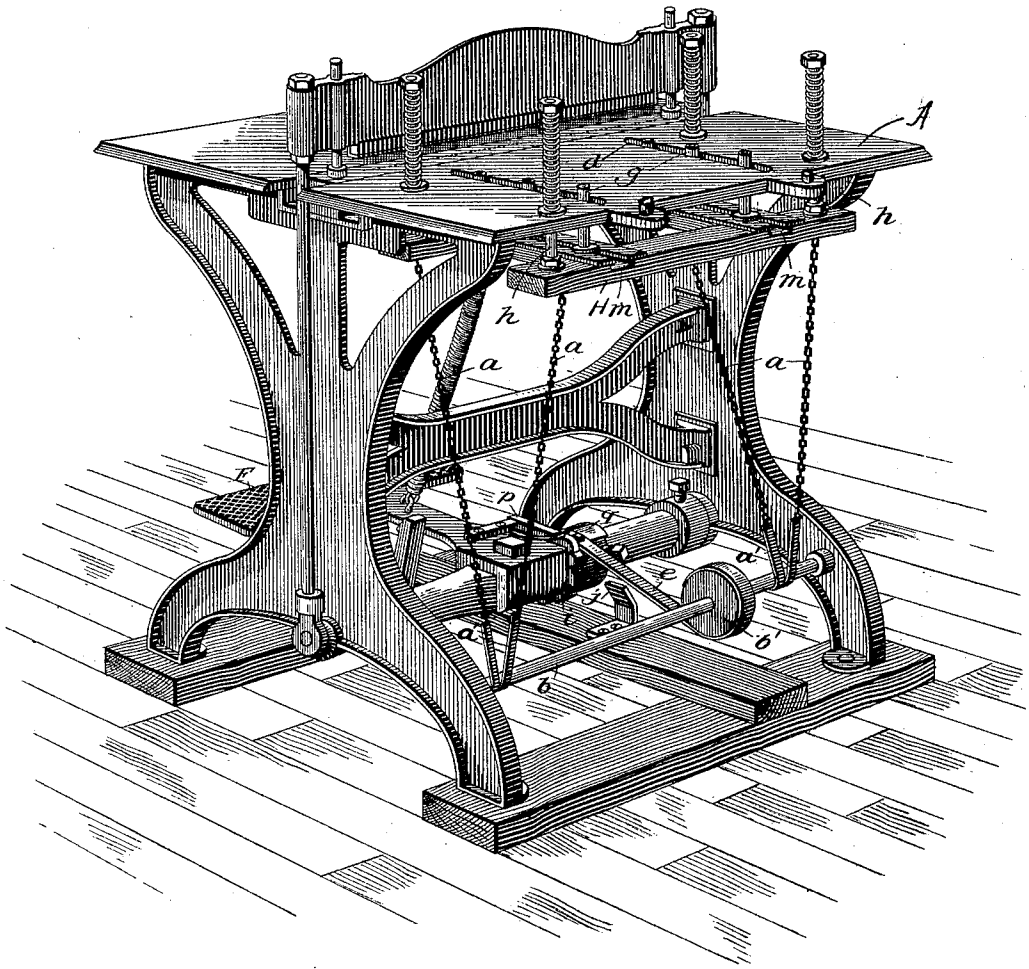
(No Model.) 2 Sheets—Sheet 1.

A. GREENLEAF.

MACHINE FOR PERFORATING PAPER.

No. 592,564. Patented Oct. 26, 1897.

Fig. 1.



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Fig. 2.

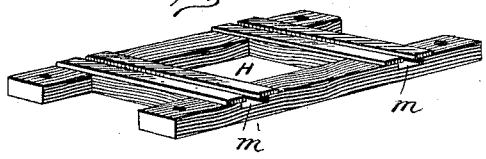


Fig. 3.

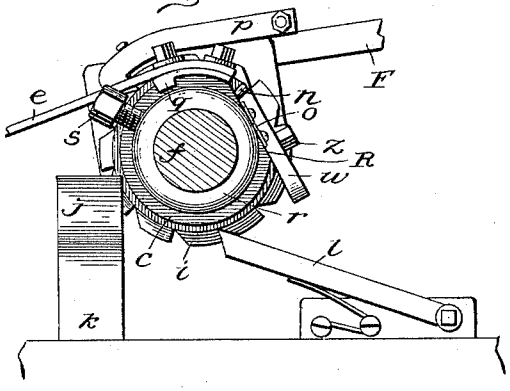


Fig. 4.

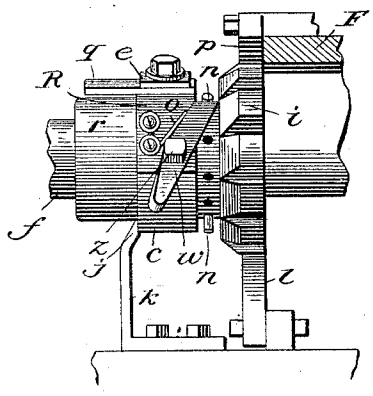


Fig. 6.

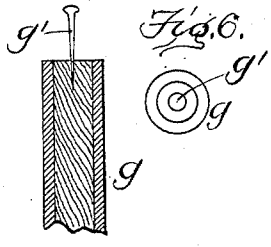
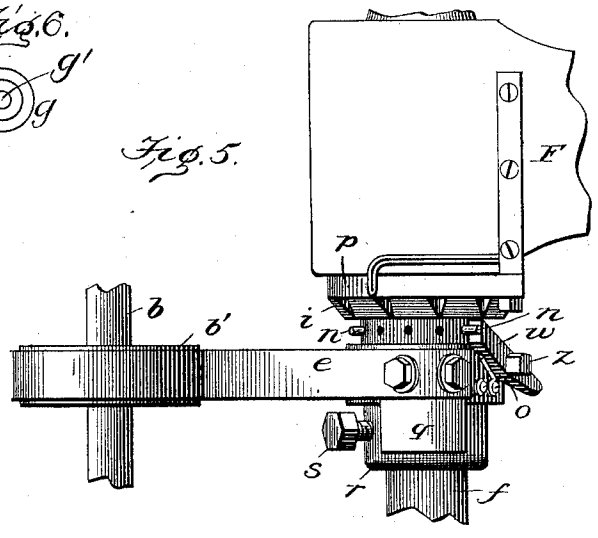


Fig. 5.



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UNITED STATES PATENT OFFICE.

ABNER GREENLEAF, OF BALTIMORE, MARYLAND.

MACHINE FOR PERFORATING PAPER.

SPECIFICATION forming part of Letters Patent No. 592,564, dated October 26, 1897.

Application filed July 8, 1895. Renewed March 29, 1897. Serial No. 629,856. (No model.)

To all whom it may concern:

Be it known that I, ABNER GREENLEAF, a citizen of the United States, residing at Baltimore city, in the State of Maryland, have invented certain new and useful Improvements in Machines for Perforating Paper; 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.

My invention relates to machines for perforating paper and belongs to the class in which stop-gages are employed against which the work abuts while the perforations are being made; and it consists in the means by which the gages may be first fixed at distances corresponding to the spaces desired between the lines to be perforated and then automatically actuated in a manner to render them effective successively until all have been used and the means employed for repeating the cycle of operations at pleasure.

The object of my invention is to provide a series of stop-gages against which the work may be consecutively brought, which gages may be adjusted beforehand to space lines of uniform or variable distances apart, and to provide for the automatic withdrawal of the effective gage and to unmasking the next gage at each stroke of the treadle until a given number of lines have been perforated, and then to have all the gages returned to their normal position, when the operation may be repeated.

In the accompanying drawings, Figure 1 is a perspective view of a perforating-machine of the class described, showing my improvement attached. Fig. 2 is a perspective view of a movable plate provided with grooves which contain the several gages. Fig. 3 is a side elevation of a ratchet or notched wheel and a ring which when in place are located on the treadle-shaft and by which movement is transmitted to the gage-operating mechanism. This ring carries a pawl that engages a series of projecting screw-heads on the periphery of a flange at the side of said ratchet, thus forming the immediate connection between said ratchet and the mechanism by which the gages are operated. Fig. 4 is a fragmentary view of a portion of the treadle-shaft, showing a front elevation of the ratchet, ring, and adjustable collar for holding the ratchet and ring in place, also disclosing the connecting-pawl, tripping-cam, and a portion of the framework. Fig. 5 is a fragmentary plan view showing a part of the treadle-shaft, treadle, ratchet, ring, and collar and a portion of the auxiliary shaft that communicates motion to the gage-plate by means of suitable connections. Fig. 6 is a detail section of a modified form of stop-piece.

The table, the perforating mechanism dividing the table into front and rear parts, the operating-treadle mounted upon a rock-shaft beneath the table, and the connecting-rod by which the power is communicated from the rock-shaft to the gate or bar carrying the perforating-needles are or may be of the conventional character and form of themselves no part of my present invention, which has reference only to the stop-gages and the mechanism and combinations of parts constituting the means by which the invention is rendered effective.

Before entering upon a detailed description of the parts and the manner in which they perform their several and collective functions I will define what I mean by certain terms to obviate confusion and possible misunderstanding.

In carrying out my invention I use for gages pins set in T-grooves in a plate. The plate I designate as the "gage-plate" and the pins "stop-gages." Each gage is shown as consisting of two pins, and when I refer to a "gage" the term is intended to comprehend the two pins against which the paper abuts while one line is being perforated, and when I use the plural "gages" I refer to two or more sets, each set consisting of two pins, as illustrated, against which the paper successively abuts while the perforations are being made.

It will of course be understood that while I have shown but two pins as forming one gage three or more may be used, additional grooves being provided in the gage-plate for their accommodation, or a single gage might be used having tines or prongs. It will also be understood that three or more gages may be provided, each consisting of two or more pins, as above stated, at least four sets being, in fact, contemplated.

By the term "stop-gages" I mean to differ-

entiate between gages against which the work abuts while the perforations are being made and gages that operate upon the work or the machinery so as to automatically advance the work predetermined distances as the perforations are made or after they have been made.

The term "work" herein refers to the paper or other material operated upon.

Referring to the several parts that constitute the means for carrying out my invention, H indicates the gage-plate provided with two grooves *m* to accommodate the pins *g*, which form the stop-gages, the gage-plate being supported at a distance from the under side of the rear portion of the table A by means of posts *h*, extending up from near the corners of the plate and through bearings in the table provided for the purpose, the posts being provided above the table with helical springs and caps or nuts to retain the springs in place and against which they act to keep the plate as high as the chains *a* will admit. The slots *d* in the top of the table correspond with the T-grooves in the gage-plate, and the stop-gage pins *g* pass freely through said slots and may be moved back and forth in the grooves when it is necessary to set them for the work in hand. When set, they are clamped in position by means of nuts. Near the corners of the gage-plate are attached chains *a*, which terminate at their lower extremities in straps *a'*, by which they are connected to a shaft *b*. This shaft has a pulley rigidly mounted upon it, from which a strap *e* extends to a wheel or ring *c*, loosely mounted upon the treadle-shaft *f*. By the side of this ring is also loosely mounted the ratchet-wheel *i*, the ring and the ratchet being held in place on the treadle-shaft by the fulcrumed end of the treadle-arm and the set-collar *r*. On the side next to the ring this ratchet is provided with a projecting flange or hub containing a series of screws having projecting heads *n*, the number of screws in place at any given time depending upon the number of perforations it is desired to make before the gages have completed the cycle of their operations and returned to normal position. There are openings enough in the flange or hub of the ratchet *i* to hold a screw for each tooth on the ratchet, but there are never more than half of them filled. If two perforations only are required, then a screw is placed in every alternate opening. If three perforations are required, a screw is placed in every third opening, and if four perforations are required a screw is placed in every fourth opening. If only a single line of perforations are required, the pawl *p* is raised out of contact with the ratchet-wheel.

When it is desired to make a number of perforations which will not divide the number of teeth in the wheel without a remainder—for instance, twelve teeth and five perforations—the work may be done at a slight disadvantage by inserting, in the case supposed, a screw in the first and the sixth opening and making the eleventh and twelfth strokes of the treadle without putting in the work to be perforated.

Mounted upon the flattened surface R of the ring *c* is a pawl *w*, pivoted at *z*. One end of this pawl engages the head of one of the screws *n* at the side of the ratchet, and the other end is intended to cause the pawl to be tripped by making contact with a fixed cam *j* on a bracket *k*. By this means the pawl is disengaged from contact with the screw-heads at the proper time, as will be disclosed in describing the operation of this part hereinafter. Upon the arm of the treadle F there is pivoted a pawl *p*, which rests upon and engages the teeth of the ratchet, so that each stroke of the treadle will operate to advance the ratchet the space of one tooth, which movement will be imparted to the ring *c* and gage mechanism through the instrumentality of the screws *n*, pawl *w*, strap *e*, pulley *b'*, straps *a'*, and chains *a* in the manner to be presently described, the pawl *l* holding the ratchet *i* to the point to which it has been advanced by the motion of the pawl *p*.

The several operative parts having now been referred to and their location pointed out, it is only necessary to refer briefly to the gages before describing the operation of my improvement in connection with the machine. The gages, as stated, are composed of two or more pins each, the pins for any one gage being located in separate grooves in the gage-plate, the pins of the first gage being not so long as those of the second, the second not so long as the third, the third not so long as the fourth, and so on, from which it follows that if the gage-plate be lowered intermittently to the extent that each gage is higher than the one which preceded it, the first gage being at the start a relative distance above the top of the table, the gages will successively disappear, and when the last of the disappearing gages have been used the final gage may be a fixed one, such as the conventional pins inserted in the table-top or other equivalent device. It is also obvious that if the gage-plate is restored to its normal position after the final gage has been used the operation may be repeated at pleasure.

The gage-pins are counterbored at the top and plugged with wood or other soft material, the purpose of which is that the operator may use small pins *g'* stuck into the soft cores as gages and thereby make any slight adjustment without changing the pins in the plate H. When these small pins are used, the first gage in its normal position should be flush with the table-top and the small pins not higher than the difference in length of the pins *n*. This construction is clearly shown in Fig. 6.

The operation of my improvement when connected to a machine of the class referred to is as follows: The work being inserted under the gate or head carrying the perforating-needles is advanced by the operator until it is arrested by the first stop-gage, when a

stroke of the treadle operates to perform the work and at the same time by means of the pawl *p* to rotate the ratchet the space of one tooth, the ratchet in turn transmitting its movement to the ring *c* through the medium of the screw-heads *n* and the pawl *w*, the ring transmitting its movement to the shaft *b* through the medium of the strap *e* and pulley *b'*, which action causes the shaft *b* to rotate and wind up a part of the straps *a'*, thus drawing upon the chains *a* and pulling down the gage-plate H against the pressure of the springs on the posts *h*, which action causes the first gage against which the paper is abutting to disappear through the slots *d* in the top of the table, thereby unmasking or making effective the second gage which has been lowered, but not sufficient to render it inoperative. Another stroke of the treadle will perforate the second line and repeat the operation just described, thereby causing the second gage or set of stop-pins to disappear and unmask or render effective the third gage. When the operator has advanced the work to the gage for a third line, the same operation will be repeated, and so on until all the lines have been perforated for which the gages have been set. When the line corresponding to the last gage is perforated, the plate H will be raised automatically and all the gages will be restored to their normal position, when another piece of work may be inserted and the operations repeated.

Having shown how the gage-plate is intermittently drawn down as the several lines are perforated, I will now describe how it is returned after the last stop-gage has been used.

As previously stated, if only two lines are to be perforated every other screw-pin *n* at the side of the ratchet is removed, and it will therefore follow that when the pawl *w* is tripped or disengaged from contact with one of these pins by means of the cam *j* on the bracket *k* there will be nothing to prevent the plate H from rising in response to the pressure of the springs on the posts *h*. The raising of the plate H pulls on the chains *a* and unwinds the straps *a'* from the shaft *b*, turning said shaft and the pulley *b'*, which acting through the strap *e* on the ring *c* gives it a return movement that brings the pawl *w* back and engages it with the next screw *n* at the side of the ratchet, when two or more strokes of the treadle will carry it back to be tripped again. The pawl *w* after being tripped is returned by a spring *o* to position for engaging the next screw *n* on the return movement of the ring *c*. It will thus be seen that at every stroke of the treadle a line is perforated and the stop-gage or pin against which the work abuts is automatically withdrawn, allowing the operator to advance the work to the next gage, when another stroke will cause that gage to be withdrawn and permit the operator to advance the work the space of another line; but in the case supposed where but two lines are perforated on the same piece of work the stroke of the treadle for the second line (which is the last line for that sheet) will always operate to disengage the pawl *w* and allow the plate H to rise, so that only two gages will be used and only two lines perforated. If, however, it is desired to make three or four perforations on one piece of work, then the screw-pins *n* at the side of the ratchet are removed from all but every third or fourth opening at the side of the ratchet, and so on, according to the number of perforations to be made on any one piece of work, for it will be observed that if the pins are only placed in every third or fourth opening when the pawl *w* is tripped it will permit the ring to return so far that it will take three or four strokes of the treadle to bring it back to the tripping point again and release the plate H, which in rising will restore all the gages to normal position.

To prevent the blow on the pins *n* made by the return of the pawl *w*, I provide the ring *c* with a lug *q*, which will engage a stop on the set-collar *r* and thus break the force of the contact, the set-collar being adjustable longitudinally on the treadle-shaft to keep the ring and ratchet in place and circumferentially to bring the stop *s* in position to make contact with the lug.

Believing the nature of my invention and its construction and manner of operation will be sufficiently understood from the foregoing description, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a perforating mechanism of two or more stop-gages and means whereby each gage is brought successively into operation as the successive rows of perforations are made.

2. The combination of perforating mechanism, two or more stop-gages arranged in series and automatic means to successively and repeatedly bring the gages into operation as the perforations are made.

3. In a perforating-machine the combination of a series of adjustable gages adapted to be set according to the distances between the lines or perforations, means for making perforations and means operated through the perforating mechanism to successively bring the gages into operative position.

4. In a perforating-machine, the combination of a series of gages, movable and fixed, and means to automatically remove and render inoperative the movable gages one at a time and leave the next in order effective.

5. In a perforating-machine, the combination of perforating mechanism, with gaging mechanism, and means whereby the same operation which causes the perforating of one line, will make effective the gage for the next line, substantially as set forth.

6. In a perforating-machine, a movable frame, a series of adjustable gages fixed in

said frame, and means to automatically render said gages consecutively effective, as set forth.

7. In a perforating-machine, a movable frame, having movable gages arranged therein, said gages being normally fixed, and the frame having an automatic action, by which the gages become successively effective and then inoperative in a continuous round, as set forth.

8. In a perforating-machine, a movable frame containing gages, means to support the frame in normal position, and means to withdraw the gages *seriatim* as the perforations are made, until all have operated, and means to return all the gages to normal position, as set forth.

9. In a perforating-machine, a table provided with perforating mechanism, and a series of movable gages connected therewith, the gages being actuated by the operation of the machine and thereby rendered effective to gage the distance between the several lines of perforations, said gages being fixed in regard to the distance from the line of perforation, while in operation, but capable of adjustment to and from the same, as set forth.

10. In a perforating-machine, a series of adjustable gages, normally fixed in their relation to the line of perforation, the series being disposed progressively in the order of the work to be done, and each gage determining the location of a line of perforation, and each gage in the series being automatically withdrawn after it has performed its function, in the manner as set forth.

11. In a perforating-machine, the combination of perforating mechanism, with a table provided with suitable openings, a frame located beneath, adjustable gages normally fixed in said frame and projecting through the openings in said table, and means to cause the gages to disappear, in the manner described and for the purpose set forth.

12. In a perforating-machine, the combination of perforating mechanism, with a table provided with suitable openings, a frame located beneath and movable to and from the table, adjustable gages normally fixed in said frame, means to cause each gage to automatically disappear after performing its function, and means to restore all the gages to normal position, as and for the purpose set forth.

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

ABNER GREENLEAF.

Witnesses:
ROGER W. CULL,
A. F. CONNOLLY.