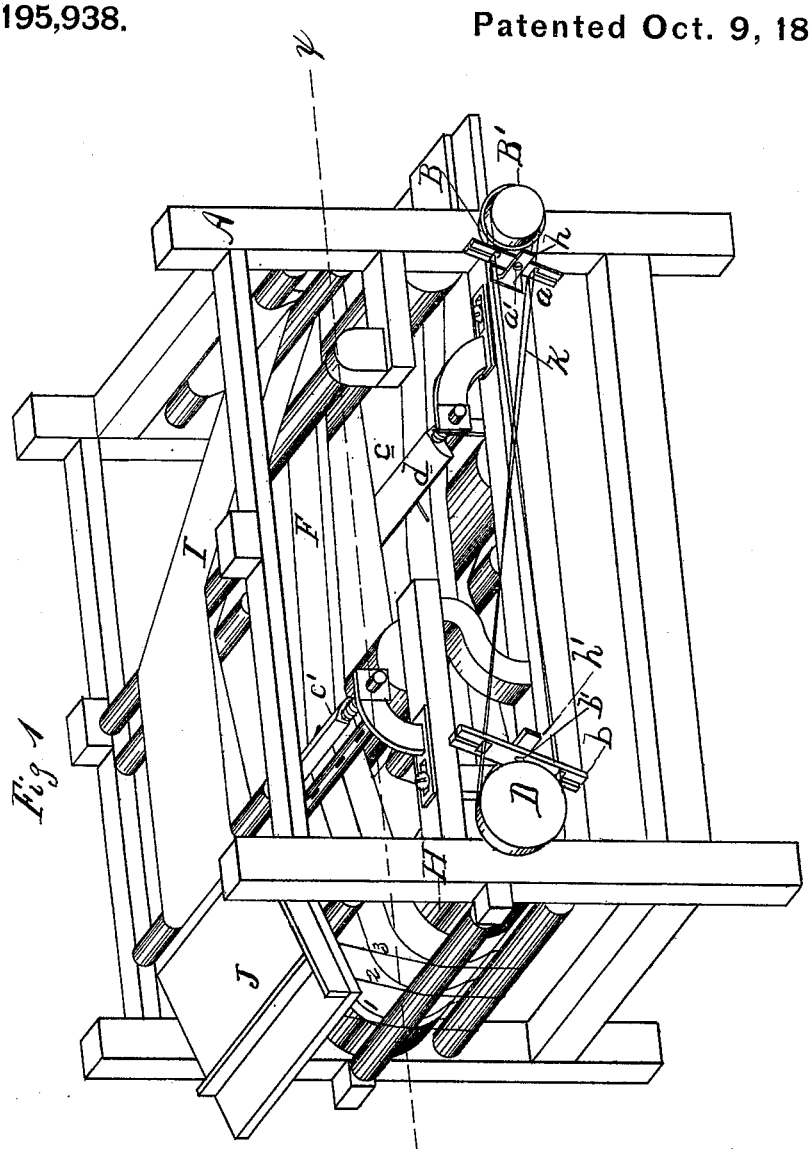
2 Sheets—Sheet 1.

J. T. F. MacDONNELL.

Paper-Ruling Machines.

No. 195,938. Patented Oct. 9, 1877.



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2 Sheets—Sheet 2.

J. T. F. MacDONNELL.

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Fig 3

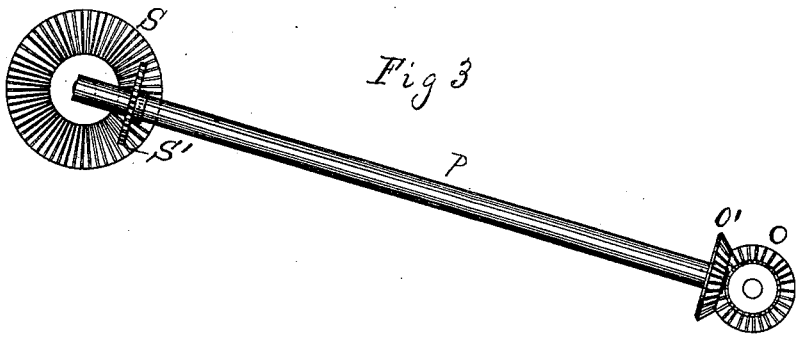
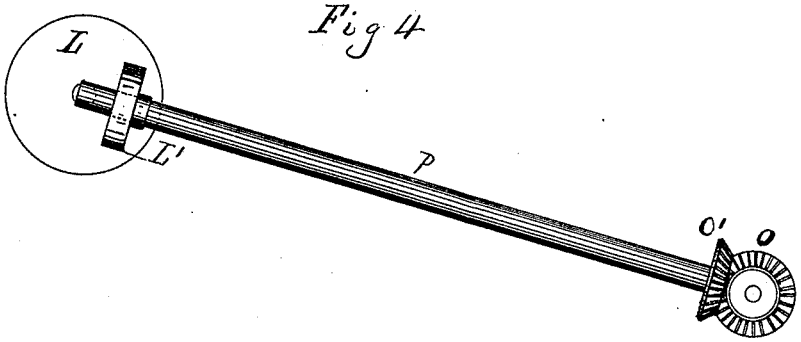


Fig 4



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UNITED STATES PATENT OFFICE.

JOHN T. F. MACDONNELL, OF HOLYOKE, MASSACHUSETTS.

IMPROVEMENT IN PAPER-RULING MACHINES.

Specification forming part of Letters Patent No. **195,938**, dated October 9, 1877; application filed June 15, 1877.

To all whom it may concern:

Be it known that I, JOHN T. F. MACDONNELL, of Holyoke, county of Hampden, and State of Massachusetts, have invented new and useful Improvements in Double Paper-Ruling Machines with Double Strikers, which improvements are fully set forth in the annexed specification, and in the accompanying drawings.

In the drawings, Figure 1 is a perspective view of my machine, in which A is the frame thereof. B B′ is a double pulley on the end of the shaft on which the main driving-roller of the lower division of the machine is fixed.

Motion is transmitted to the machine by a belt running upon the portion, B, of this pulley next to frame A. The outer portion B′ of this pulley is turned slightly conical. *a* is a belt-guide, adjustable upon a bracket, *h*, attached to frame A, horizontally across the conical face of pulley B′, and can be secured in any required position by a set-screw, *a′*. Upon the same side of the machine is a second conical pulley, D, near to which is a second belt-guide, *b*, adjustable in the same manner upon a bracket, *h′*, secured likewise to frame A, relatively to pulley D, as is belt-guide *a* to pulley B′. Belt-guide *b* can likewise be secured in any required position on bracket *h′* by a set-screw, *b′*.

The line of division of the two ruling-trains runs horizontally about on line *x x*. The general arrangement of parts in detail of each machine or division is of the ordinary character.

In the lower division, *d* is the striker, and *c* is the carrying-apron, with which are arranged the usual cords. In the upper division, *c′* is the striker. Both of the said strikers are operated by the usual cam-movements.

F is the apron for the upper division. H is the driving-cylinder for the upper division, and is fixed upon the shaft that is driven by pulley D. 1 2 3 are cords adjusted by means of proper rollers to run from nearly under the center of cylinder H on the surface of apron F, and under striker *c′*. I is an auxiliary apron, which takes the ruled sheets from apron F, and carries them back and deposits them in the receiver-box J. K is a band running upon cone-pulley B′ and D through belt-guides *a* and *b*.

Fig. 2 is a detailed view of pulleys B, B′, and D, belt-guides *a b*, brackets *h h′*, and belt K.

In the two figures like letters refer to like parts.

The object of my invention is to provide a double paper-ruling machine with double strikers, in which the two divisions of the machine, by means of suitable adjustable connecting devices, can be made to run and operate together with sufficient precision and corresponding regularity of movement to produce paper ruled on both sides of a sheet by once passing it through the machine, and whereupon will be produced ruling and striking identically the same on both sides, whether the ruling be plain or composed of plain ruling and various head-lines.

The chief obstacle to the successful working of machines which have been heretofore constructed for the above-named purpose has been the lack of proper connections between the two machines for producing a uniformity of movement in the two, and for adjusting the movements of one to those of the other with that closeness which the accomplishment of perfect ruling and striking requires.

The operation of my improved machine is as follows, viz: The lower division of the machine is set in motion by a belt running on the portion B of pulley B B′ next to frame A. The upper division receives its motion from the conical or outer portion B′ of the same pulley by means of belt K, which runs upon pulleys B′ and D through belt-guides *a* and *b*.

After starting up the machine a sheet of paper is sent through for the purpose of ascertaining if the movements of the strikers of the two divisions coincide, so as to produce the same ruling and striking on both sides of the sheet. Any considerable variation might be adjusted by means of ordinary cone-pulleys in place of pulleys B′ and D, or by a train of changeable gears on and between the shafts on which these pulleys are fixed; but such fine adjustments as less than the width of a fine-ruled line are in no wise so easily and surely attainable as by the employment of two

conical pulleys, B′ and D, on which runs belt K, said belt being adjustable to and held in any required fixed position on said pulleys by means of the belt-guides *a* and *b*. Hence, in starting up the machine, and finding that the two divisions require to have their movements adjusted one to the other, either one of the belt-guides *a b* may be moved on its bracket, so as to cause the belt K to run on such a place on cone-pulleys B′ D as shall give the required coinciding speed to the two divisions. The belt-guides, having been so adjusted, may be fastened in their places by their set-screws *a′ b′*.

The sheet of paper fed to the machine first passes under striker *d*, and is ruled on its upper side; thence it is carried back on apron *c* until its forward edge reaches the cords 1 2 3, between which and apron F of the upper division it is carried up onto the top of apron F, being in its passage turned over, so as to bring the side which was the under one at starting to be the upper one in its present position, and thus bring the unruled side into proper position for the action of the second striker, *c′*, in the upper division. After passing the second striker the sheet passes on to the end of the frame, where it meets the auxiliary apron I, and is by it carried up over the top and deposited, with the ruling of both sides done, in the receiving-box J.

I do not confine myself to the employment of conical pulleys B′ D and a belt, K, for the purpose of producing the necessary corresponding movement of the parts of a double ruling machine with double strikers; but such a device as is shown by Fig. 4 may be substituted for the cone-pulleys B′ and D and the belt K, and in employing which there may be placed on the shaft, in place of cone-pulley B′, a bevel-gear, O, which shall engage in a second bevel-gear, O′, placed on the end of a shaft, P, supported on the side of frame A, and extending up to near the center of the shaft, on which is placed conical pulley D; and in place of pulley D there may be placed upon the same shaft a face-place, L, covered with leather or other frictional material, and upon the end of the before-mentioned shaft P, terminating in front of said face-plate, may be placed a pulley, L′, adjustable to bear against and run face-plate L, and likewise adjustable on shaft P, to be run at varying distances from the center of said face-plate, thus affording a means of close adjustment of corresponding speeds between the two divisions of the machine; or, in place of said face-plate L, there may be employed, as is shown in Fig. 3, a face-gear, S, and upon shaft P, in place of the pulley L′, a proper pinion, S′, may be placed to run thereon, and be also adjustable on shaft P, to run at very slightly-varying distances from the center of said face-gear, such variations only being required, for it is obvious that, owing to the divergence of the teeth on the surface of the face-gear, the pinion S′ can only be moved on shaft P such distance as a loose fit of teeth and grooves on pinion and face-gear may permit of; but that would be sufficient; still I prefer to use the conical pulleys and belt.

What I claim as my invention is—

In a double ruling machine with double strikers, the combination, with the two strikers *d c′*, of conical pulleys B′ D, belt-guides *a b*, and belt K, or their equivalents, substantially as and for the purpose set forth.

JOHN T. F. MACDONNELL.

Witnesses:

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