end rack bars meshing with opposite sides of a spur wheel at the upper end of the frame, one of said slides being provided with a second rack bar, a suitably arranged shifting lever carrying a toothed segment meshing with said second rack bar to operate the slides, and shifting plates secured to both sides of said slides and embracing the projecting ends of said weft wire carriers, substantially as set forth.

17. In a wire fabric machine, a series of notched inter-meshing and inter-communicating twister wheels, combined weft wire carrier and guides mounted in said wheels and adapted to be shifted from one to the other, oppositely moving shifting slides, and shifting plates attached to both sides of said slides and extended arms provided with notches adapted to embrace the projecting portions of the carriers, substantially as set forth.

18. In a wire fabric machine, the combination of the opposite frame boards or plates having bearing openings and connecting slots, and concentric grooves upon their inner faces around certain of said bearing openings, and the twisting wheels mounted in said bearing openings for a fixed rotation, some of said twisting wheels being provided with circular retaining or strengthening ribs moving in said grooves, substantially as set forth.

19. In a machine of the class described, the combination with the machine frame; of a stationary rod or shaft braced from one side of the machine frame and having perforated ends, laterally swinging slide runners having curved ends, one of which ends is threaded and passes through the machine frame, while the other unthreaded end of each runner passes through a perforated end of said stationary rod or shaft, binding nuts engaging the threaded ends of said runners and working against the machine frame, and set screws adapted to work in the extremities of said rod or shaft and onto the runner ends therein, substantially as set forth.

20. The combination with a weaving machine of the class described; of the brace rods connected to and extending out from the front of said machine, a stationary rod or shaft secured to the lower outer ends of said brace rods and having perforated ends, laterally swinging slide runners adjustably connected at one end to the machine body and at their other ends in the perforated ends of said rod or shaft, and combined propelling and mesh regulating devices arranged on said rod or shaft, substantially as set forth.

21. In a machine of the class described, the combination with the runner supported machine; of a stationary shaft at the front ends of said runners, a chain wheel loosely mounted on said shaft provided with a ratchet face on one side, a spring pressed pawl lever loosely mounted on said shaft alongside of the wheel and normally held in engagement with the ratchet teeth thereof, a chain engaging the upper portion of said chain wheel and anchored stationary a distance in front of the same, and a check pawl for said chain wheel, substantially as set forth.

22. In a machine of the class described, the combination with the runner supported ma-

chine; of parallel rods extended from said machine and having lower curved ends, a stationary shaft connected to the lower ends of said rods, a combined drag and mesh regulating device on said shaft, and having a pawl lever moving between said rods, a fixed stop connecting said brace rods to limit the movement of the pawl lever in one direction, and an adjustable regulating stop bar arranged to work over the curved ends of said rods to regulate the movement of the pawl lever in the other direction, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

ALVA L. KITSELMAN.

Witnesses:

JOHN H. SIGGERS,

GEO. C. SHOEMAKER.