

No. 652,020.

J. EDWARDS.
DRAWBRIDGE.

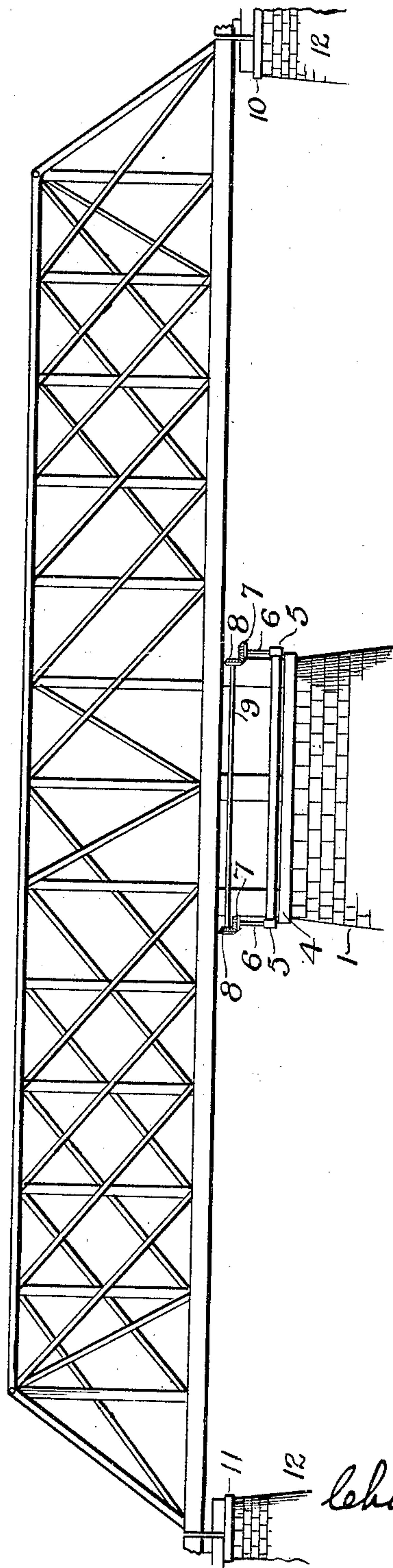
Patented June 19, 1900.

(Application filed Apr. 3, 1899.)

(No Model.)

8 Sheets—Sheet 1.

Fig. 1.



WITNESSES

James F. Duhamel
W. L. Shay

INVENTOR

Joseph Edwards

BY

Charles S. Rogers
ATTORNEY

No. 652,020.

Patented June 19, 1900.

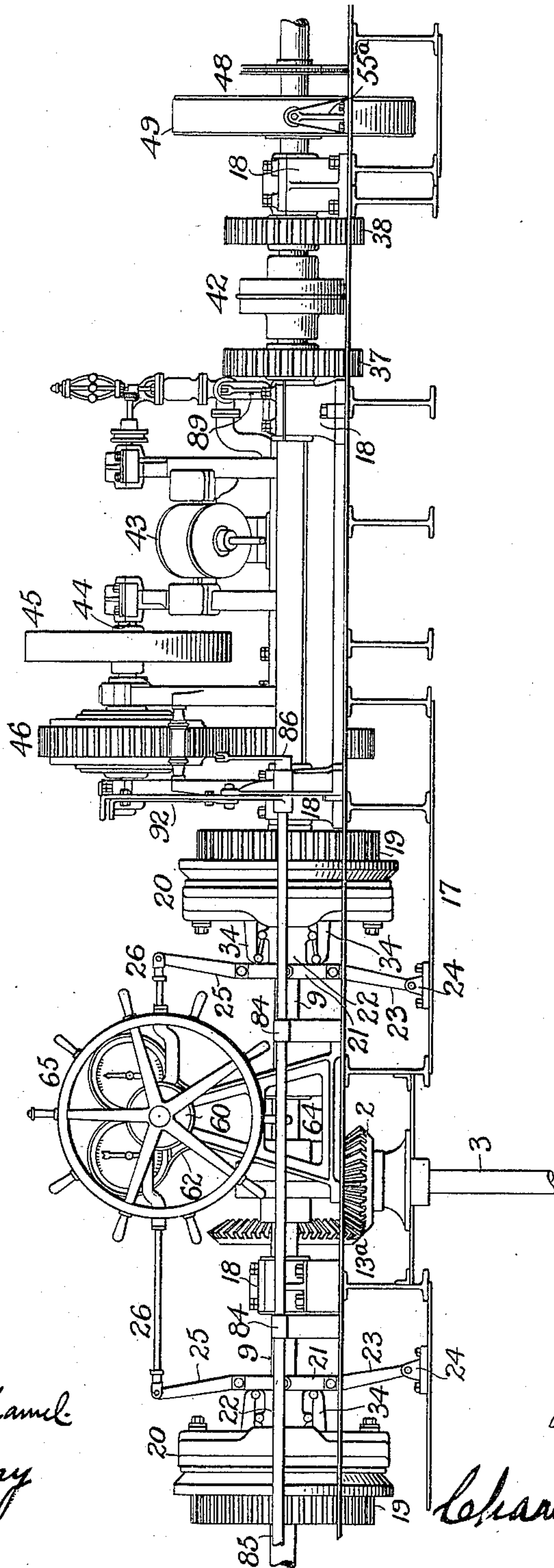
J. EDWARDS.
DRAWBRIDGE.

(Application filed Apr. 3, 1899.)

(No Model.)

8 Sheets—Sheet 2.

Fig. 2.



WITNESSES

James F. Duhamel
M. L. Shay

INVENTOR

Joseph Edwards

BY

Charles S. Rogers
ATTORNEY

No. 652,020.

Patented June 19, 1900.

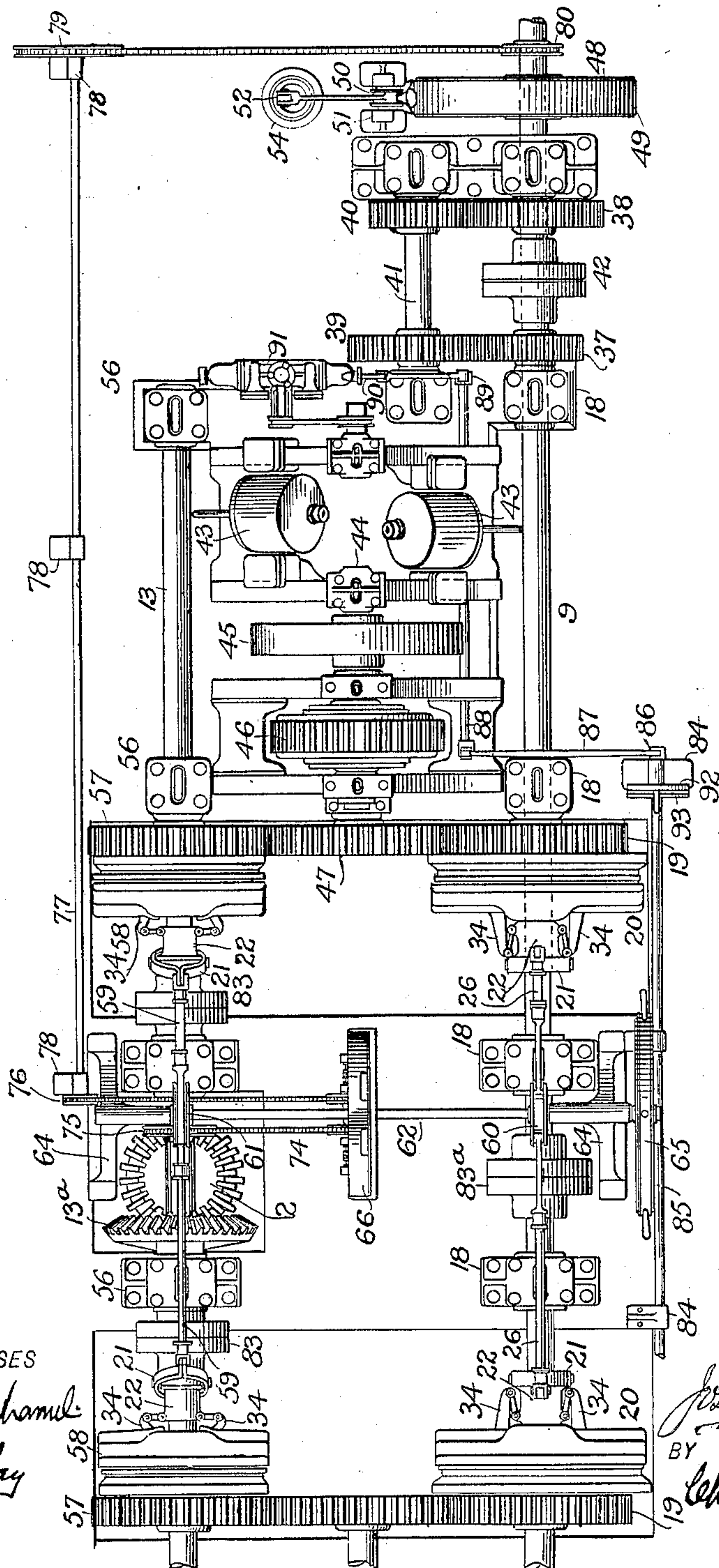
J. EDWARDS.
DRAWBRIDGE.

(Application filed Apr. 3, 1899.)

(No Model.)

8 Sheets—Sheet 3.

Fig. 3.



WITNESSES

James F. Duhamel
M. L. Shay

INVENTOR

Joseph Edwards

BY

Charles S. Rogers

ATTORNEY

No. 652,020.

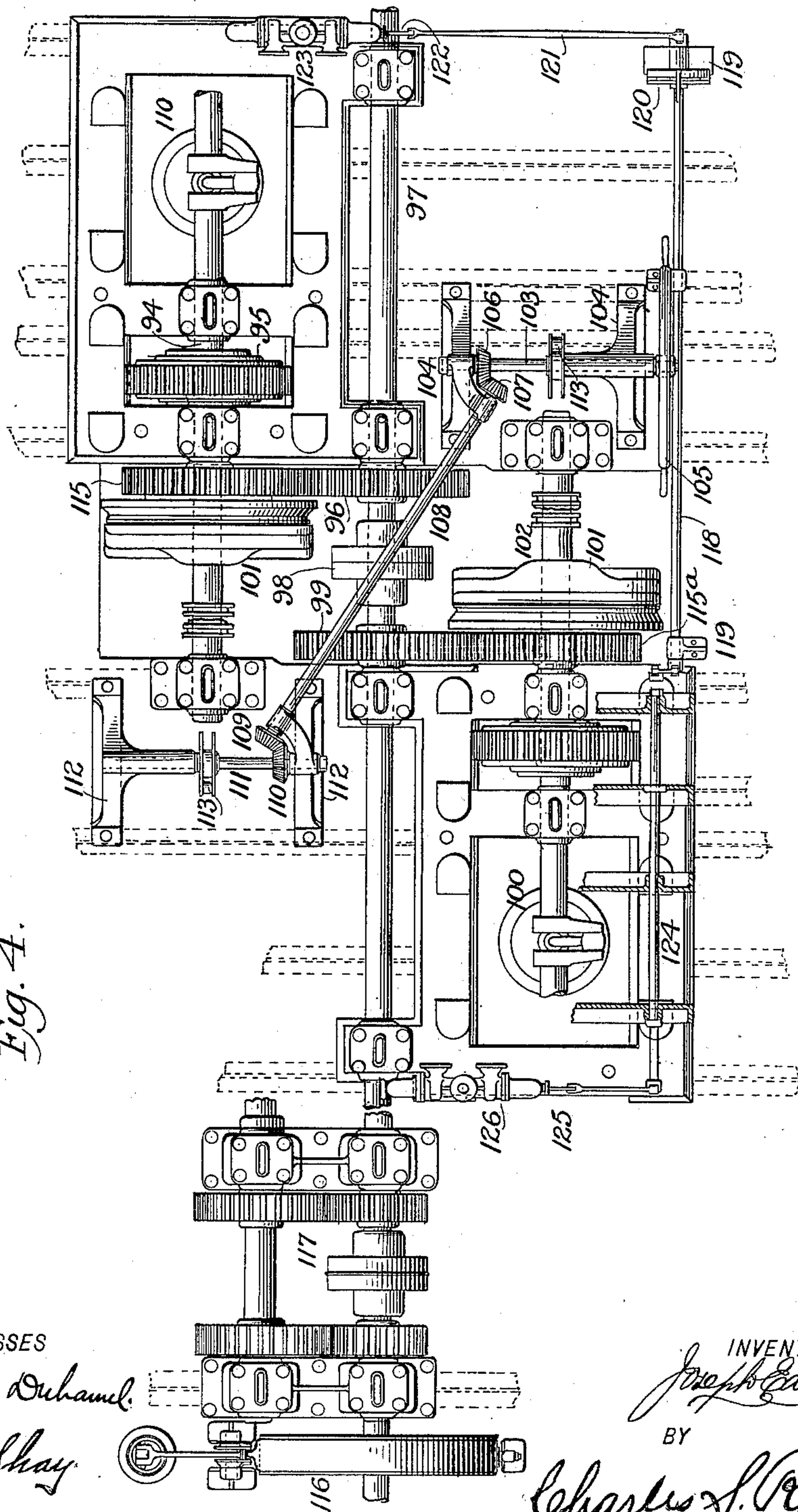
Patented June 19, 1900.

J. EDWARDS.
DRAWBRIDGE.

(Application filed Apr. 3, 1899.)

(No Model.)

8 Sheets—Sheet 4.



WITNESSES

James F. Duhamel.

M. L. Shay.

INVENTOR

Joseph Edwards

BY

Charles S. Rogers
ATTORNEY

No. 652,020.

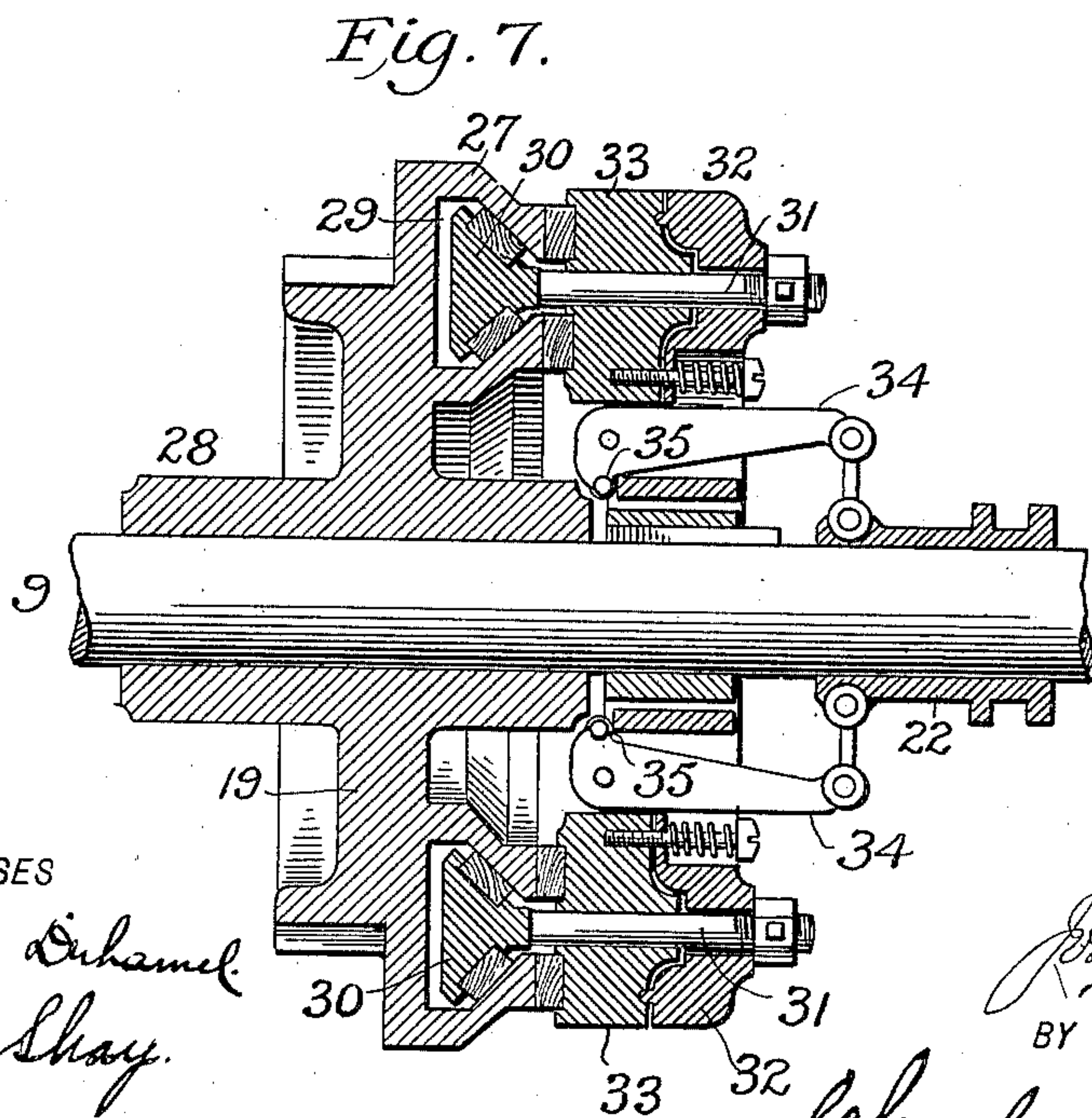
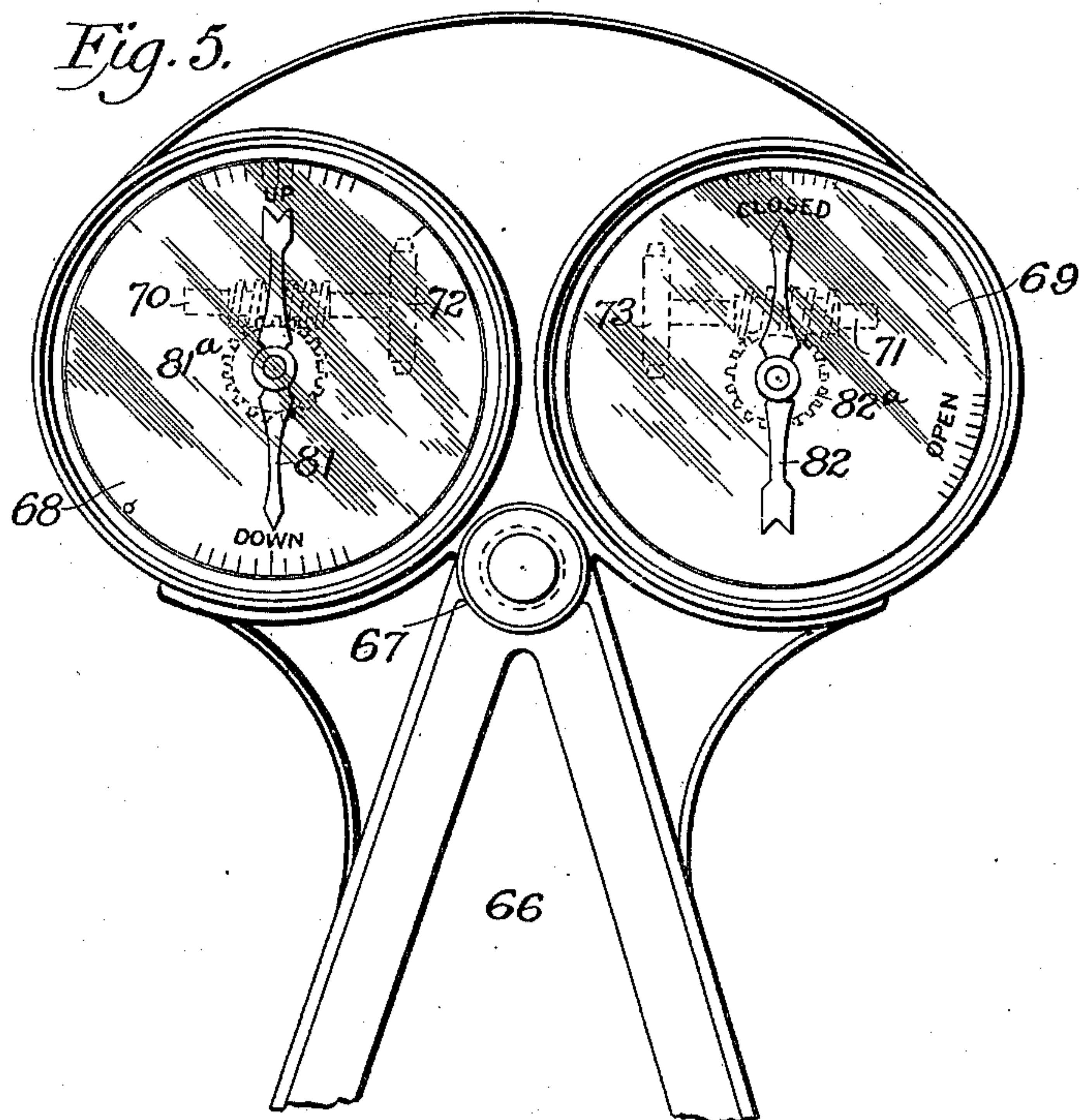
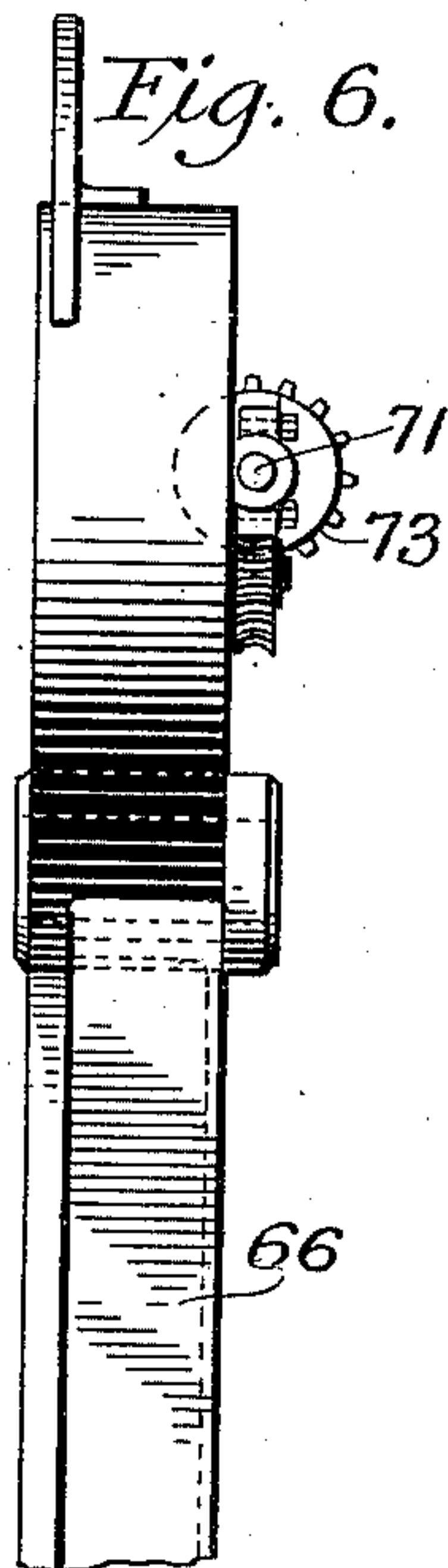
J. EDWARDS.
DRAWBRIDGE.

Patented June 19, 1900.

(Application filed Apr. 3, 1899.)

(No Model.)

8 Sheets—Sheet 5.



WITNESSES

James F. Duhamel
W. L. Shay.

INVENTOR

Joseph Edwards

BY

Charles S. Rogers
ATTORNEY

No. 652,020.

J. EDWARDS.
DRAWBRIDGE.

Patented June 19, 1900.

(Application filed Apr. 3, 1899.)

(No Model.)

8 Sheets—Sheet 6.

Fig. 8.

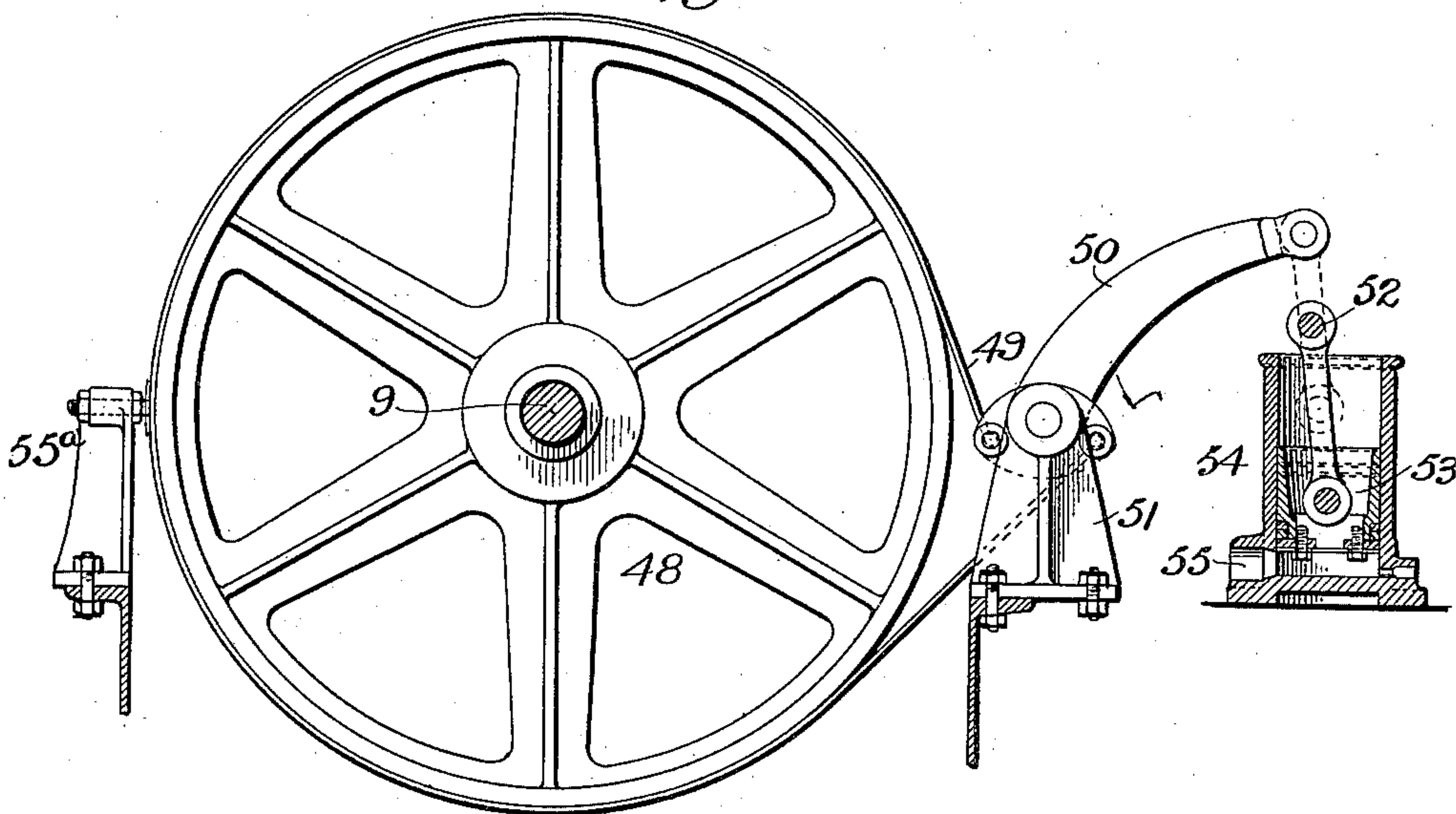
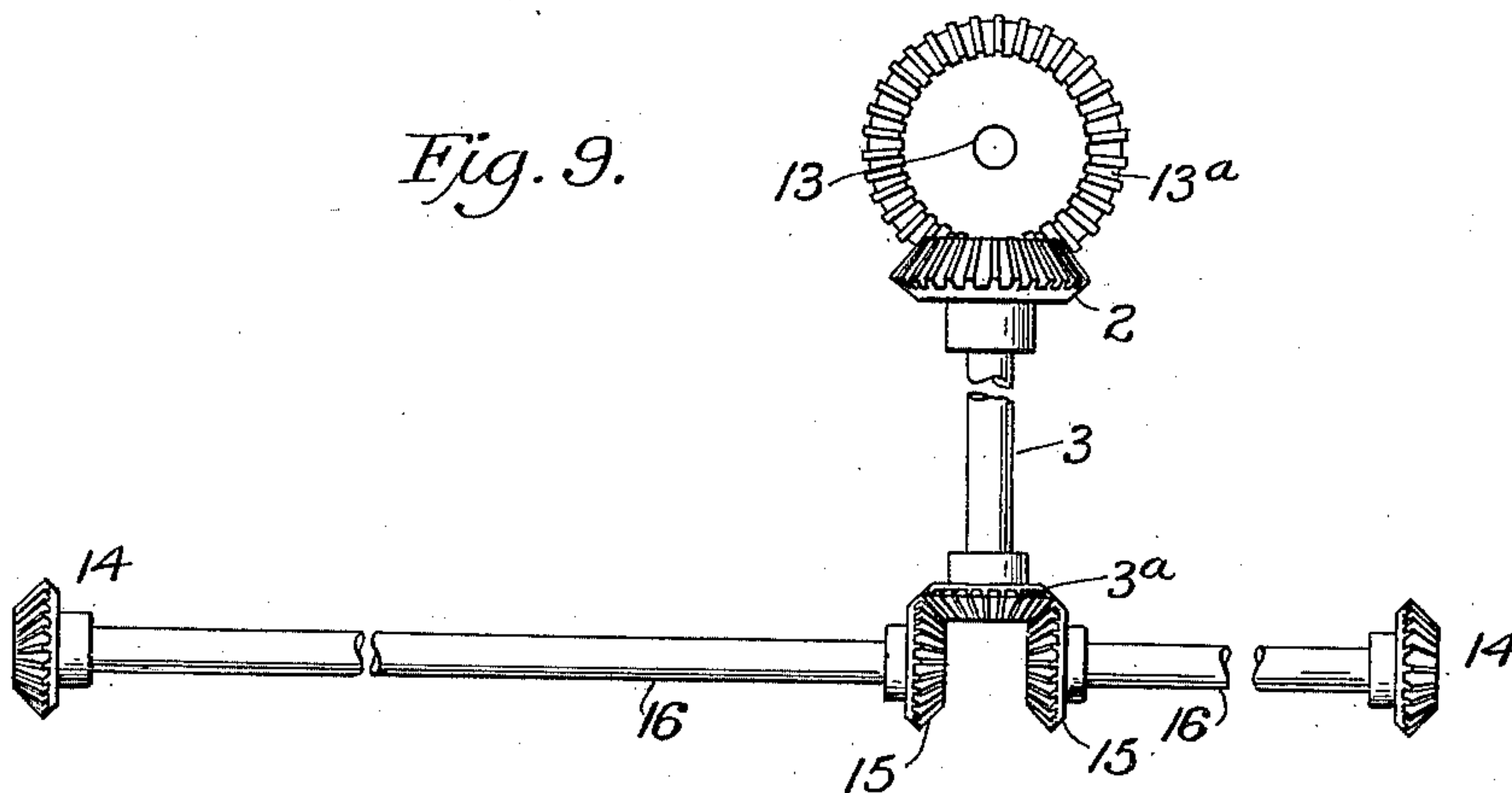


Fig. 9.



WITNESSES

James F. Duhamel.
M. L. Shay

INVENTOR

Joseph Edwards

BY

Charles S. Rogers
ATTORNEY

No. 652,020.

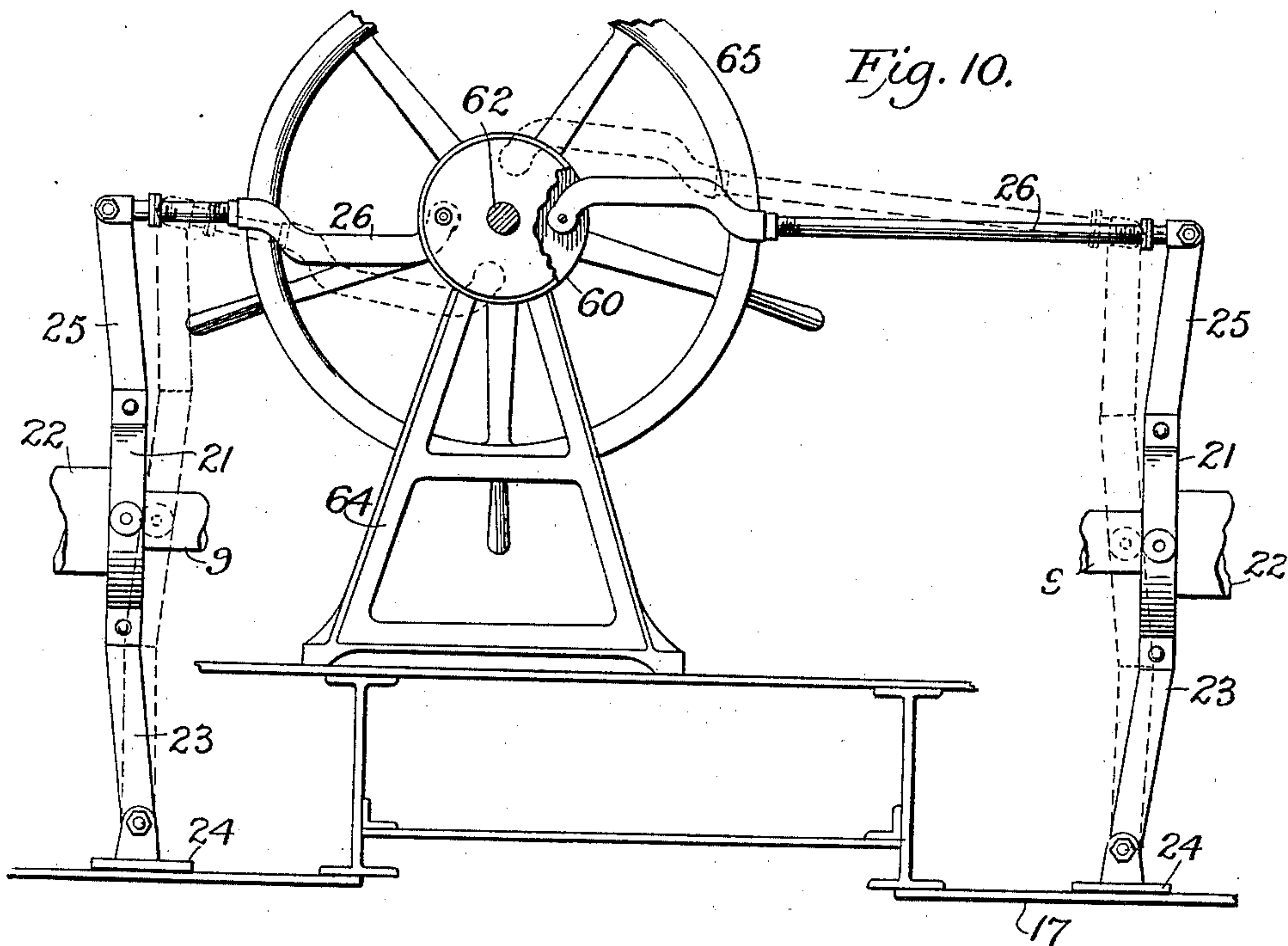
J. EDWARDS.
DRAWBRIDGE.

Patented June 19, 1900.

(Application filed Apr. 3, 1899.)

(No Model.)

8 Sheets—Sheet 7.



WITNESSES

James T. Duhamel
M. L. Shay

INVENTOR

Joseph Edwards

BY

Charles S. Rogers
his ATTORNEY

No. 652,020.

J. EDWARDS.
DRAWBRIDGE.

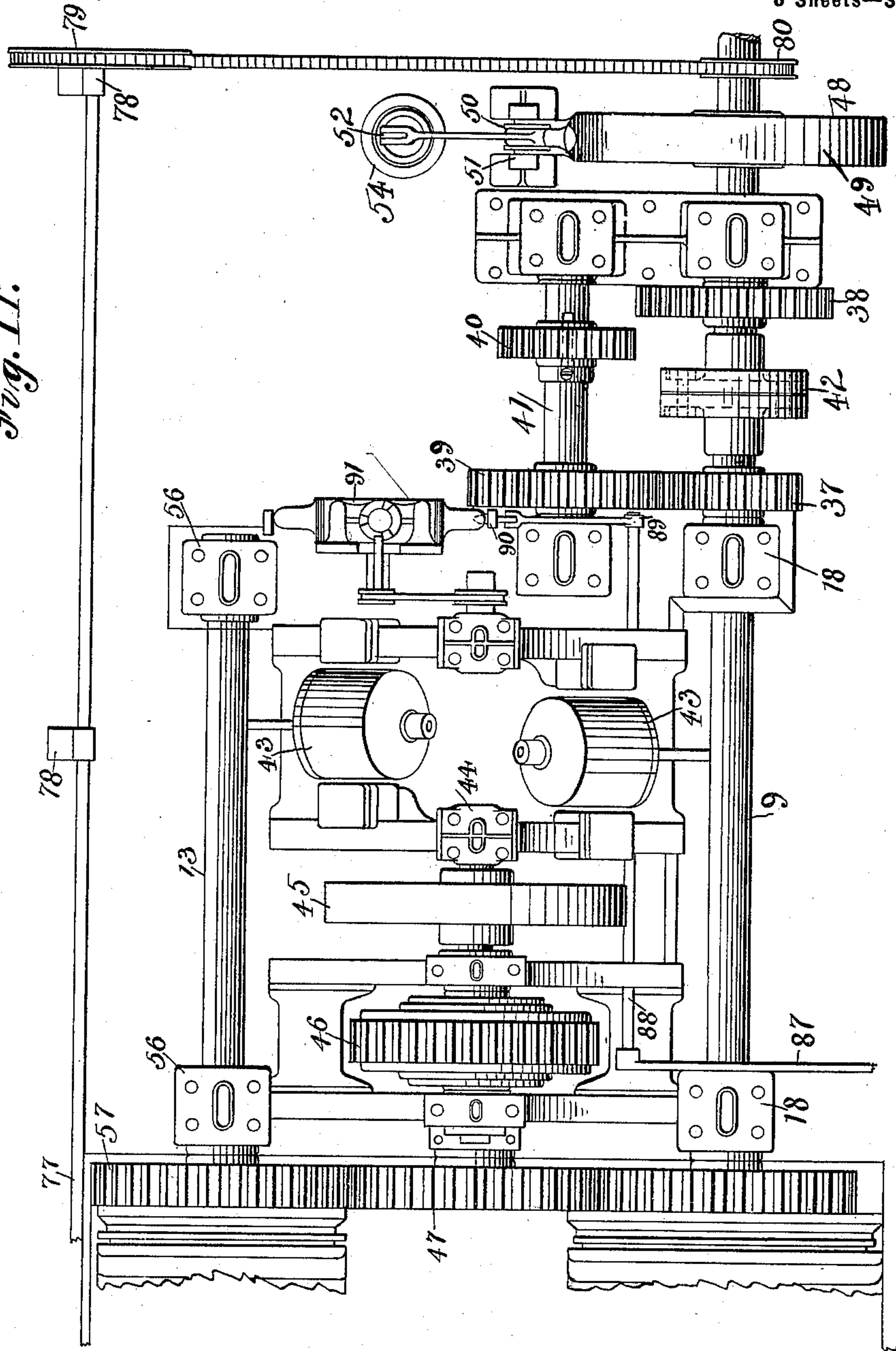
Patented June 19, 1900.

(Application filed Apr. 3, 1899.)

(No Model.)

8 Sheets—Sheet 8.

Fig. 11.



WITNESSES

J. S. Cade.
M. L. Shay.

Joseph Edwards INVENTOR
By Charles S. Rogers
ATTY.

UNITED STATES PATENT OFFICE.

JOSEPH EDWARDS, OF NEW YORK, N. Y.

DRAWBRIDGE.

SPECIFICATION forming part of Letters Patent No. 652,020, dated June 19, 1900.

Application filed April 3, 1899. Serial No. 711,585. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH EDWARDS, a citizen of the United States, residing in the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Drawbridges; 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.

This invention relates to bridges, and particularly to those constructed to be swung or drawn; and some of the objects of this invention are to provide improved means for swinging or drawing the bridge and for indicating the position of the movable span at all times.

Another object is to provide means for controlling the speed of the swinging or drawing mechanism and for stopping the same speedily.

A further object is to provide direct and positively acting mechanism to operate the clutches upon the turning and locking shafts and to provide convenient means to control the valves of the motors or engines.

It is also an object of this invention to combine the operating mechanism into as little space as possible and to provide for the employment of more than one motor or driving apparatus, whereby when one motor is disabled another may be brought into use, and, further, to provide means for speedily disconnecting the disabled motor and its mechanism, so that another motor and its mechanism can be employed.

With these and other objects in view the invention consists, essentially, in the construction, combination, and arrangement of parts, substantially as hereinafter more fully described in the following specification and illustrated in the accompanying drawings, in which—

Figure 1 represents a side view of one form of swinging or drawing bridge to which the invention may be applied. Fig. 2 is a side elevational view illustrating mainly the turning mechanism. Fig. 3 is a top plan view of the mechanism illustrated in Fig. 2. Fig. 4 is a view similar to Fig. 3 of a modified construction wherein more than one motor or driving apparatus is shown arranged closely together.

Fig. 5 is a front elevational view of the indicators and a supporting-frame therefor. Fig. 6 is an edge view of the same. Fig. 7 is a longitudinal central section of a form of clutch mechanism employed. Fig. 8 is a side view of a form of brake apparatus used. Fig. 9 is a detail view of the locking-shaft and actuating mechanism. Fig. 10 is a detail view of the clutch-actuated mechanism, and Fig. 11 is an enlarged detailed view of the compound gears.

Similar characters of reference designate corresponding parts throughout the several views.

Referring to the drawings, and particularly to Fig. 1 thereof, the reference character 1 designates a central pier, upon which is pivotally mounted the movable or swinging member or span of a drawbridge of any preferred form or construction, that shown being illustrated only as an exemplification of the invention. The pier 1 is preferably provided with a circular plate or ring 2 to receive supporting rollers or wheels 3, connected with the framework of the movable span in the usual manner, and said pier also supports a master-wheel or externally-toothed ring 4, with which engages a spur gear-wheel 5, carried by a vertical spindle 6, suitably journaled in the framework supporting the movable span, and there are preferably more than one of the vertical spindles 6, two being here shown. Mounted upon the other ends of the vertical spindles 6 are bevel gear-wheels 7, engaging with the bevel gear-wheels 8 upon the extremities of a horizontal turning shaft 9, journaled in the framework or platform supporting the movable span and driven in the manner substantially as hereinafter described.

The parts above described are of the usual construction and detail description thereof will not be required.

In Fig. 1 is illustrated only a portion of the fixed spans or members 10 and 11 of the bridge, preferably supported by piers or masonry 12, and to secure the ends of the movable span or draw in the proper position when the same is closed any improved locking mechanism may be employed, only a portion of which is shown, consisting of a horizontal locking-shaft 13, Figs. 3 and 9, desirably pro-

vided with a bevel gear-wheel 13^a, engaging a similar wheel 2, upon a vertical shaft 3, Figs. 2 and 9, carrying at the lower end thereof a bevel gear-wheel 3^a, preferably engaging bevel gear-wheels 15, carried by horizontally-disposed shaft 16, preferably extending parallel with and adjacent to the movable span and provided at the opposite ends thereof with bevel gear-wheels 14, adapted to operate the locking mechanism employed, as will be understood.

I preferably employ double or compound driving apparatus and mechanism for transmitting power to the turning and locking shafts and provides suitable couplings to throw either of the driving apparatus out of use when disabled; but as both of the driving apparatus and their power-transmitting mechanism are substantially similar I will only illustrate and describe one of the same, it being understood that only one set of driving apparatus is in use at a time.

Referring particularly to Figs. 2 and 3 of the drawings, the reference character 17 designates a platform or framework of any preferred formation upon which the mechanism for operating the movable span of the bridge is mounted, and the turning shaft 9 is preferably provided with suitable journals 18, formed on or connected with the platform in any suitable manner, and the turning shaft 9 also preferably carries spur gear-wheels 19, desirably loosely mounted thereon and constructed to be rotated by means of suitable clutches 20, Figs. 2, 3, and 7.

Any preferred form of clutch may be employed; but that shown in detail in Fig. 7 of the drawings consists, substantially, of a disk or ring 27, having an elongated tubular hub 28, loose upon the shaft 9 and preferably carrying a spur gear-wheel 19, and the disk 27 is preferably provided with an annular chamber 29, having inclined walls adapted to receive friction-shoes 30 or other devices, carrying bolts 31 to retain the ring 32 and spider 33 in position, and pivotally connected with the latter are arms or levers 34, carrying rollers or spurs 35, adapted to bear against the hub of the ring 32 and force the same outwardly, so as to draw the friction-shoes 30 into contact with the inclined walls 29 of the disk 27, carrying the gear-wheels 19, said arms 34 having link connection with the sliding sleeve or hub 22, having an annular recess adapted to receive the jaws of the clutch-operating levers 21, hereinafter described, it being understood that the spider is feathered upon the turning shaft 9, as shown in Fig. 7. These clutches are preferably operated by means of levers 21, having jaws embracing the annularly-recessed hub 22 of the clutches 20, and the lower end of said levers are preferably pivoted to a link 23, having pivotal connection with plates 24 upon the platform 17, and the free end of said levers 21 may be pivoted to links 25, which may be movably

connected with actuating-rods 26, operated in the manner hereinafter described.

Mounted upon the turning shaft 9 are spur gear-wheels 37 and 38, preferably engaging spur gear-wheels 39 and 40, carried by a counter-shaft 41, the gear-wheels 37 and 40 being here illustrated smaller in diameter than the gear-wheels 38 and 39 in order that the power and speed of the turning shaft may be regulated, as will be readily understood. The gear-wheel 40 is preferably feathered upon the counter-shaft 41 and provided with a hub carrying a set-screw or similar device by means of which the position of the gear-wheel 40 may be controlled, and when it is desired to throw that wheel out of engagement with the gear-wheel 38 the set-screw may be loosened, and the gear-wheel 40 may be moved out of said engagement, as shown in full lines in Fig. 11 of the drawings. The gear-wheel 40 is always out of engagement when the coupling 42 is connected by bolts, as shown in dotted lines in Fig. 11 of the drawings, and in this case the gear-wheel 39 acts as an idler. If the bolts are removed from the coupling, the gear-wheel 40 may be moved into engagement with the gear-wheel 38, so that the different parts of the turning shaft 9 will move at various speed on each side of the coupling, as will be readily understood.

The driving apparatus 43 may be of any preferred form or construction, and steam, air, or gas engines may be used or electric motors may be employed, as found desirable in practice, and a driving-shaft 44, carrying a fly-wheel 45 and a differential gear 46, preferably of the ratio of nineteen to one, to regulate the speed of the turning shaft, and the drive-shaft also carries a spur gear-wheel 47, constructed to engage with and drive the spur gear-wheel 19 on the turning shaft 9.

Preferably mounted upon the ends of the turning shaft 9 are break-wheels 48, Figs. 2, 3, and 8, only one of which is shown, desirably encircled by a flexible band 49, operated by a curved lever 50, pivotally mounted in a brace or stud 51, formed on or connected with the platform 17, and this lever may be actuated in any preferred manner, but is here shown pivotally connected with a piston-rod 52, driven by a piston 53, mounted in a cylinder 54, the latter having an orifice 55 for the introduction of the actuating medium employed. The band 49 is preferably retained in position upon the wheel 48 by a guide or like device 55^a, and by means of this construction the operation of the turning mechanism may be quickly and positively controlled by the operator, as will be readily understood.

The locking-shaft 13 is suitably mounted in journals 56, Fig. 3, formed on or connected with the platform or framework 17 and preferably carries loose spur gear-wheels 57, desirably constructed to engage with and be driven by the spur gear-wheel 47 on the driv-

ing-shaft 44, which also engages with and drives the loose spur gear-wheel 19 on the turning shaft 9, and the loose spur gear-wheels 57 are preferably provided with clutches 58, substantially of the construction hereinbefore described.

Both of the clutches 20 and 58 are preferably provided with actuating-rods 26 and 59, respectively, desirably made adjustable, eccentrically pivoted to disks 60 and 61, respectively, keyed to the horizontal shaft 62, journaled in the supports or brackets 64, said shaft being preferably operated by hand-wheel 65, Figs. 2 and 3 of the drawings, so that by the partial revolution of shaft 62 in one direction the rods 26 and 59 are drawn toward and forced from said shaft, thereby engaging and disengaging the clutches 20 and 58, as will be understood.

The devices for indicating the position of the locking and turning mechanism are desirably located between the turning and locking shafts directly back of the hand-wheel 65, so as to be observable by the operator without leaving his position at the hand-wheel.

A suitable bracket or support 66, Figs. 3, 5, and 6, is preferably connected with the platform and may be provided with bearings 67 for the shaft 62, and formed on or connected with this bracket are two or more indicating-disks 68 and 69, respectively, preferably provided with graduations and with the words "Up" and "Down" and "Open" and "Closed," respectively, and over these disks move indicators or pointers 81 and 82, respectively, as clearly shown in Figs. 5 and 6 of the drawings. Suitably mounted upon the other side or face of said disks 68 and 69 are worm-shafts 70 and 71, respectively, carrying sprocket-wheels 72 and 73, respectively, the former preferably connected by a sprocket-chain 74 with a sprocket-wheel 75 upon the locking-shaft 13, while the sprocket-wheel 73 is preferably connected by a similar chain to a sprocket-wheel 76 upon one end of a horizontal shaft 77, journaled in hangers 78 upon the framework or platform 17 in any suitable manner, said shaft carrying another sprocket-wheel 79, connected with a similar wheel 80 upon the turning shaft 9 by a sprocket-chain, as shown in Fig. 3.

If desired, other mechanical equivalents may be employed to transmit the motion of the turning and locking shafts 9 and 13 to the indicators, and the mechanism just described may be changed or altered in practice.

The indicators or pointers 81 and 82 are preferably mounted upon short spindles journaled in the disks 68 and 69, respectively, and are desirably constructed to travel partially or entirely around the circles laid out upon said disks, and the spindles of these indicators may be driven by the worms on the shafts 70 and 71, respectively, through the medium of worm gear-wheels 81^a and 82^a, re-

spectively, as clearly shown in Figs. 5 and 6 of the drawings. By means of this construction the operator can actuate the hand-wheel 65 so as to throw the clutches 58 into engagement with the loose gear-wheels 57, driven by the driving gear-wheel 47 on the drive-shaft 44, and thereby rotate the locking-shaft 13, and the operation of said shaft will be readily observable by the operator from his station at said hand-wheel by means of the indicator 81, geared with the locking-shaft in the manner before described.

The locking-shaft 13 is preferably provided with couplings 83, of any desired construction, adapted to be employed for disconnecting either driving apparatus when occasion requires, as before set forth, for either driving apparatus will operate the turning and locking shafts, or both may be employed for this purpose when desired, and the turning shaft 9 is preferably provided with a similar coupling 83^a for the same purpose.

Suitably journaled in hangers or similar devices 84 is a rocking shaft 85, preferably provided with a crank-arm 86, connected by a link 87 to a similar arm of a rock-shaft 88, having another crank-arm 89, provided with suitable connections with a rod 90, connected with the controlling-valve 91 or similar device of the driving apparatus. The rock-shaft 85 is preferably provided with a ratchet-lever 92, operating with a rack-bar 93, connected with the platform 17, and the said lever is preferably located adjacent to the hand-wheel 65, so that the operator may control the driving apparatus without leaving his position at the hand-wheel.

In Fig. 4 is illustrated a construction and arrangement of the mechanism preferably employed when it is desired to economize space and to bring the several parts in close proximity to each other. In this construction and arrangement separate sets of driving apparatus 100 of any desired character are employed, actuating a drive-shaft 94, carrying a differential gear 95, and a loose spur gear-wheel 115, engaging with a spur gear-wheel 96, upon the turning shaft 97, which is preferably provided with a coupling 98 to throw either driving apparatus out of use, and said shaft carries a spur gear-wheel 99, engaging a loose spur gear-wheel 115^a upon a drive-shaft 102. The shafts 94 and 102 are preferably provided with clutches 101, substantially of the construction before described. The clutch mechanism is preferably operated by a shaft 103, suitably journaled in supports 104, formed on or connected with the platform or framework supporting the parts, said shaft being provided with a hand-wheel 105 and a bevel gear-wheel 106, constructed to engage a similar wheel 107 upon the obliquely-mounted shaft 108, preferably carrying a corresponding wheel 109 upon the other end thereof, engaging a bevel gear-wheel 110 upon a shaft 111, journaled in supports 112

upon the platform. Both of the shafts 108 and 111 are preferably provided with disks 113, having link connection with the clutch-actuating levers constructed to force the clutches 5 101 into engagement with the loose gear-wheels 115 and 115^a, substantially as before described. The turning-shaft 97 is preferably provided with a brake device 116 of the character before stated and with compound gear- 10 ing 117, as heretofore described. A rock-shaft 118, suitably journaled in brackets 119, and carrying a ratchet-lever 120 is connected by a rod or link 121 with the piston-rod 122 of a controlling-valve 123 of the driving appa- 15 ratus 110, and the other end of said rock-shaft is connected to a similar shaft 124, operating the piston-rod 125 of a like valve 126, as before set forth in connection with Figs. 2 and 3 of the drawings.

20 The operation of the invention will be readily understood from the foregoing description when taken in connection with the accompanying drawings and the following explanation thereof.

25 Presuming the movable span to be closed and locked, the operator then turns the hand-wheel 65 to throw the clutches 58 into engagement with the loose gear-wheels 57, thereby rotating the locking-shaft until the indi- 30 cator 81 shows that the movable span is unlocked, whereupon the hand-wheel is again turned, so as to throw the clutches 20 into engagement with loose gear-wheels 19 upon the turning shaft 9, which is then rotated, 35 thereby revolving the bevel gear-wheels 3, carried by said shaft, and the latter wheels drive bevel-wheels 7 upon vertical spindles 6, operating with the fixed master-wheel 4, thereby swinging or drawing said movable span.

40 I do not confine myself to the construction, combination, and arrangement of parts herein shown and described, and I reserve the right to make all such changes in and modifications of the same in practice as come 45 within the spirit and scope of my invention.

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

1. A movable member provided with a turn- 50 ing shaft carrying clutches, a clutch-actuating shaft, levers connected with said member and with said clutches and devices connected with said clutch-actuating shaft and said levers to adjust the throw of said clutches.

2. A movable member provided with a turn- 55 ing shaft carrying clutches, a clutch-actuating shaft having a hand-wheel, and interhinged levers connected with the latter shaft and with said clutches to force the same into engage- ment with a driving apparatus.

60 3. A movable member provided with a turn- ing shaft carrying clutches, a clutch-actuating shaft carrying disks and clutch-levers periph- erally pivoted to said disks and connected with said clutches to force the latter into en- 65 gagement with a driving apparatus.

4. A movable member provided with turn-

ing mechanism carrying clutches, a clutch-actuating shaft, clutch-levers and independ- 70 ent levers connected with the latter and said shaft to operate said clutches.

5. A movable member provided with turn- ing mechanism, carrying clutches, a clutch-actuating shaft, clutch-levers, links between the latter and said member and pivotal con- 75 nections between said levers and a device upon said shaft to operate said clutches.

6. A movable member provided with turn- ing mechanism, carrying clutches, a clutch-actuating shaft, clutch-levers, pivotally con- 80 nected with said member, disks on said shaft and pivotal connections between the latter and said levers to operate said clutches by the rotation of the shaft.

7. A movable member provided with turn- 85 ing mechanism carrying clutches, a clutch-actuating shaft having a hand-wheel, clutch-levers pivotally connected with said member, disks on said shaft and pivotal connection between the latter and said levers to operate 90 said clutches by the rotation of said hand-wheel.

8. A movable member provided with turn- ing mechanism, a brake-wheel carried by the latter, a flexible band operating with said 95 wheel, a curved lever pivotally connected with said member and with the ends of said band, a guide to retain the latter in position, a cylinder and piston, connection between the lat- 100 ter and said lever and means for operating the piston to force said bands upon the wheel.

9. A movable member provided with turn- ing and locking mechanism carrying clutches, a clutch-actuating shaft and adjustable con- 105 nections between said shaft and clutches to regulate the throw of said clutches.

10. A movable member provided with turn- ing mechanism, carrying clutches, a clutch-actuating shaft, clutch-levers movably con- 110 nected with said member and adjustable connections between said levers and shaft to regulate the tension of said clutches.

11. A movable member provided with turn- ing mechanism carrying clutches, levers piv- 115 otally connected with said clutches and member, a clutch-actuating shaft carrying disks and adjustable connections between said le- 120 vers and disks to regulate the tension of said clutches.

12. A movable member provided with turn- 120 ing and locking mechanism having clutches, a clutch-actuating shaft carrying disks, le- vers pivotally connected with said member and engaging said clutches, an adjustable rod connected with said levers and disks and 125 means for rotating said shaft.

13. A movable member provided with turn- ing mechanism, having clutches with recessed hubs, a clutch-actuating shaft carrying disks, 130 levers having link connection with said member and provided with a bifurcated portion engaging said recess, a rod having movable connection with the free end of said levers

and provided with adjustable connection with said disks, whereby the wear of the clutches can be taken up.

14. A movable member provided with a locking-shaft, a sprocket-wheel keyed thereon, an indicator for the locking mechanism carrying a gear-wheel, a sprocket-wheel driven by the former sprocket-wheel and carrying a device to actuate said gear.

15. A movable member provided with a locking-shaft carrying a sprocket-wheel, an indicator-shaft carrying a gear-wheel, a shaft provided with a worm engaging said wheel and having a sprocket-wheel geared to the first sprocket-wheel.

16. A movable member provided with an indicator-frame, a locking-shaft having a sprocket-wheel, an indicator-shaft mounted in said frame carrying a gear-wheel, a shaft carrying a worm engaging said gear and having a sprocket-wheel connected with the first sprocket-wheel.

17. A movable member provided with a turning shaft, carrying a sprocket-wheel, a shaft carrying sprocket-wheels, one having connection with the first-mentioned sprocket-wheel and an indicator having connections with the other of said sprocket-wheels.

18. A movable member provided with a turning shaft, carrying a sprocket-wheel, an independent shaft, having sprocket-wheels, one being connected to said wheel, a worm-shaft provided with a sprocket-wheel connected with the other of said sprocket-wheels and an indicator driven by said worm-shaft.

19. A movable member provided with a turning shaft having a sprocket-wheel, a shaft carrying sprocket-wheels, one being connected to the sprocket-wheel on said turning shaft, a worm-shaft having a sprocket-wheel connected with the other of said sprocket-wheels, and an indicator carrying a gear engaging said worm.

20. A movable member provided with a turning shaft, an indicator-frame, a shaft carrying sprocket-wheels, connections between one end of said shaft and the turning shaft and connections between the other end of said shaft and an indicator mounted in said frame.

21. A movable member provided with turning and locking shafts, driving apparatus carrying propelling differential gears, actuating said shafts, whereby the speed of the latter can be regulated.

22. A movable member provided with a sectional turning shaft having couplings to connect or disconnect either section, each section having gear-wheels, a counter-shaft carrying gear-wheels one whereof is normally out of engagement with the first wheels and means for actuating the parts.

In testimony whereof I have hereunto affixed my signature in presence of two witnesses.

JOSEPH EDWARDS.

Witnesses:

CHARLES S. ROGERS,
M. L. SHAY.