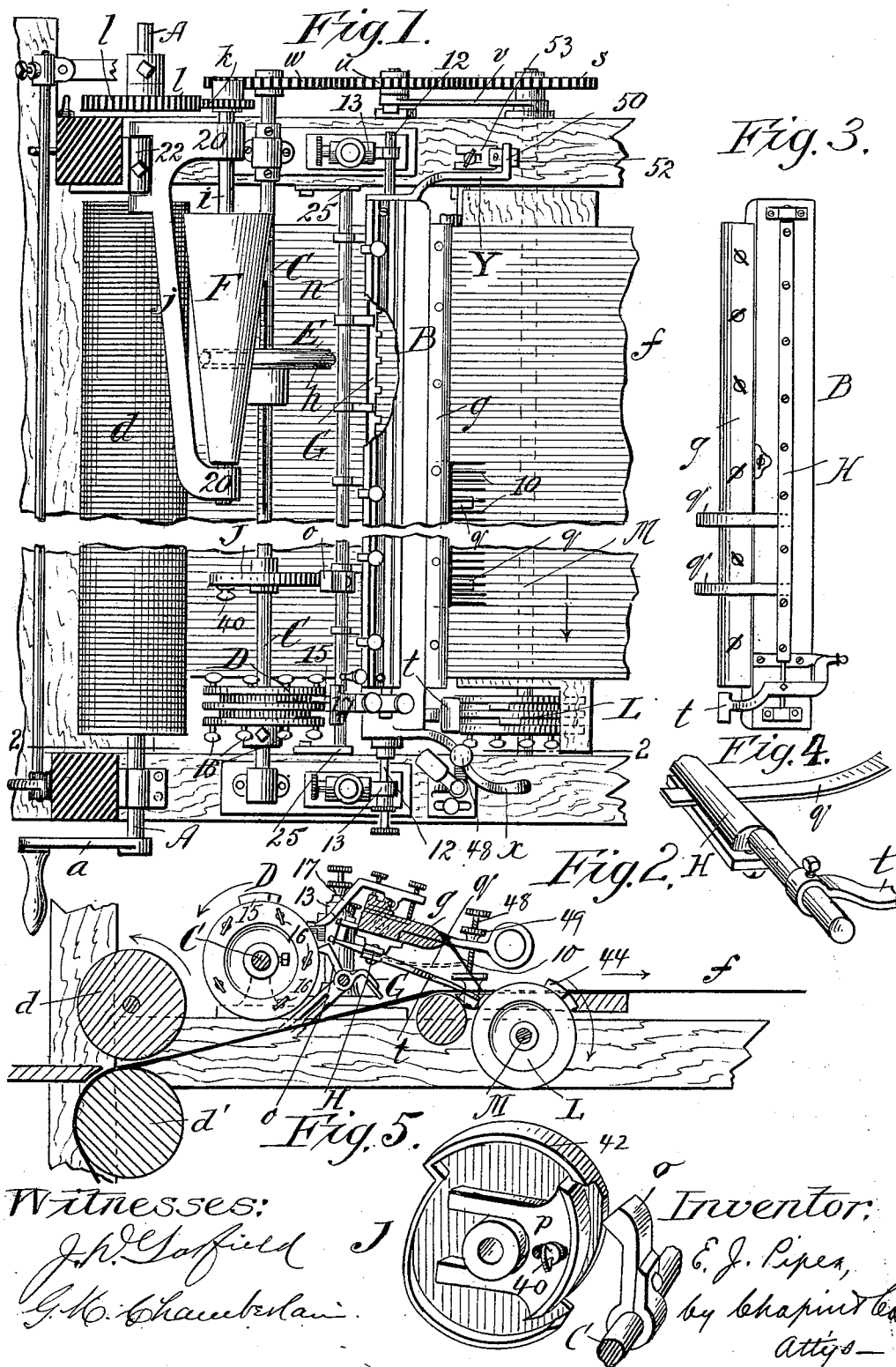


E. J. PIPER.
PAPER RULING MACHINE.

No. 461,642.

Patented Oct. 20, 1891.



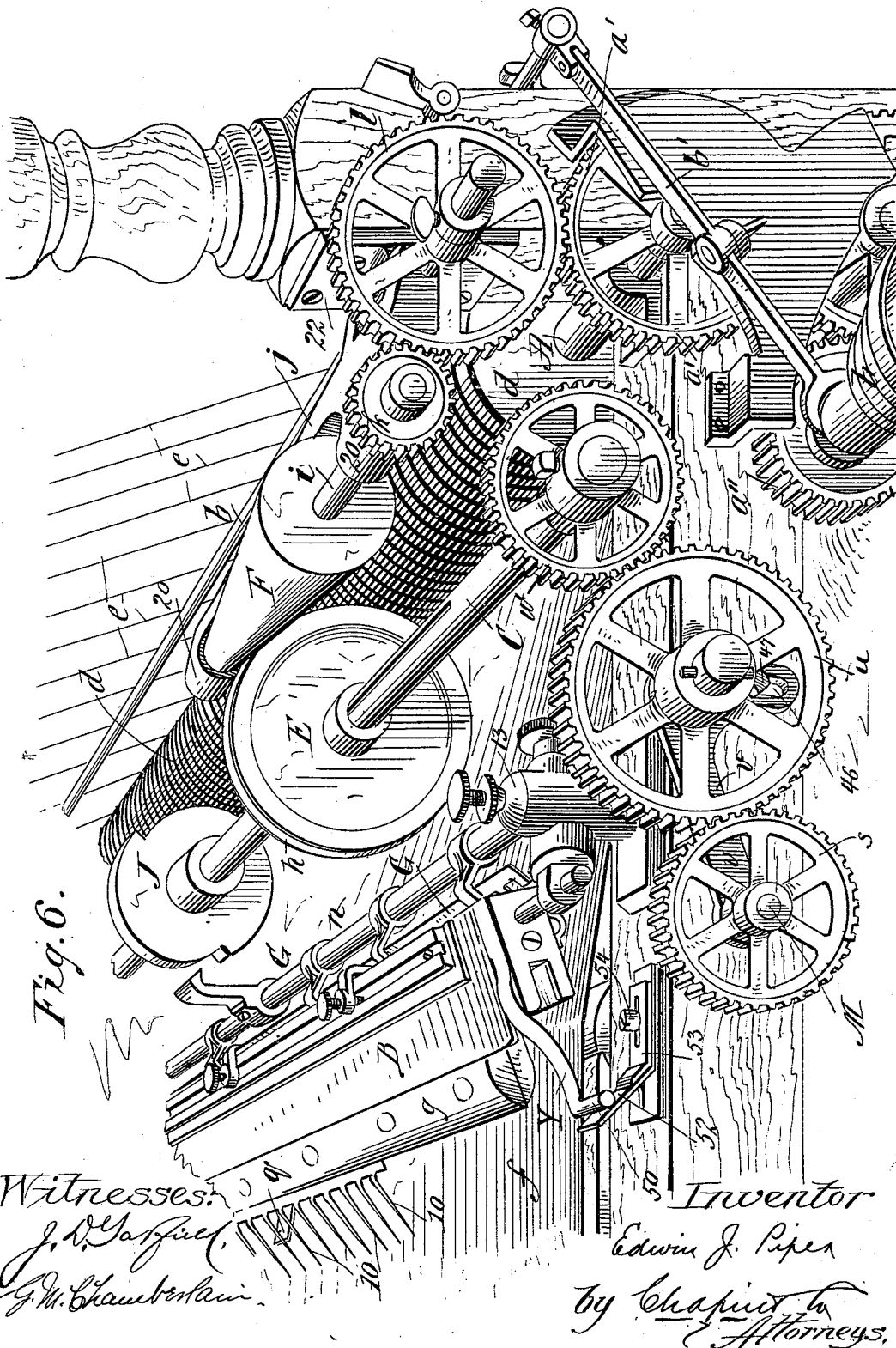
(No Model.)

2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

EDWIN J. PIPER, OF SPRINGFIELD, MASSACHUSETTS.

PAPER-RULING MACHINE.

SPECIFICATION forming part of Letters Patent No. 461,642, dated October 20, 1891.

Application filed April 11, 1891. Serial No. 388,548. (No model.)

To all whom it may concern:

Be it known that I, EDWIN J. PIPER, a citizen of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Paper-Ruling Machines, of which the following is a specification.

This invention has for its object the improvement of machines for ruling paper, the improvements particularly relating to the construction and arrangement of and means for operating the pen-beam, the gate or lap insuring devices, the under-lift devices, and to the organization of the machine, whereby the same may perform work of various natures and classes. For instance, the machine may be run for plain or continuous ruling, portions of the sheets may be left plain or unrulled to constitute headings, and this may be secured by the usual method of lapping effected by the operation of the gate, the pen-beam remaining always down, or such headings may be secured without lapping by the co-operation of the gate with the pen-beam and its striker or swinging device, and under any method of working during the running of the machine any one or more of the series or gang of pens employed may be lifted from its ruling contact independently of the other pens of the series, which continue or remain in their working contact with the paper thereunder, said pen or pens so independently lifted being upheld during any desired portion of the period consumed in the passage under the pen-bar of the paper sheet. Headings may be formed on the sheets of any desired length by the automatic mechanism employed, which may comprise any portion of the length of such sheets.

The invention, to the ends above indicated, consists in the construction and combination of parts, all substantially as will hereinafter more fully appear, and be set forth in the claims.

In the drawings, Figure 1 is a plan view of the end portion of the machine at which the novel parts and devices are located, some parts being shown as broken away or removed for better illustration. Fig. 2 is a sectional elevation taken on the line 2 2, Fig. 1. Fig. 3 is an under side view of the pen-beam, showing the under-lift mechanism mounted there-

on, Fig. 4 being a perspective view of portions of the latter. Fig. 5 represents in perspective a cam-disk and rocker-arm coacting therewith, which parts form the operating mechanism for the gate or lapper. Fig. 6 is a perspective view of the principal mechanisms embodying my invention as seen from what is relatively the rear of the machine as shown in Fig. 1.

Similar characters of reference indicate corresponding parts in all the views.

A represents a main shaft, to which a crank-arm *a* is applied for convenience in rotating it, although, as will be clearly seen in Fig. 6, the said shaft may be driven through the gearing *a'* and *a''* from a counter-shaft having thereon the cone-pulley *b*. A shipper rod and lever *b'* is provided relative to the cone-pulley or the part rotatable therewith for throwing on and off the power in a usual manner, and of course where the machine is to be employed extensively it is to be power-driven instead of driven through the crank-arm by hand.

There is mounted on the shaft A the drum *d*, around which the carrier-cords *e* pass in a manner common in ruling-machines, the said cords being otherwise and furthermore supported and guided as usual, and inasmuch as there is no innovation respecting the arrangement and functions of the carrier-cords the same are merely partially and incidentally shown in Fig. 6, such cords being omitted from Figs. 1 and 2 for the purpose of insuring greater perspicuity in the illustration of the novel devices, and below the said drum *d* there is another drum *d'*, which serves in part to support the carrier-apron *f*, the same being further supported by other rolls, and has a progressive movement as the machine runs, the said movement being imparted thereto in any of the well-known ways practiced in the art of paper-ruling.

B represents the pen-beam, which comprises the clamp *g* for the pens 10, said beam being mounted by the journal-studs 12 upon the suitably-formed uprights 13 13 of the main frame of the machine, and C represents a horizontal shaft suitably mounted and carrying thereon the striker D for the pen-beam, which striker consists of a disk peripherally grooved, receiving therein segmental pieces

15, which are held in place by the clamp-screws 16, and which segmental pieces extend beyond the periphery of the said disk, acting as a wiper-cam upon the arm 17, which is affixed to and suitably extended from the pen-beam. The pen-beam normally remains so as to present its pens to contact with the supporting-surface thereunder—the apron *f* or other means as employed—and the pen-beam is periodically lifted by the striker and remains so lifted for a longer or shorter time, according as the peripheral face of the striker-segment 15 is longer or shorter. Several and interchangeable segments are to be provided for the machine, so that under different circumstances the pen-beam may be sustained to hold the pens free from their working contact with the paper for longer or shorter periods. The said shaft C has thereon a friction-disk E, which is adapted to rotate as one with the shaft at all times, but to be movable longitudinally thereon, being preferably splined on the shaft. The said disk E is peripherally provided with rubber, as indicated at *h*, and at all times has a bearing upon the cone F, which is carried on the arbor or counter-shaft *i*, that is mounted for rotation in the arms 20 20 of a holder *j*, which is pivotally mounted on the supporting-lug 22, secured on the main frame, so that the said holder *j* and cone-roller F thereon may swing in a vertical plane to rise or fall, according as the friction-disk E is slid. The rubber *h* is in the form of a gasket partially let into an annular depression in the edge of the roll and capable of a compression, so that the true and reliable surfaces of the disk and cone may come to positive contact for the utmost accuracy, the rubber at such place of contact yielding sufficiently and at the same time affording, practically, a friction-bearing between the said parts. The said arbor *i* for the cone-roller has thereon a gear *k*, which is in mesh with the idler-gear *l*, that is intermediate of gear *k* and gear *a'*, which is on what has been termed the "main shaft."

G represents the lapper-gate, which is mounted on a horizontal shaft or beam *n*, that is supported in bearings 25 of the frame of the machine, and the said lapper-gate has the arm *o*, with which the striker-cam J has an impingement as the said shaft C rotates. The only novelty in the gate or lapper mechanism is that which pertains to the devices for securing the periodical swinging of the same, which are substantially the same as the devices for actuating the pen-beam—that is to say, there is on the shaft C striker devices for swinging the pen-beam and the gate which are not deemed particularly novel so far as this invention is concerned; but the novelty consists in the peculiar combination and arrangement of the friction-disk E and the cone-roller F. It will be seen that during any given amount of travel of the carriers for the paper the shaft C may be rotated more or less, according as the friction-disk E

is in contact with a portion of the cone-roller having a greater or smaller diameter. If, as shown in Fig. 5, the friction-disk is slid to have a bearing upon the smaller end of the cone-roller, the shaft C in a given time has a comparatively slight rotational movement, and a long portion of a sheet being ruled may be caused to travel under the pens before the pen-beam will be lifted to make a break for the heading, and as the rotation of the shaft C affects the gate, as plain, the results in ruling incidental to a comparatively infrequent lifting or lowering of said gate are, as will be plain, attained.

It is not to be understood that at this time it is new to employ cone-rollers for actuating and effecting the periodicity of movements of the pen-beam and the gate, for in Letters Patent of the United States issued to me July 2, 1878, No. 205,502, a mechanism broadly of this character is illustrated, described, and claimed; but it will be noticed that in the present contrivance the same is very much simplified, a single cone-roller being sufficient for securing the variable action on the shaft C through the friction-disk, which has the sliding movement relative to the cone-roller. The cone-roller being mounted on a holder *j*, which swings from the center that is coincident with the center of the gear that meshes with the gear *k* on the cone-arbor *i*, may be moved to accommodate the cone-periphery to the position of the friction-disk E without throwing the cone out of its driving-engagement with the gear *l*, and thus a single cone may directly affect the speed of the striker-shaft in lieu of two cones, as heretofore. The striker-cam *j*, as indicated in Fig. 5, has a portion of its periphery constituted by the movable piece *p*, which by the set-screw may be retained either in a position to form a full and continuous portion of the cam-rim 42 or by being set in to form an extra break therein, and thereby provide a striker adapted on one rotation of shaft C to secure two different depressions or closings of the gate.

The under-lift mechanism will be now described.

H represents a bar, which by its ends is journaled to rock upon the under side of the pen-beam B, the said rock-bar being formed in separable members or otherwise, as common or desirable, to constitute a clamp for arms *q*, more or less, as it is found desirable to employ, and which arms are removable at will. While the pen-beam is down and ruling, should the rocker-bar H be swung, such of the arms *q* thereon as are under and adapted to engage pens 10 of the series mounted on the pen-beam will lift such adjacent pens and for the time being render them inoperative and occasion breaks by them in the lines of ruling corresponding thereto.

L represents a striker-cam, which is similar to the one D for the pen-beam B, and this striker is mounted upon the transverse horizontal shaft M, which is adapted through suit-

able gearing or driving connections to be rotated as the shaft C is rotated or at will to remain as a fixed shaft and without effect upon the under lift. As the striker L rotates the extended segmental portion 44 thereof strikes the arm *t*, which is secured to the said rocker-bar H.

As shown, the shaft M for actuating the under lift has a gear *s* thereon, with which engages another gear *u*, that is carried on the end of a radius-bar *v*, that has a pivotal connection coincident with the axis of said shaft M. The said gear *u* will, no matter in what manner the radius-bar may be swung, always be in mesh with the said gear *s* on shaft M; but it may or it may not be in mesh with the gear *w*, which is on the end of the striker-shaft C. If the radius-bar is upwardly swung, as shown in Fig. 6, so that the gear *u* acts as an intermediate between and in mesh with gears *w* and *s*, the under-lift mechanism may be operated in conjunction with either the pen-beam, which may constantly remain downwardly swung or which may have the periodical lifting movement, and with the gate, and of course if the said radius-bar is downwardly swung from the position shown in Fig. 6 the gear *u* will cease to act as a medium for imparting rotation from the shaft C to the shaft M, and of course the operation of the said shaft C will be independent of the under-lift-actuating shaft. The radius-bar at its ends is provided with the curved slot 46, through which passes a bolt 47, that is supported on the main frame of the machine or fixture thereof, and which bolt by its head may be set against the face of the radius-bar to confine it for retaining the gear *u* in mesh with the one *w*.

The pen-beam has at its one end an arm *x*, through which passes a screw 48, which has a lock-nut 49 thereon, and the bottom of the said screw is adapted to rest upon a suitable part of or fixture of the machine-frame and to form the limiting-abutment for the downward swing of the pen-beam. By turning the screw the said abutment may be adjusted so that the beam may be downwardly swung more or less, in accordance with the length and nature of the ruling-pens employed and of the contact desired. The pen-beam B at its other end is provided with an arm Y, which by its extremity 50, suitably formed or extended, has an impingement upon an inclined spring 52 as the pen-beam descends, the said spring acting to cushion the beam, so that the pen-points will not be thrust hard upon the paper being ruled, but will be presented thereupon with an easy contact, as plain. The spring 52 is provided with a slotted foot-piece 53, held in place by the set-screw 54, so that the said spring may be adjusted as well as and in conjunction with the abutment member or screw 48.

What I claim as my invention is—

1. In a paper-ruling machine, the combination, with a striker-shaft which is provided to coact with a tilting device of the machine, as the pen-beam or lapper-gate, of a counter-shaft or arbor ranged alongside of said striker-shaft, one of said shafts having a cone-roller thereon and the other a friction-disk, and one shaft movably mounted, so that the friction-disk, while always in peripheral engagement with the cone-roller, may assumed different positions with relation to the length thereof, and means for rotating the roller, which is on the counter-shaft, for the purpose set forth.

2. In a paper-ruling machine, the combination, with a striker-shaft and with a tilting device of the machine, such as the pen-beam or lapper-gate, said shaft and tilting device being provided with coacting and interengaging mechanism, whereby from the rotation of the shaft the said tilting device will be swung, of a counter-shaft or arbor ranged alongside of said striker-shaft, and a holder pivotally mounted and adapted to be swung to present the said counter-shaft nearer to or farther from the striker-shaft, a cone-roller on one of said shafts and a friction-disk on the other, and one of said parts being movable with relation to the shaft on which it is carried, and means for rotating the roller which is on the counter-shaft, for the purpose set forth.

3. In a paper-ruling machine, the combination, with a striker-shaft provided with a friction-disk E, movable longitudinally thereon, of a counter-shaft provided with a cone-roller, which shaft is mounted alongside of said striker-shaft upon a holder *j*, pivotally connected to a suitable support therefor, the gear *k* on the counter-shaft, and a gear *l*, with which said gear meshes, which is axially coincident with the center of swinging motion for said carrier, and means for imparting motion to said gear *l*, substantially as set forth.

4. In a paper-ruling machine, the combination, with the pen-beam and with a striker-shaft having thereon a friction-disk E, and a cone-roller mounted and movable relative to the said friction-disk, substantially as described, of an under-lift mechanism and a shaft M and striker therefor, and gearing between the said first striker-shaft and the striker-shaft for the under lift, substantially as and for the purpose described.

5. In a paper-ruling machine, the combination, with the gate having an arm *o* thereon, of a striker-cam having a concentric rim and a break therein, a portion of which rim is constituted by a movable piece *p*, which is adapted to be receded to constitute an extra break, and a securing device for confining the said movable piece in position, substantially as and for the purposes set forth.

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