(No Model.) 4 Sheets—Sheet 1.

T. COOKSON.

WIRE ROPE MACHINE.

No. 495,085. Patented Apr. 11, 1893.

Fig. 1.

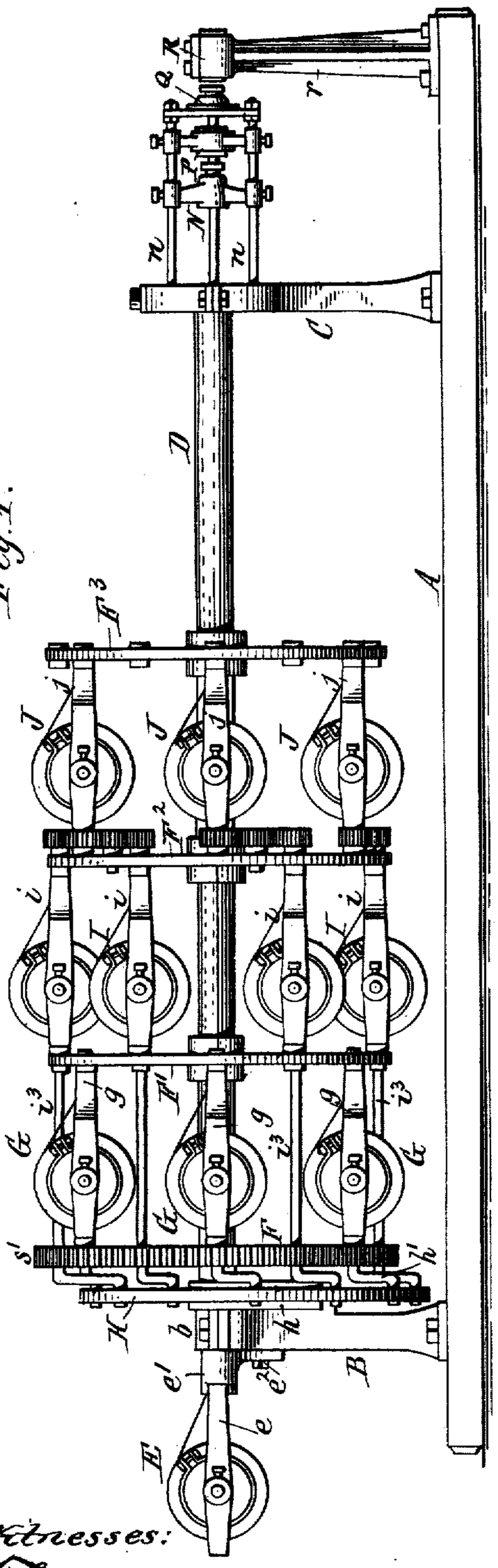
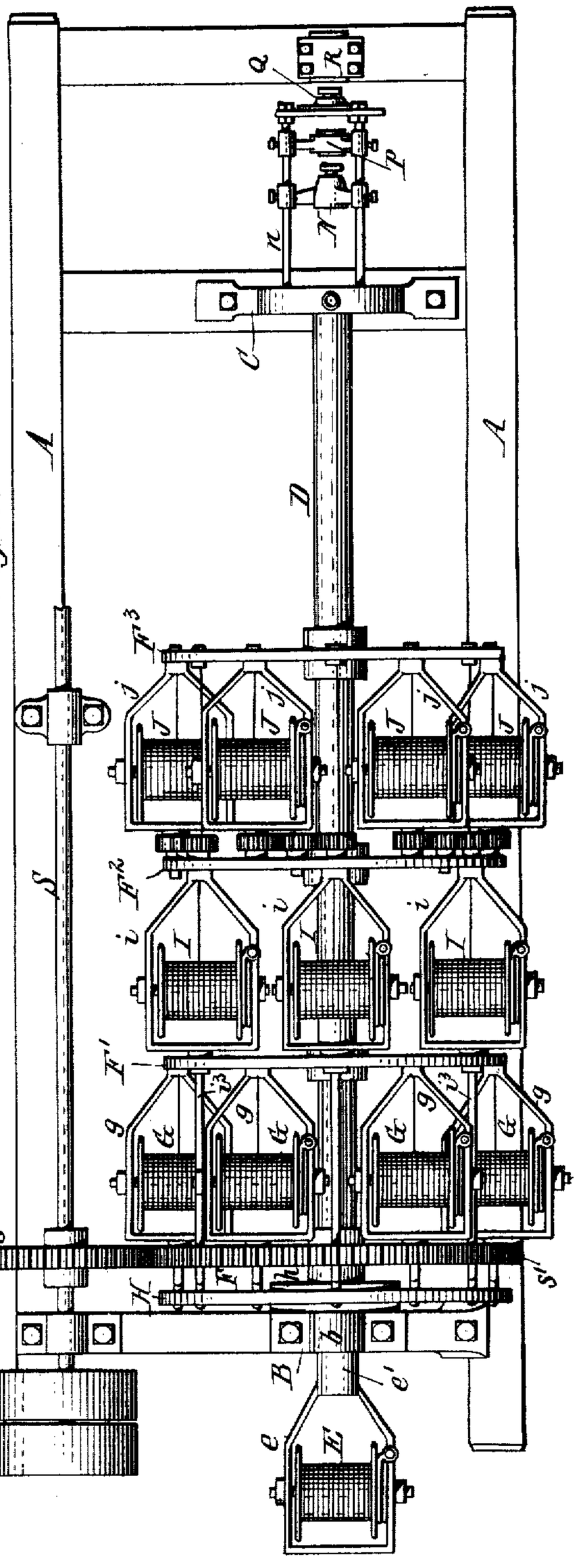


Fig. 2.



Witnesses:
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(No Model.) 4 Sheets—Sheet 2.

T. COOKSON.

WIRE ROPE MACHINE.

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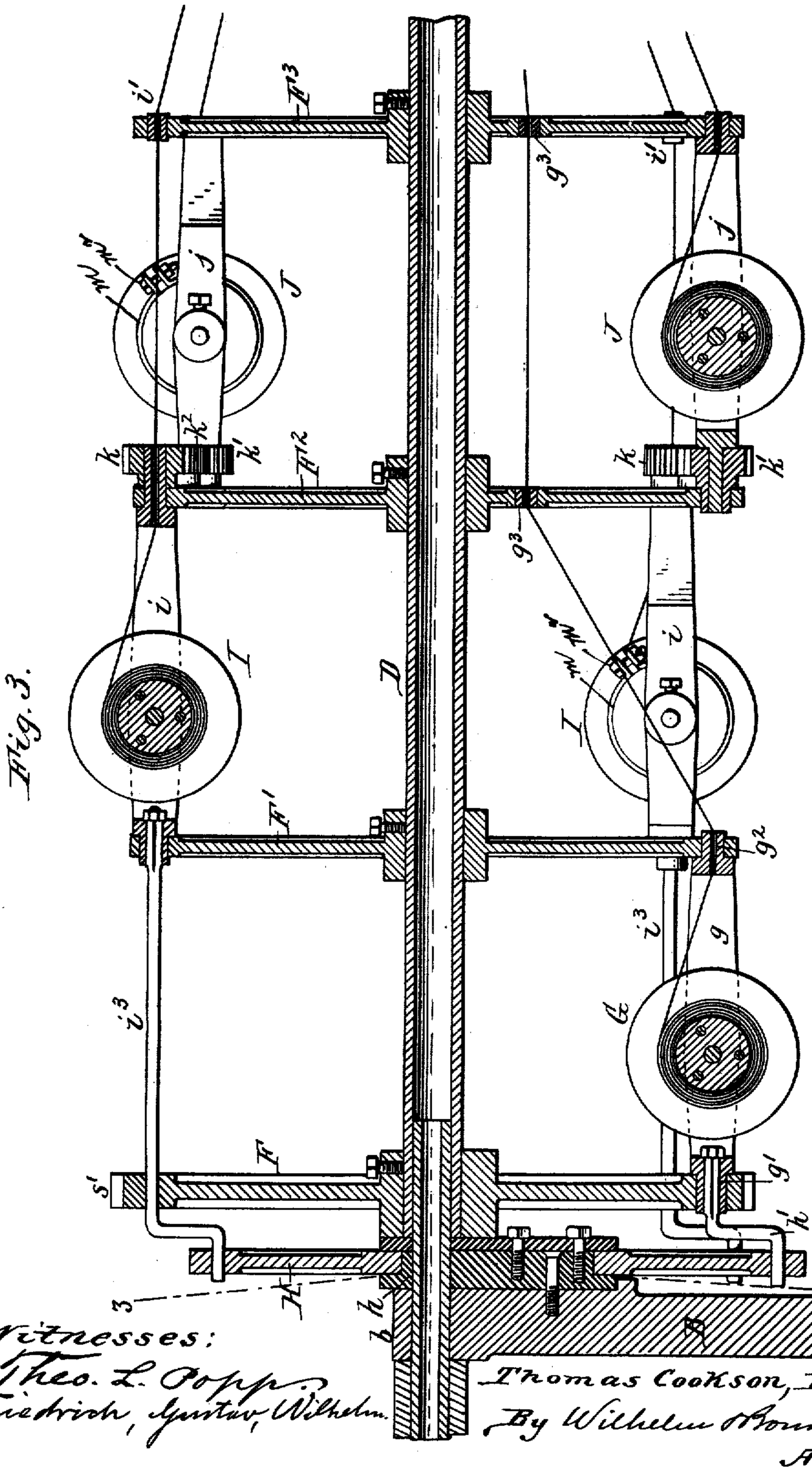

Fig. 3.

Witnesses:
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(No Model.) 4 Sheets—Sheet 3.

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Fig. 5.

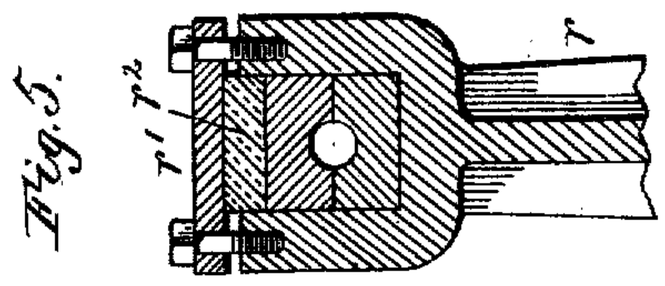


Fig. 9.

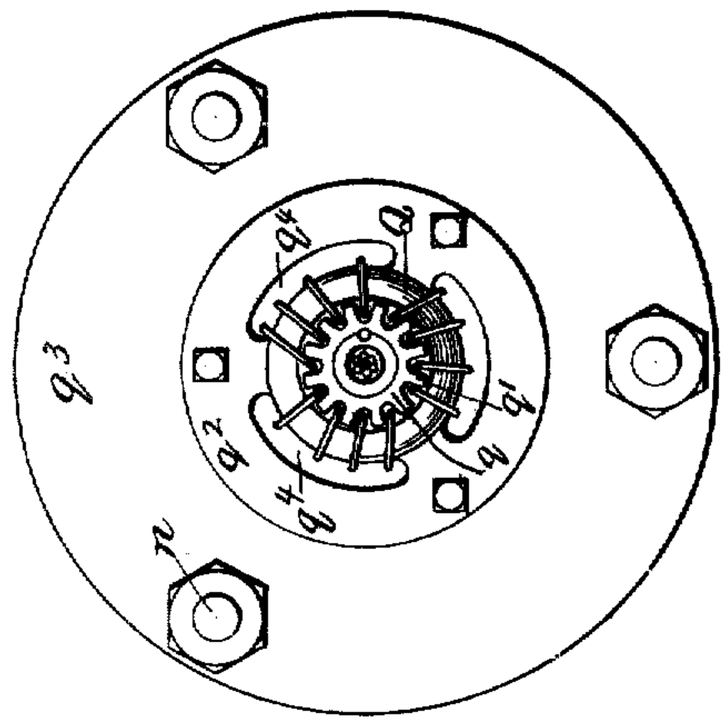


Fig. 8.

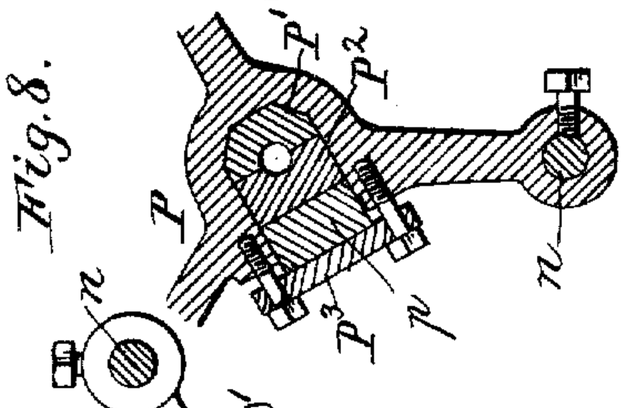


Fig. 7.

Fig. 4.

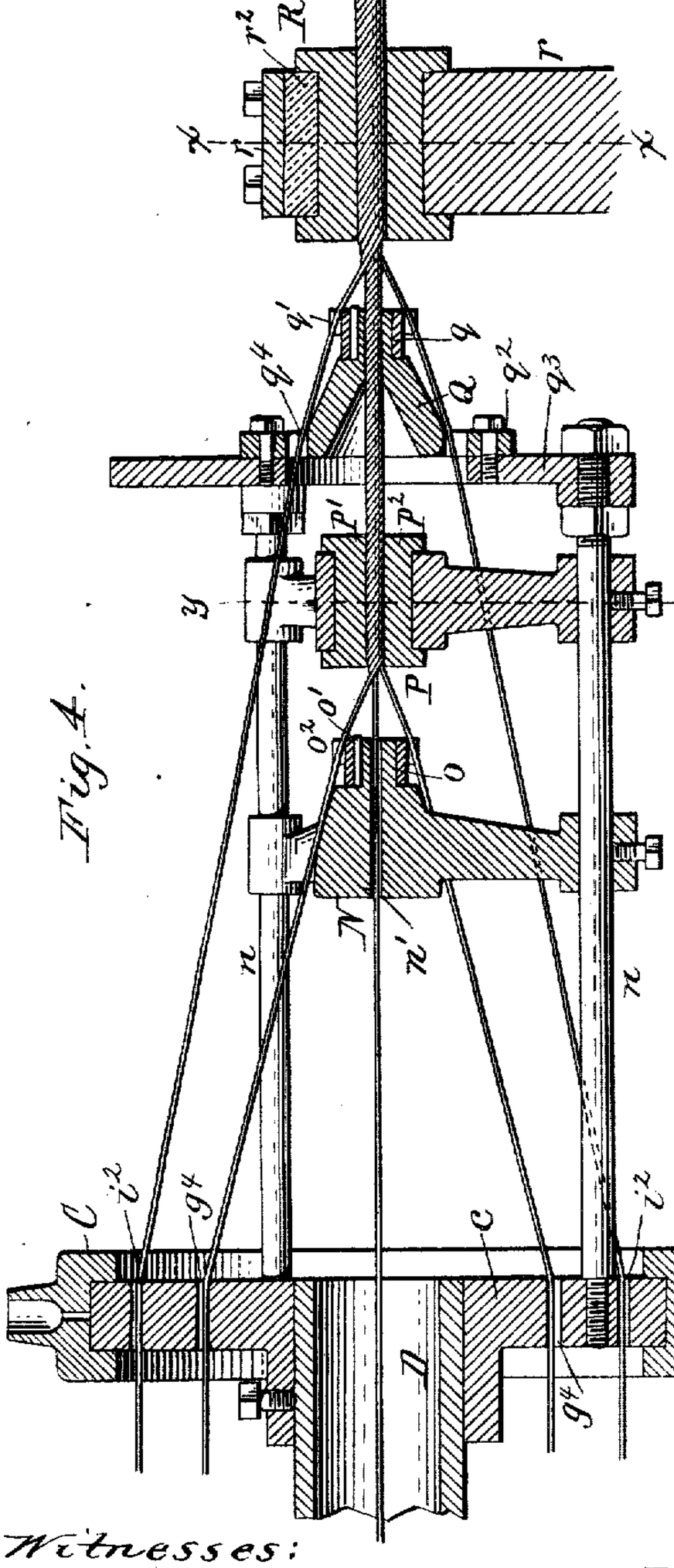
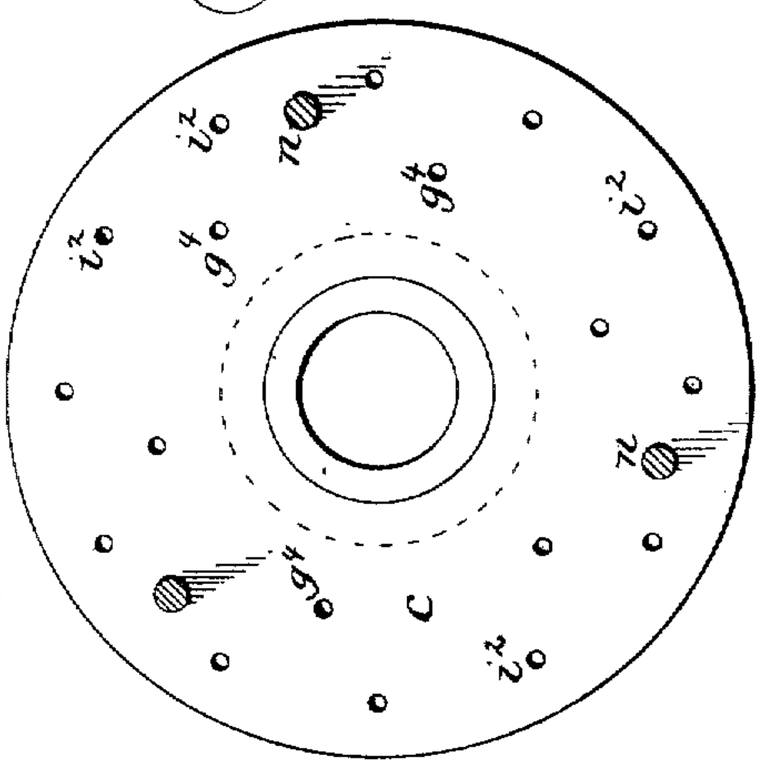


Fig. 6.



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(No Model.) 4 Sheets—Sheet 4.

T. COOKSON.

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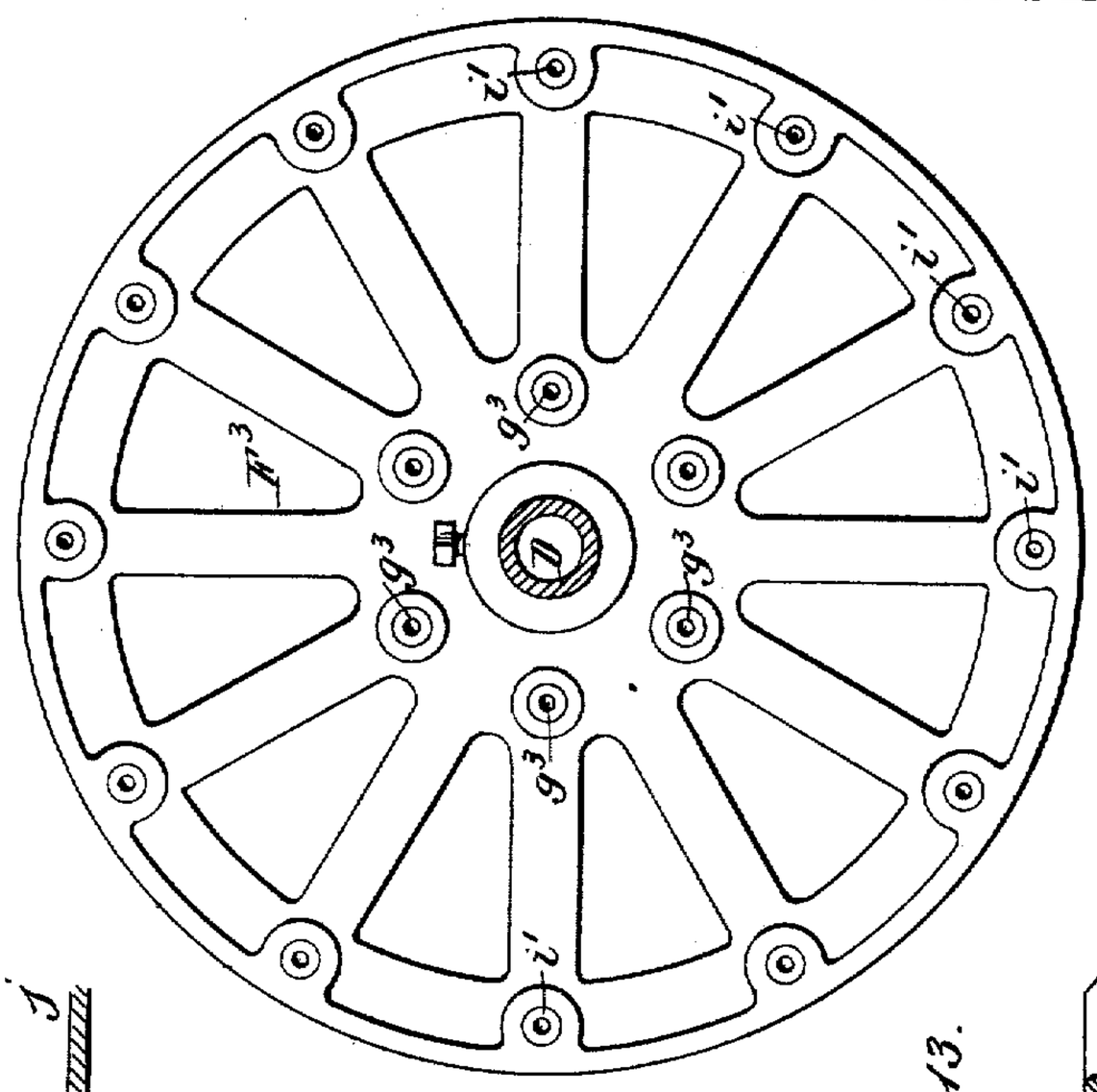

Fig. 4.

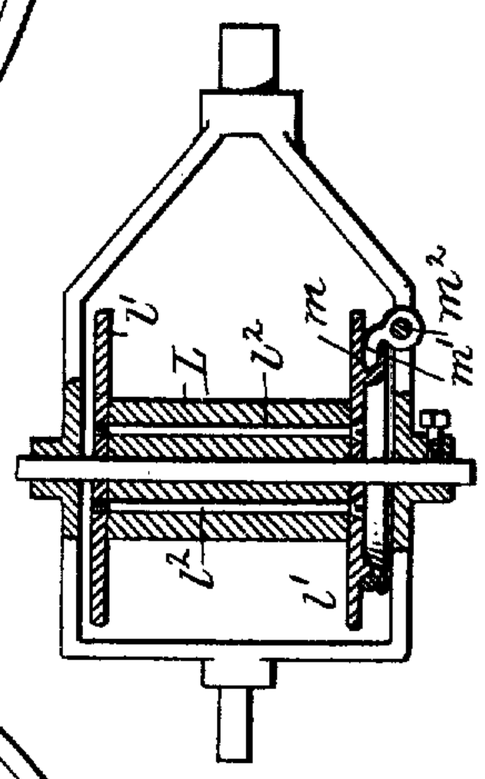

Fig. 13.

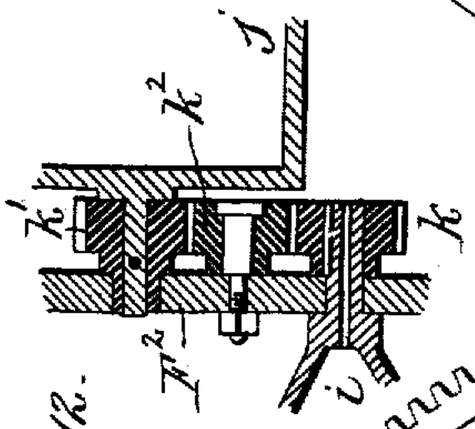

Fig. 12.

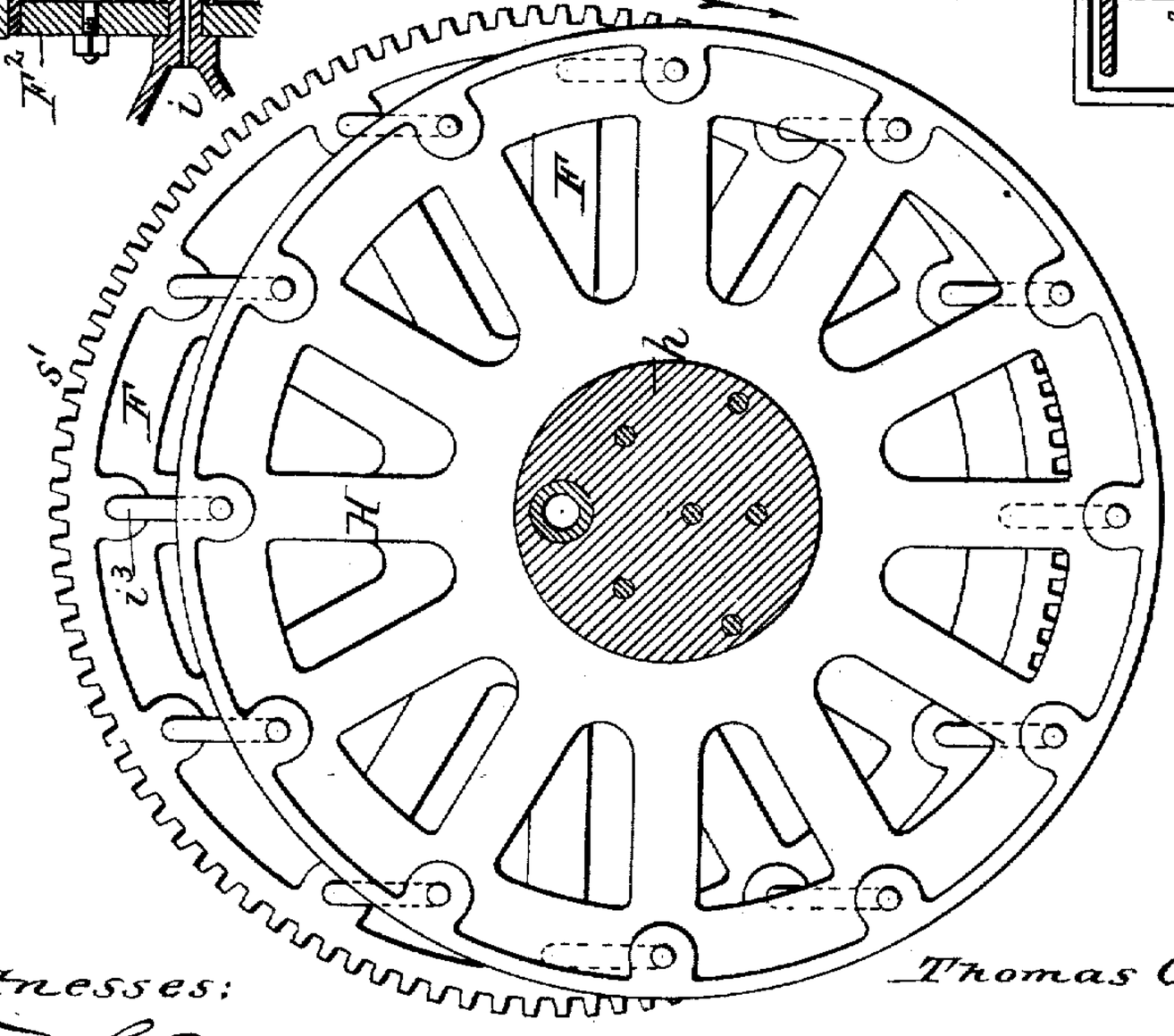

Fig. 10.

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UNITED STATES PATENT OFFICE.

THOMAS COOKSON, OF MERRITTON, CANADA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO JAMES WILSON, OF SAME PLACE, AND CHARLES RIORDON, OF TORONTO, CANADA.

WIRE-ROPE MACHINE.

SPECIFICATION forming part of Letters Patent No. 495,085, dated April 11, 1893.

Application filed September 2, 1891. Serial No. 404,492. (No model.)

To all whom it may concern:

Be it known that I, THOMAS COOKSON, a citizen of Canada, residing at Merritton, in the county of Lincoln, in the Province of Ontario, Canada, have invented new and useful Improvements in Wire-Rope Machines, of which the following is a specification.

The objects of this invention are to produce a simple, compact and easily adjustable machine for making wire rope composed of nineteen wires or strands by one operation, the inner layer of six strands being surrounded by the outer layer of twelve strands which is wound around the inner layer in the same direction in which the inner layer is wound around the core, whereby a rope of great flexibility and strength is formed in which each strand bears its full share of the strain.

In the accompanying drawings consisting of four sheets:—Figure 1 is a side elevation of my improved wire rope machine. Fig. 2 is a top plan view thereof. Fig. 3 is a longitudinal section, on an enlarged scale, of the main reel frame and connecting parts. Fig. 4 is a longitudinal section, on an enlarged scale, of the guide and die frame and connecting parts. Fig. 5 is a cross section of the final die in line *x*—*x*, Fig. 4. Fig. 6 is a rear view of the head in which both series of wires are guided and which is secured to the rear end of the hollow shaft. Fig. 7 is a rear view of the primary guide head. Fig. 8 is a fragmentary cross section of the primary die in line *y*—*y*, Fig. 4. Fig. 9 is a rear elevation of the secondary guide head and its supporting plate. Fig. 10 is a front view, partly in section, of the main reel frame, the section being taken in line *z*—*z*, Fig. 3. Fig. 11 is a detached view of the last reel carrying wheel. Fig. 12 is a detached sectional view of the gear mechanism connecting the individual frames of the second and third sets of reels. Fig. 13 is a horizontal section of one of the reels and its frame.

Like letters of reference refer to like parts in the several figures.

A represents the base frame of the machine and B C are standards secured transversely upon the base frame near the front and rear ends thereof.

D represents the hollow longitudinal shaft of the main reel frame. This shaft is journaled at its front end in a bearing *b* formed at the upper end of the front standard B, while its rear end is provided with a circular disk *c*, which is journaled in a bearing formed in the upper end of the rear standards C.

E represents the reel or spool which carries the central strand or core wire of the rope. This reel is arranged horizontally at the front end of the machine and is journaled on a transverse arbor secured in a frame *e*, which latter is supported and centered by a sleeve *e'* on the front end of the hollow shaft, but is secured to the front standard B by a bolt e^2, so as to be held against turning with said shaft. The wire from this reel passes through the hollow shaft to the guides and dies.

F F' F^2 F^3 represent four carrier wheels or circular frames which support the reels carrying the wire for all of the strands which surround the core strand spirally. These carrier or supporting wheels are secured to the hollow shaft at suitable intervals and support three sets of reels between them, each set consisting of six reels and each reel being mounted in an individual reel frame.

G represents the first set of six reels which carry the six strands of wire which are wound immediately around the central or core wire and which form the first layer around the same. Each of these reels is journaled in an individual frame *g* journaled horizontally between the first carrier wheel F and the second carrier wheel F'. The frames *g* are arranged equidistant around the hollow shaft and are provided at their front and rear ends with longitudinal trunnions *g'* g^2 which are journaled in bearings formed in the carrier wheels F and F'. The wires pass from the reels G through openings formed in the rear trunnions g^2, thence through steel bushings g^3 secured in the wheels F^2 F^3 nearer the shaft D, thence through an annular row of openings g^4 formed in the disk *c* supporting the rear end of the hollow shaft, and thence to the guides and dies.

H represents an eccentric wheel whereby the reels are maintained in a horizontal position during the rotation of the carrier wheels,

to avoid twisting of the wire. This eccentric wheel is arranged in front of the first carrier wheel F and is mounted on an eccentric bearing h secured to the rear side of the front standard B. The front trunnion of each reel frame g is provided with a crank h' which is pivoted at its free end to the eccentric wheel. The length of each crank is equal to the eccentricity of the eccentric wheel, whereby upon rotating the carrier wheels and the eccentric wheel, the latter maintains the reels in a horizontal position.

I represents the second set of six reels which supply one-half of the twelve wires or strands of which the second or outer layer of the rope is formed. These reels are arranged between the second carrier wheel F′ and the third carrier wheel F^2 and are supported in individual frames i having trunnions at their front and rear ends journaled in the carrier wheels F′ F^2. The wires from these reels pass through openings formed in the rear trunnion of the frames i, thence through steel bushings i' secured to the carrier wheel F^3 near the periphery thereof, and thence through openings i^2 in the disk c. Each of the reels I is maintained in a horizontal position by a longitudinal crank shaft i^3 which is journaled with its front end in the carrier wheel F and has its crank pivoted to the eccentric wheel II like the cranks h'. The rear end of each crank h' and of each crank shaft i^3 is square and is seated in a correspondingly shaped opening formed in the front trunnion of the reel frame, so that the frame and crank or crank shaft are compelled to turn together.

J represents the third set of six reels arranged between the third carrier wheel F^2 and the fourth carrier wheel F^3, whereby the remaining half of the twelve outer wire strands is supplied. Each of these reels is arranged in an individual frame j having trunnions at its front and rear ends which are journaled in the carrier wheels F^2 and F^3. The wires from the reels J pass through openings formed in the rear trunnions of the frames j, and thence through openings formed in the disk c. The frames of this third set of reels are maintained in a horizontal position by gear mechanism which connects each frame with a frame of the second set of reels, and which is constructed as follows: The rear trunnion of each frame i, of the second set of reels, is provided with a pinion k and the front trunnion of each frame j of the third set of reels is provided with a similar pinion k'.

k^2 represents an idler pinion which is pivoted to the rear side of the carrier wheel F^2 and meshes with both of the pinions k and k', whereby motion is transmitted from the reel frames i of the second set to the reel frames j of the third set and the latter are caused to move precisely like the reel frames of the second set and are so maintained in a horizontal position. The reel frames g and j of the first and third sets are axially in line, and the reel frames i of the second set are arranged equidistant between the reel frames g and j.

Each of the wire reels consists of a cylindrical body of wood L having flanges formed at its ends by metal disks l' secured to the body by tie bolts l^2. One of these disks is provided with an annular channel m which receives a divided tension ring m'. The ends of this tension ring are provided with eyes which are connected by a screw bolt m^2. The eyes of the tension ring are bent outwardly, so that, when the reel is rotated these eyes strike against the reel frame and arrest the rotary movement of the tension ring. The reel rotates within the tension ring which opposes a constant and uniform frictional resistance to the rotary movement of the reel. The friction between the tension ring and the reel can be increased or decreased by tightening or loosening the bolt m^2.

N represents the primary guide head, shown most clearly in Figs. 4 and 7, whereby the core or central strand and the six strands forming the first layer around the core are guided while being twisted together. This guide head tapers rearwardly and is provided with radial arms which are secured with their outer ends to longitudinal supporting rods n. The latter are secured at their front ends to the disk c. The primary guide-head is provided with a central bore or passage n' through which the core wire passes.

O represents a wearing sleeve which is removably secured to the contracted cylindrical rear end of the guide-head N by a pin O′. This wearing sleeve is provided at its rear end with an annular series of lugs O^2 forming between them notches or recesses O^3 and having openings O^4. The inner series of six wires which are laid immediately around the core strand rest against the outer conical surface of the guide-head N and are passed either through the openings O^4 in the lugs O^2 or through the notches O^3 between these lugs. Small wires are preferably guided by passing them through the openings in the lugs, because they are guided therein more securely, but large wires are preferably guided in the notches, which latter also permit the wires to be threaded more rapidly through the machine. When the wearing sleeve is worn it can be removed upon withdrawing the pin O′, and can be replaced by a new one. By providing the primary guide-head with a removable wearing piece, the necessity of replacing the whole guide-head, when worn, is avoided.

P represents the primary die which receives the core wire and the first layer of wires wound around the same. This die consists of two halves P′ P^2, Figs. 4 and 8, which are arranged in a cross-head secured to the longitudinal supporting rods n. The divided die is yieldingly held in place by a cap P^3 secured to the cross-head and a block of rubber p interposed between the cap P^3 and one part of the divided die. This die straightens the rope after the first layer has been wound

around the core, and takes out any kinks, so as to leave the rope comparatively round to receive the second layer of wire strands.

Q represents the secondary guide-head, whereby the twelve wires or strands which form the second or outer layer of the rope are guided upon the seven-strand rope which issues from the primary die. This secondary guide-head is similar in construction to the primary guide-head. It tapers rearwardly and is provided at its rear end with a removable wear sleeve q having an annular row of lugs q' which form intermediate notches or recesses in which the wires are guided. This guide-head is attached by a flange q^2 to a face plate q^3 which is secured to the rear ends of the longitudinal rods n. The flange q^2 is provided with several segmental slots q^4 through which the wires pass.

R represents the secondary die which receives the completed rope. This die is divided and is arranged in a seat formed at the upper end of a standard r. The secondary die is yieldingly held in its seat by means of a cap plate r' secured to the standard and a rubber block r^2 arranged between said cap plate and the die.

S represents the driving shaft whereby motion is imparted to the shaft D and carrier wheels constituting the frame supporting the wire reels. The shaft S is provided with a gear wheel s meshing with a gear rim s' formed on the first carrier wheel F.

The primary guide head and the primary die are attached to the longitudinal supporting rods by set screws, as shown, or other suitable devices, so that this guide head and die can be adjusted lengthwise in the machine, as may be necessary to properly guide the first series of wires upon the core strand.

It is obvious that a seven-wire cable may be made upon this machine by simply omitting the twelve wires which form the outer layer when a nineteen-wire cable is made.

The main reel frame consists of the hollow shaft and the four wheels or circular frames mounted thereon which form three compartments, one behind the other, in which the individual reel frames are arranged in three annular sets. This frame is very simple and compact, containing eighteen reels in three annular sets, whereby the length of the machine is considerably reduced, and maintains each individual reel frame by positive means in a horizontal position.

I claim as my invention—

1. The combination with the main reel frame, of two sets of individual reel frames mounted therein one behind the other, mechanism whereby one of said sets of individual frames is maintained in a horizontal position during the rotation of the main reel frame, and gear wheels connecting the two sets of individual frames and controlling one set from the other, substantially as set forth.

2. The combination with a main reel frame composed of three annular compartments, one behind the other, three annular sets of individual reel frames journaled in said compartments, an eccentrically mounted wheel, cranks attached to the individual frames of the first and second sets and pivoted to the eccentric wheel, and gear wheels connecting the individual frames of the third set with those of the second set, substantially as set forth.

3. The combination with a main reel frame, an individual reel frame journaled therein, an eccentric wheel, a crank connecting the individual reel frame with the eccentric wheel, an individual reel frame arranged in rear of the first mentioned individual frame, gear wheels secured to the journals of said individual frames, and idler wheels attached to the main frame and meshing with the gear wheels of said individual frames, substantially as set forth.

4. The combination with the main reel frame and its hollow shaft, of a disk mounted on said shaft and provided with a row of holes for the wires, a guide and die frame connected with said disk and rotating therewith, and a guide head and die mounted one behind the other in said guide and die frame and capable of independent longitudinal adjustment thereon, substantially as set forth.

5. The combination with the main reel frame and its hollow shaft, of a disk mounted on said shaft and provided with two concentric rows of openings for the wires, a guide and die frame connected with said disk and rotating therewith, a primary guide-head and a primary die mounted in said guide and die frame, one behind the other, a secondary guide-head arranged in the rear of the primary die, and a stationary die arranged in the rear of the secondary guide-head, substantially as set forth.

6. The combination with the main reel frame and its hollow shaft, of a disk mounted on said shaft and provided with two concentric rows of openings for the wires, longitudinal rods secured to said disk, a primary guide-head and a primary die adjustably secured to said rods, and a secondary guide-head secured to the ends of said rods, substantially as set forth.

Witness my hand this 24th day of August, 1891.

THOMAS COOKSON.

Witnesses:
THOS. F. PATTISON,
A. B. SHAW.