(No Model.) 5 Sheets—Sheet 1.

L. C. CROWELL.

STOP MECHANISM.

No. 404,960. Patented June 11, 1889.

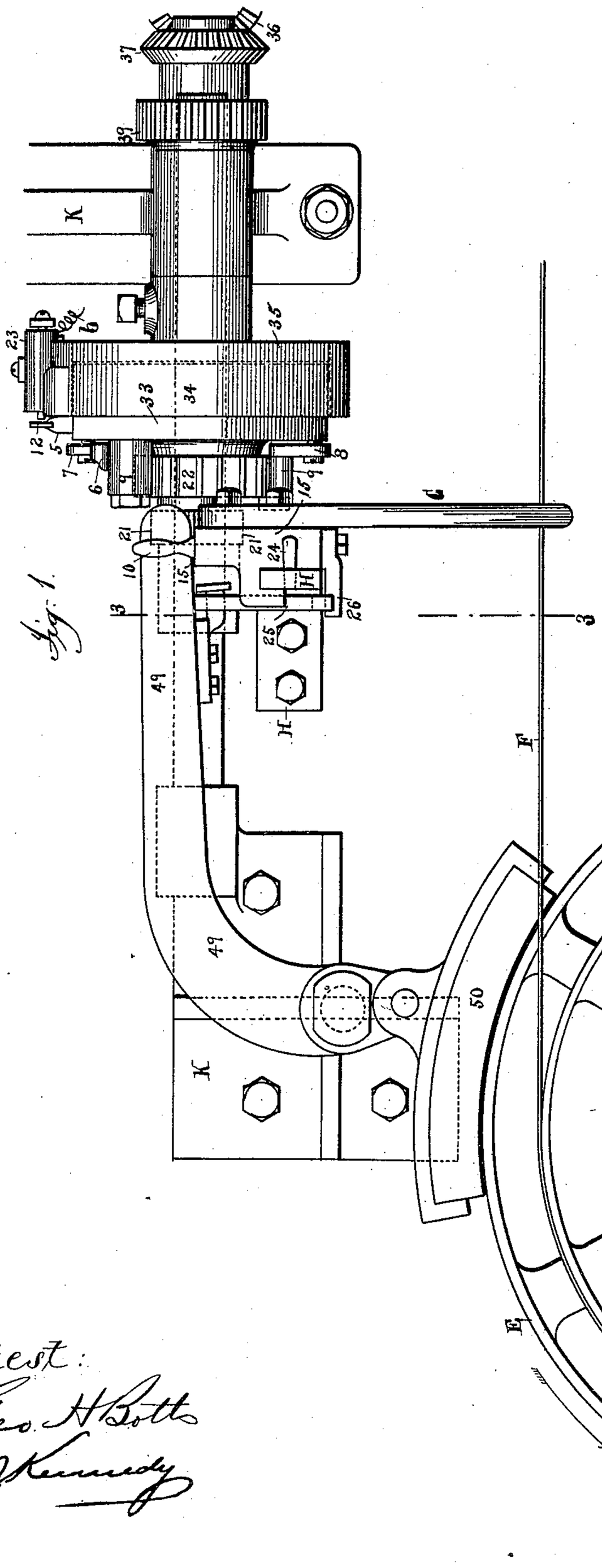

Fig. 1.

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(No Model.) 5 Sheets—Sheet 2.

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STOP MECHANISM.

No. 404,960. Patented June 11, 1889.

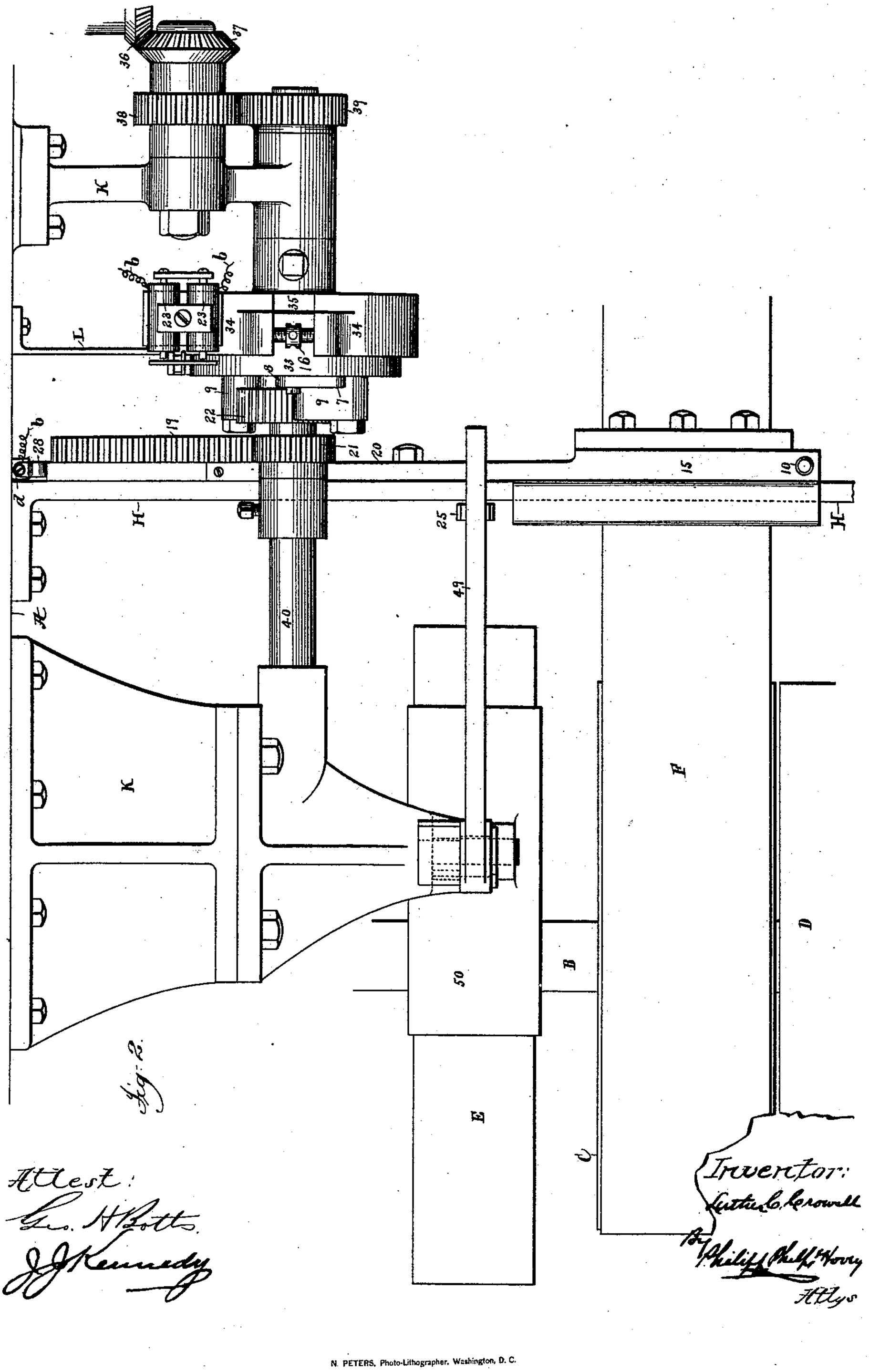

Fig. 2.

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STOP MECHANISM.

No. 404,960. Patented June 11, 1889.

Fig. 3.

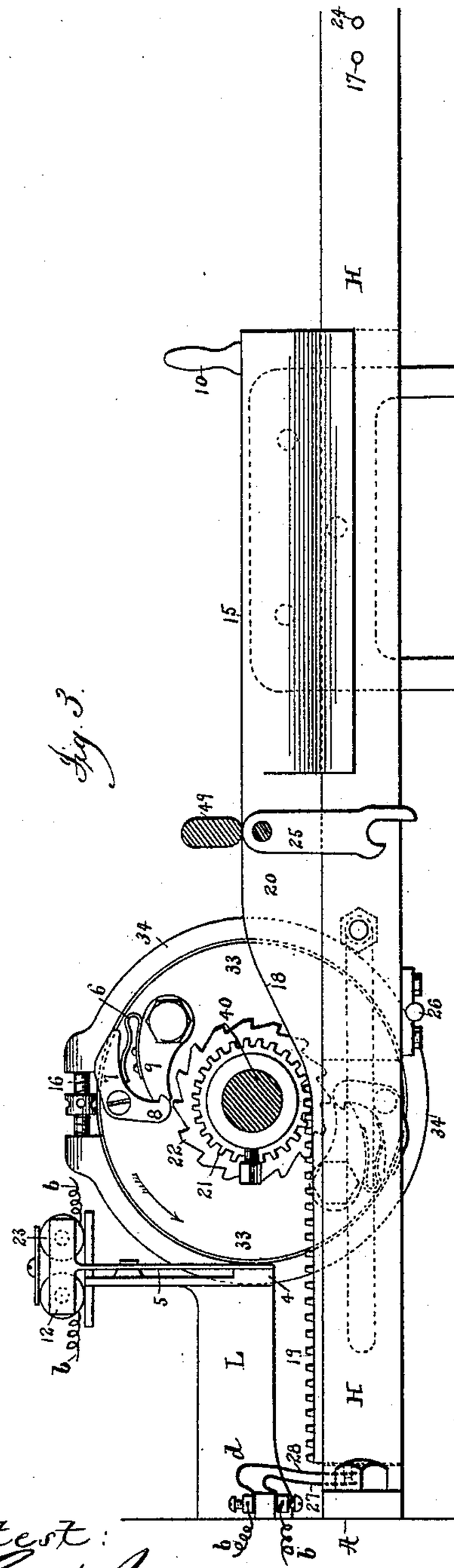
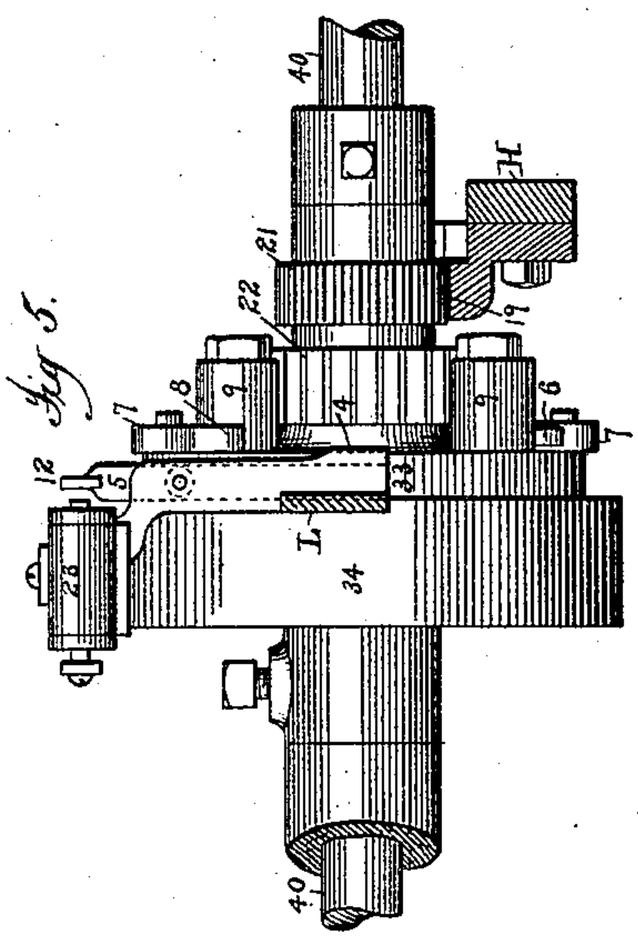


Fig. 5.



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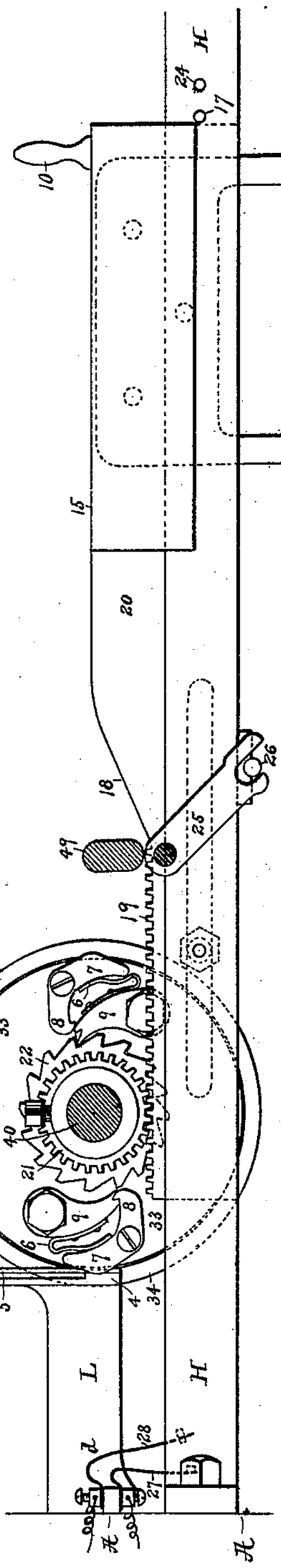
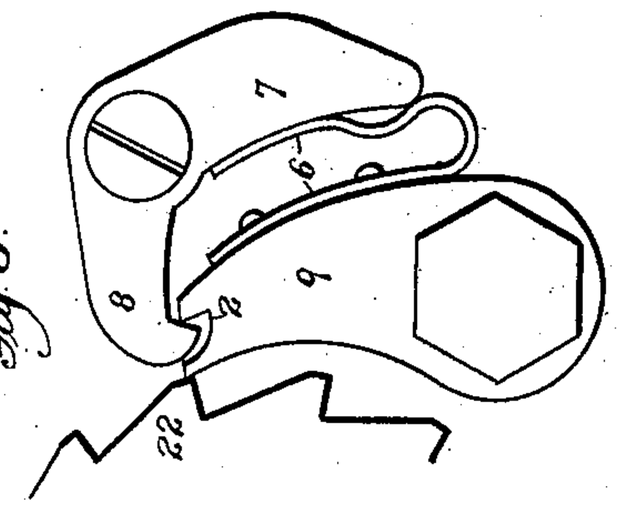
STOP MECHANISM.

No. 404,960. Patented June 11, 1889.





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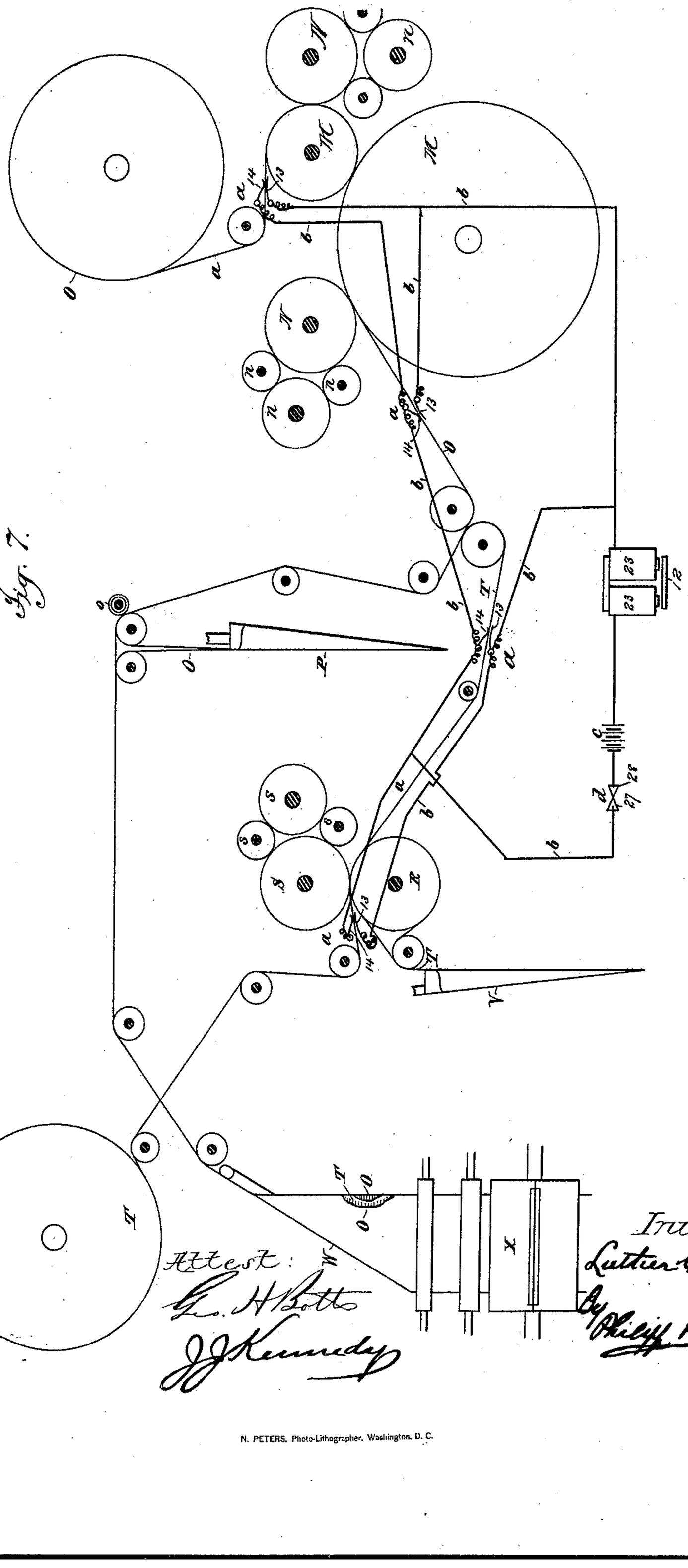
(No Model.) 5 Sheets—Sheet 5.

L. C. CROWELL.

STOP MECHANISM.

No. 404,960. Patented June 11, 1889

Fig. 7.



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UNITED STATES PATENT OFFICE.

LUTHER C. CROWELL, OF BROOKLYN, ASSIGNOR TO R. HOE & CO., OF NEW YORK, N. Y.

STOP MECHANISM.

SPECIFICATION forming part of Letters Patent No. 404,960, dated June 11, 1889.

Original application filed June 22, 1887, Serial No. 242,108. Divided and this application filed December 5, 1888. Serial No. 292,718. (No model.)

To all whom it may concern:

Be it known that I, LUTHER C. CROWELL, a citizen of the United States, residing at Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Stop Mechanism, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to a stop mechanism which is designed for use in connection with various classes of machinery for the purpose of stopping a machine in case the material upon which the machine is operating becomes broken or disarranged in such manner as to make it desirable to stop the machine quickly to prevent a choke or other damage. Examples of machines of this class are web-printing machines, looms, paper-making machines, and various other machines which handle material in a more or less analogous manner. To accomplish this stopping of the machine, I provide the devices which are employed to start and stop the machine—namely, the belt-shifter or other similar device and the brake, if the machine is provided with a brake—with connections by which they can be operated from some moving part of the machine, these connections being controlled by a clutch mechanism, the operation of which is controlled by the position or condition of the material passing through the machine. For this purpose the clutch mechanism is preferably operated by an electro-magnet located in an electric circuit having one or more circuit-closers located in suitable position to be controlled by the position or condition of the material passing through the machine. The clutch mechanism may, however, be controlled by mechanical instead of electrical connections in a similar manner. The organization thus briefly outlined will now be described in detail, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of the stop mechanism embodying the present invention. Fig. 2 is a plan view of the same. Fig. 3 is a sectional elevation taken on the line 3 of Fig. 1. Fig. 4 is a similar view showing the parts in a different position to illustrate the operation of the apparatus. Fig. 5 is an elevation of the clutch mechanism, looking outward from the frame of the machine. Fig. 6 is a detail of the clutch mechanism. Fig. 7 is a diagrammatic view illustrating the application of the invention to a web printing and delivery mechanism.

Referring to said figures, it is to be understood that A represents the side frame of a machine of the character referred to; B, the main driving-shaft of the machine; C D, the usual fast and loose pulleys with which the main shaft is provided; E, the brake-pulley; F, the driving-belt, and G a forked belt-shifter of the usual form.

The belt-shifter G is attached to a head 15, which is arranged to slide freely upon a bar H, projecting from the frame-work A, and is provided with a handle 10, by which the belt-shifter can be operated. The head 15 is provided with an inwardly-extending bar 20, having a rack 19, which engages with a pinion 21, which is mounted to turn freely upon a shaft 40, supported in brackets K, extending from the frame A.

Secured to the side of the pinion 21, or made integral therewith, is a ratchet 22, which is of somewhat larger size than the pinion.

The shaft 40 is provided with a gear 39, which engages with a gear 38, mounted on a stud extending from the bracket K and connected to a beveled gear 37, which in turn engages with a similar gear 36, mounted upon a shaft, which is driven from the machine in such manner as to constantly drive the shaft 40 when the machine is in operation. The shaft 40, in addition to the loose pinion 21 and ratchet 22, is provided with a disk 35, which is fixed to the shaft and carries a friction-band 34, inside of which is arranged a disk 33, which is loose upon the shaft. The friction-band 34 is provided with an adjusting-screw 16, by which it can be tightened onto the disk 33, so as to cause the latter to turn with the shaft 40 until sufficient resistance is offered to overcome the friction of the band 34. The disk 33 is provided upon its face with one or more pawls 9, which are so arranged that when they are permitted to do so they engage with the ratchet 22, and thus impart

the motion of the shaft 40 and disk 33 to the ratchet and the pinion 21, and thence to the rack 19 and the belt-shifter.

The pawls 9 are provided at their ends with recesses 2, (see Fig. 6,) which are engaged by the hooked ends of catches 8, which are also pivoted upon the face of the disk 33 in such manner as to normally hold the pawls 9 out of engagement with the ratchet 22, as shown in Fig. 3, and the catches 8 are provided with tail-pieces 7, which project outward slightly, and between which and the pawls are arranged springs 6, which perform the double function of holding the catches in engagement with the recesses 2 in the ends of the pawls, and also of throwing the pawls into engagement with the ratchet 22 whenever they are released from the catches.

Located at one side of the disk 33 is a lever 5, which is pivoted upon a bracket L in such position that its lower end normally lies out of the path of the tail-pieces 7 of the catches 8, as they are carried around by the disk 33 in its revolution with the shaft 40. The lever 5 is so positioned, however, that by being rocked slightly on its pivot its lower end will be thrown into the path of the tail-pieces 7 and thus rock the catches 8, so as to cause them to release the pawls 9 and allow the latter to engage with the ratchet 22. In order to prevent the lever 5 from being sprung or bent as it is struck by the tail-pieces 7, its lower end is arranged to move along and be supported by a projection 4 of the bracket L.

The operation of the mechanism as thus far described is as follows: In describing this operation it will be assumed that the pawls 9 have been disconnected from the ratchet 22 and are held in their disconnected position by the catches 8, as shown in Fig. 3. So long as the lever 5 remains in its normal position, as shown in Fig. 5, the catches 8 will continue to hold the pawls out of engagement with the ratchet 22, so that the motion imparted to the shaft 40 through its connections with the machine, which have been described, will revolve the disk 33 and the pawls 9 without imparting any motion to the ratchet 22, and as a consequence the rack 19 and the belt-shifter will not be operated and the belt F will remain upon the fast pulley, so as to drive the machine. As soon, however, as the lever 5 is rocked so as to bring its lower end into the path of the tail-pieces 7, the first one of these tail-pieces which arrives opposite tbe lever will engage with the lever, so as to be rocked inward, and thereby disengage the catch 8 from the recess in the end of the pawl 9. As soon as this takes place the pawl will be acted upon by the spring 6, so as to be thrown into engagement with the ratchet 22, and thus lock the ratchet to the disk and cause the pinion 21 to revolve with the shaft 40, and the motion thus imparted to the pinion will, through the rack 19, move the bar 20 and the belt-shifter, so as to shift the belt F from the fast pulley C to the loose pulley D and remove the power from the machine, as shown in Fig. 4. As soon as the belt has been fully shifted onto the loose pulley the belt-shifter will be arrested by its head 15 coming into contact with a pin or other stop 17, projecting from the bar H, as also shown in Fig. 4. As soon as the belt-shifter is thus arrested it will overcome the friction between the disk 33 and the band 34 and permit the band to move around the disk, and thus avoid danger of breaking the parts in case the machine should not come to rest by the time the belt has been entirely shifted onto the loose pulley.

The lever 5 may be operated in any suitable manner, either by hand or mechanical connections; but as the apparatus which has been described is especially designed for operating automatically to stop the machine in case it becomes broken or disarranged or fails to operate properly, or in case the material upon which it operates fails to move through the machine in proper position or in the proper condition, the lever 5 will in practice be provided with some suitable form of connections by which it will be automatically operated from the machine whenever the conditions exist which make it desirable to stop the machine. Such connections may be mechanical, but they will preferably be electrical, and for this purpose the upper end of the lever is herein shown as provided with a cross-head 12, which forms the armature of an electro-magnet 23, which is so arranged that when energized or de-energized, according as the circuit in which it is located is a normally-open or a normally-closed circuit, it will move the armature 12 and thus rock the lever 5, so as to carry its lower end into the path of the tail-pieces 7 of the catches 8. This magnet is included in an electric circuit *b*, which will be provided with a suitable circuit closer or closers located at any suitable point or points in the machine, so as to be operated either to close or break the circuit upon the happening of the conditions which make it desirable to operate the lever 5, as before explained. Such electrical connections or other connections for operating the lever 5 form no part of the present invention; but for the purpose of a more ready understanding of the application of the invention the manner in which it may be applied to a web-printing machine is herein illustrated. Referring now to Fig. 7, such application will be explained.

The particular form of web printing and delivery mechanism which has been selected for the purpose of illustration is substantially that shown in United States Letters Patent No. 325,197, heretofore granted to me. It is to be understood, however, that the apparatus is equally applicable to other forms of web printing and delivery mechanism and to machines of the general class heretofore referred to, as will be readily understood from the following description.

In the diagram given, M represents the impression-cylinders, N the form-cylinders, and

n the inking mechanism for the main printing-machine.

O represents the main web, *o* the slitter by which the main web is divided, and P the web-turners by which the sections of the main web are associated.

R represents the single-impression cylinder, S the single-form cylinder, and *s* the inking mechanism of the supplement-printing machine.

T represents the supplement-web, which is one-half the width of the main web, and V the web-turners by which the supplement-web is transferred laterally and turned over after it is printed on one side, so as to be represented to the same cylinders to be printed on its other side.

W represents the longitudinal folder by which the two sections of the main web and the supplement-web, after being associated, are folded longitudinally, and X the cutting and folding cylinders by which the associated and longitudinally-folded webs are severed into sheets and the sheets folded transversely preparatory to being finally delivered from the machine.

Located at suitable points in the paths of the webs through the machine where the webs are most likely to become broken are a number of circuit-closers *a*, which consist of fixed contact-points 13, located upon one side of the web and just out of contact therewith, and light spring contact-points 14, located upon the other side of the web, arranged to bear gently upon the web, so that as long as the web is unbroken the two contact-points of the circuit-closers are kept apart; but whenever the web becomes broken at any point where one of these circuit-closers is located the two contact-points will immediately come together, and thus close the circuit at that point. These contact-points 13 14 are connected by wires *b* with a suitable battery *c*, and with the electro-magnet 23, as indicated, so that whenever the two points forming any one of the circuit-closers are permitted to come together a circuit will be closed through the magnet, and it will be energized and rock the lever 5 with the effect before explained. The points indicated in the diagram for the location of the circuit-closers are purely arbitrary, and have been selected merely for the purpose of illustration. The circuit-closers can be located at any points, and there can be a greater or less number of them, according to the requirements of the particular machine to which the apparatus is applied.

As many of the machines to which it is desirable to apply an automatic stop mechanism of the character herein shown are very heavy and acquire great momentum, so that they will continue to run for a considerable time after the belt has been shifted onto the loose pulley unless some special resistance is offered, it is desirable, in order to bring the machine to rest quickly, to provide a brake mechanism which shall be applied at the same time the belt is shifted. For this purpose a brake mechanism is provided which is automatically applied at the same time the belt is shifted. This mechanism consists of the brake-pulley E, which is provided with a brake-shoe 50, which is pivoted to the short arm of a lever 49, the long arm of which rests upon the upper edge of the bar 20 of the belt-shifter. The bar 20 is so formed that when the belt-shifter is in its normal position—that is to say, when the belt is on the fast pulley—the long arm of the lever 49 will be raised, so as to hold the shoe 50 out of contact with the brake-pulley, as indicated in Fig. 1. The bar 20 is, however, provided with an incline 18, which, as the bar is moved outward to shift the belt onto the loose pulley, permits the long arm of the lever 49 to drop, so as to lower the shoe 50 onto the pulley E, and the shoe 50 and the fulcrum of the lever 49 are so positioned with relation to each other and to the pulley that as soon as the shoe is applied to the pulley the further movement of the pulley tends to increase the pressure of the shoe and make the brake more effective. Whenever the clutch mechanism has been operated to shift the belt and apply the brake, as has been explained, it is of course necessary before again starting the machine to disengage the pawl 9 from the ratchet 22 and restore it to its normal position. To effect this, the pin or stop 17 is made removable from the bar H, and the bar is provided with a second pin or stop 24, located outward from the stop 17 a distance equal to the distance between two of the teeth of the ratchet 22. When, therefore, it is desired to disengage the pawl from the ratchet, it is only necessary to remove the pin or stop 17 and move the belt-shifter outward, which can readily be done by grasping the handle 10 against the stop 24. This will, through the rack 19, revolve the ratchet a distance equal to the length of one of its teeth, so as to bring the pawl 9 onto the crown of the tooth next in the rear of the one with which it is in engagement, and when it is in this position it will be caught by the catch 8 and retained so that the belt-shifter and the bar 20 can then be moved freely inward. The recesses 2 in the ends of the pawls 9 are inclined, as best shown in Fig. 6, so that as soon as the catches 8 are fairly entered into the recesses the tension of the springs 6 will force them farther in and thus raise the pawls slightly away from the teeth of the ratchet. It is also necessary before commencing to shift the belt back onto the fast-pulley in order to start the machine, to raise the shoe 50 away from the brake-pulley. The incline 18 cannot be depended upon for this purpose, because it would not act to rock the lever 49 until after the belt had been shifted a considerable part of the required distance. The bar 20 is provided upon its under edge with a stud 26, which, as the bar is moved outward to shift the belt onto the loose pulley, engages with a pivoted dog 25, depending from

the under side of the lever 49, and rocks said dog to the position shown in Fig. 4. Whenever, therefore, the bar 20 and belt-shifter are moved inward, the stud 26 engages with the recess formed in the end of the dog and acts to raise the lever abruptly, so as to raise the shoe 50 from the pulley E. As the bar 20 and belt-shifter are moved inward to their extreme position, the stud 26 is carried so far inward as to pass out of the recess in the end of the dog and permit the latter to spring backward to its normal position, as shown in Fig. 3.

It will usually be desirable that the automatic stopping mechanism herein described should not be capable of operating except when the machine to which it is applied has attained its full speed, or, in other words, until the belt has been entirely shifted onto the fast-pulley. For this purpose the circuit in which the magnet 23 is located is provided with a circuit-closer *d*, consisting of two contact-points 27 28, formed of spring-arms and located in such position that the two points will be brought together, so as to close the circuit by the bar 20 when the latter is moved inward to its extreme position. From this it will be seen that whenever the belt is on the loose pulley or not fully onto the fast pulley, as will be the case when the machine is at rest or is being operated slowly, as in starting, the circuit through the magnet 23 will be broken, so that the clutch mechanism will not be operated by the lever 5, and the circuit will only be closed when the belt is fully shifted onto the fast pulley so as to operate the machine at full speed.

Although the automatic stop mechanism is herein shown as applied to a machine in which the starting and stopping is effected by shifting the driving-belt from a fast to a loose pulley, and vice versa, it can be applied equally well to those machines where the starting and stopping is effected by other forms of mechanism.

This application is a division of that filed by me June 22, 1887, Serial No. 242,108.

What I claim is—

1. The combination, with the driving-shaft B and the driven shaft 40, of the disk 33, driven by the shaft 40 through a yielding frictional connection, the pinion 21 and mechanism connected therewith for controlling the stopping and starting of the driving-shaft, and a clutch mechanism for connecting the pinion 21 to the disk 33, substantially as described.

2. The combination, with the driving-shaft B and the driven shaft 40, of the disk 33, driven by the shaft 40 through a yielding frictional connection, the pinion 21 and mechanism connected therewith for controlling the stopping and starting of the driving-shaft, a pawl-and-ratchet clutch mechanism for connecting said disk and pinion, and a lever 5 for controlling said pawl-and-ratchet clutch mechanism, substantially as described.

3. The combination, with the driving-shaft B and the driven shaft 40, of the disk 33, driven by the shaft 40 through a yielding frictional connection, the pinion 21 and mechanism connected therewith for controlling the stopping and starting of the driving-shaft, a pawl-and-ratchet clutch mechanism for connecting said disk and pinion, a lever 5 for controlling said pawl-and-ratchet clutch mechanism, and an electro-magnet for controlling said lever, substantially as described.

4. The combination, with the driving-shaft B and a belt-shifter for applying power to and removing it from said shaft, and a brake for stopping said shaft, of the driven shaft 40, the disk 33, driven by said shaft 40 through a yielding frictional connection, the pinion 21, and a clutch mechanism for connecting said pinion and disk, and a rack-bar operated by said pinion to control said belt-shifter and brake, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

LUTHER C. CROWELL.

Witnesses:
J. J. KENNEDY,
GEORGE H. BOTTS.