No. 638,242.

Patented Dec. 5, 1899.

F. W. HEDGELAND.

PERFORATING MACHINE.

(No Model.)

(Application filed July 22, 1898.)

4 Sheets—Sheet 1.

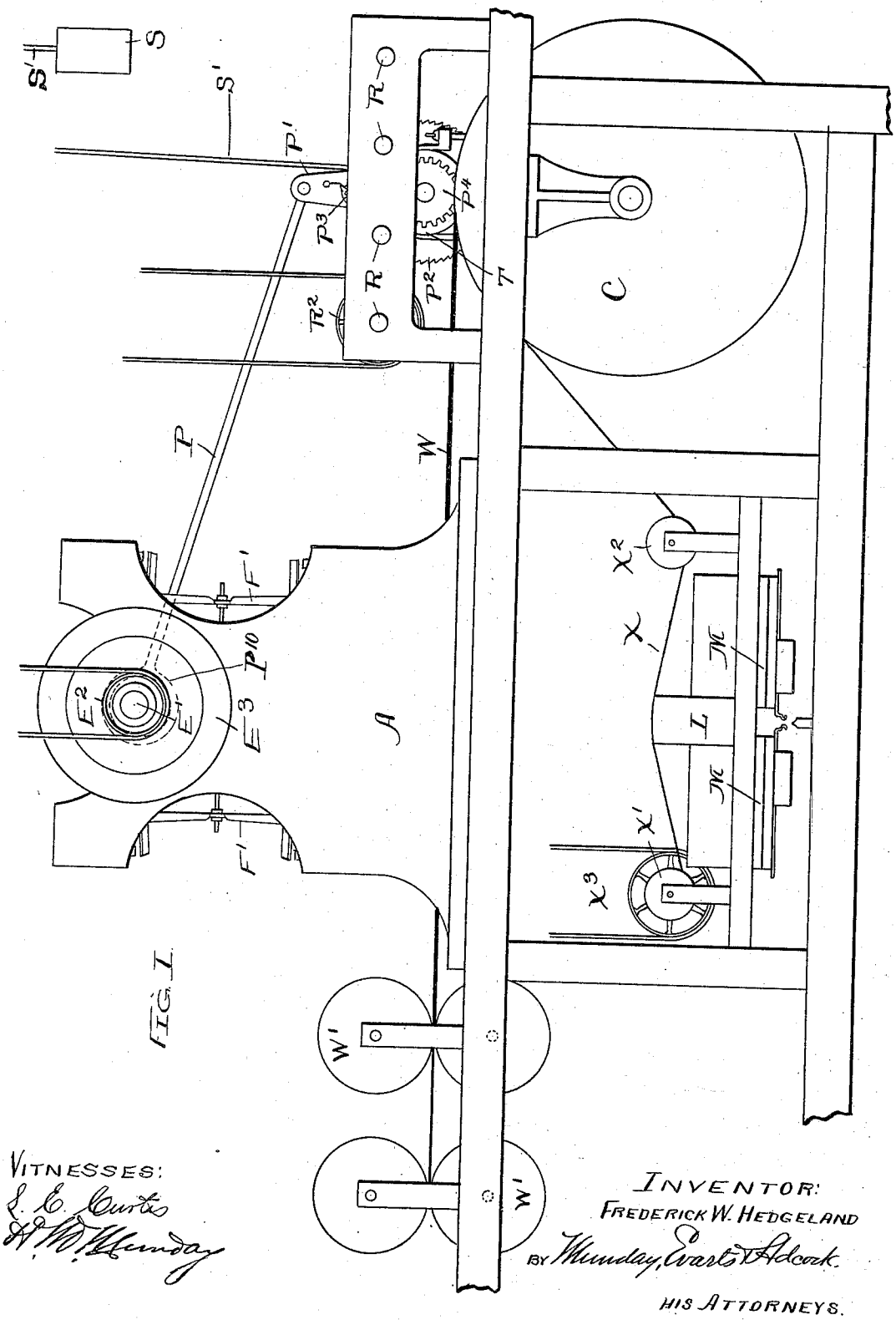


FIG. I.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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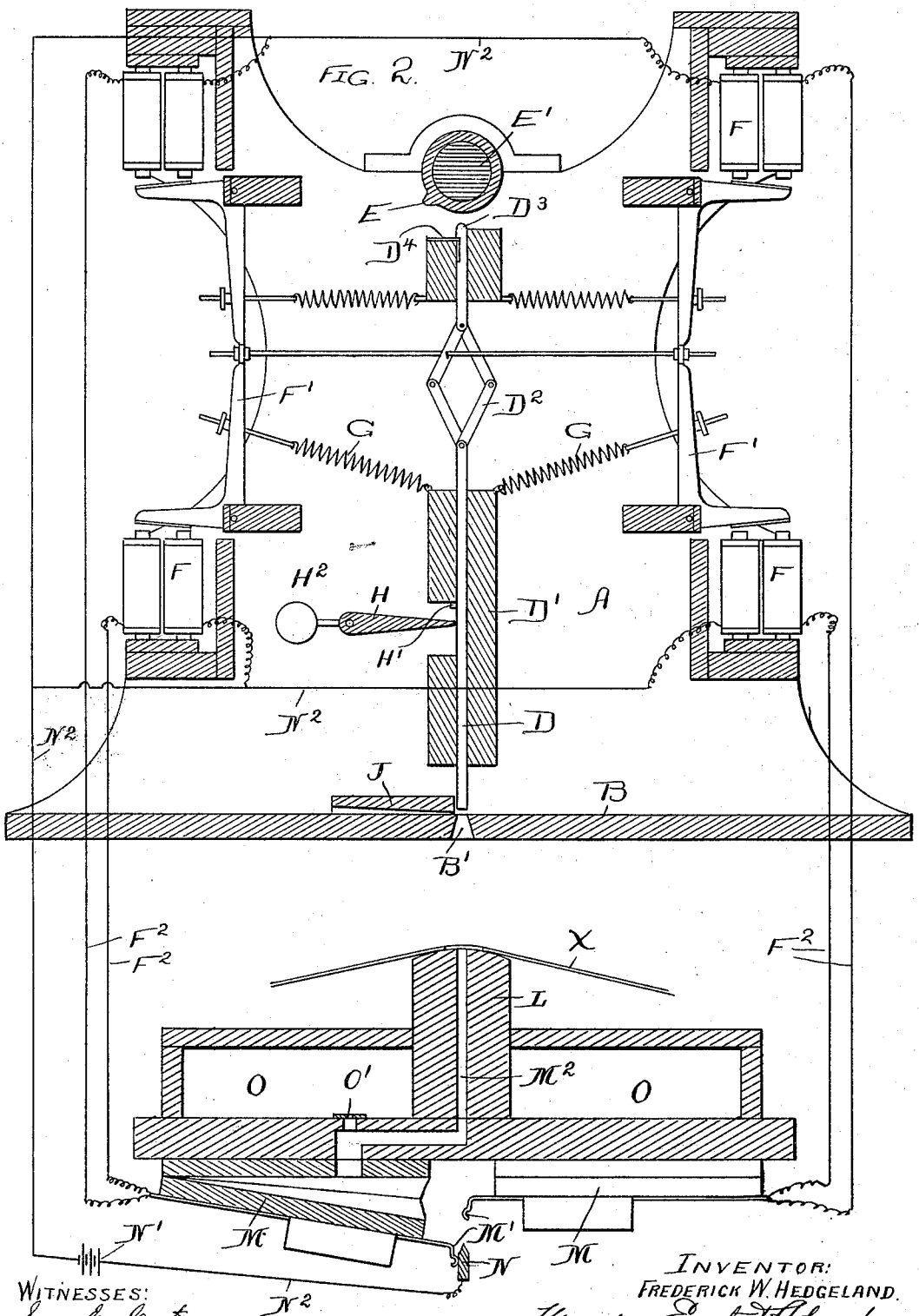
F. W. HEDGELAND.

PERFORATING MACHINE.

(Application filed July 22, 1898.)

(No Model.) 4 Sheets—Sheet 2.

FIG. 2.



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No. 638,242. Patented Dec. 5, 1899.

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PERFORATING MACHINE.

(Application filed July 22, 1898.)

(No Model.) 4 Sheets—Sheet 3.

FIG. 3.

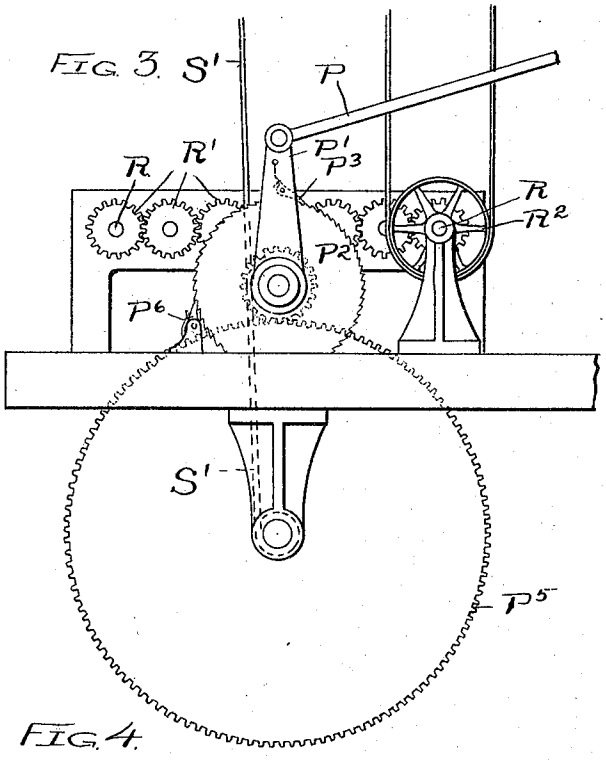


FIG. 4.

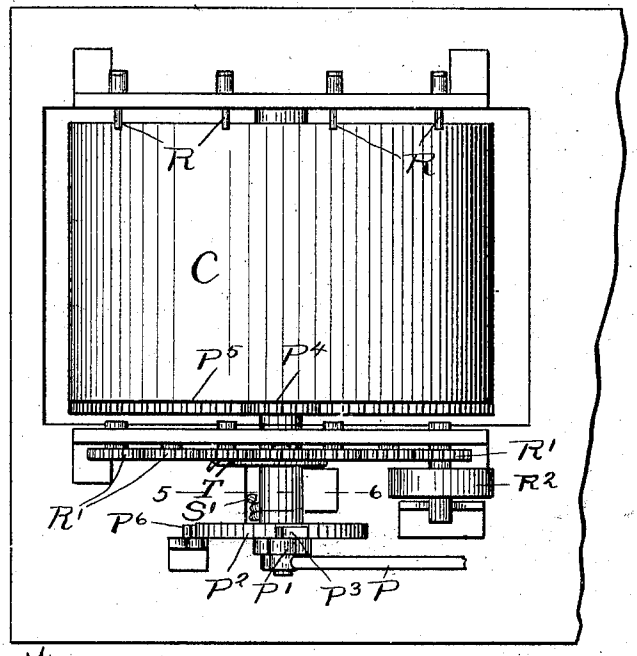


FIG. 5

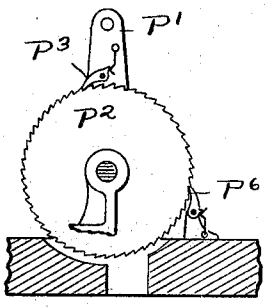
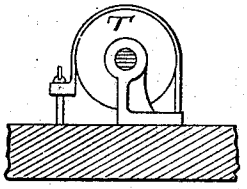


FIG. 6



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No. 638,242.

Patented Dec. 5, 1899.

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PERFORATING MACHINE.

(No Model.)

(Application filed July 22, 1898.)

4 Sheets—Sheet 4.

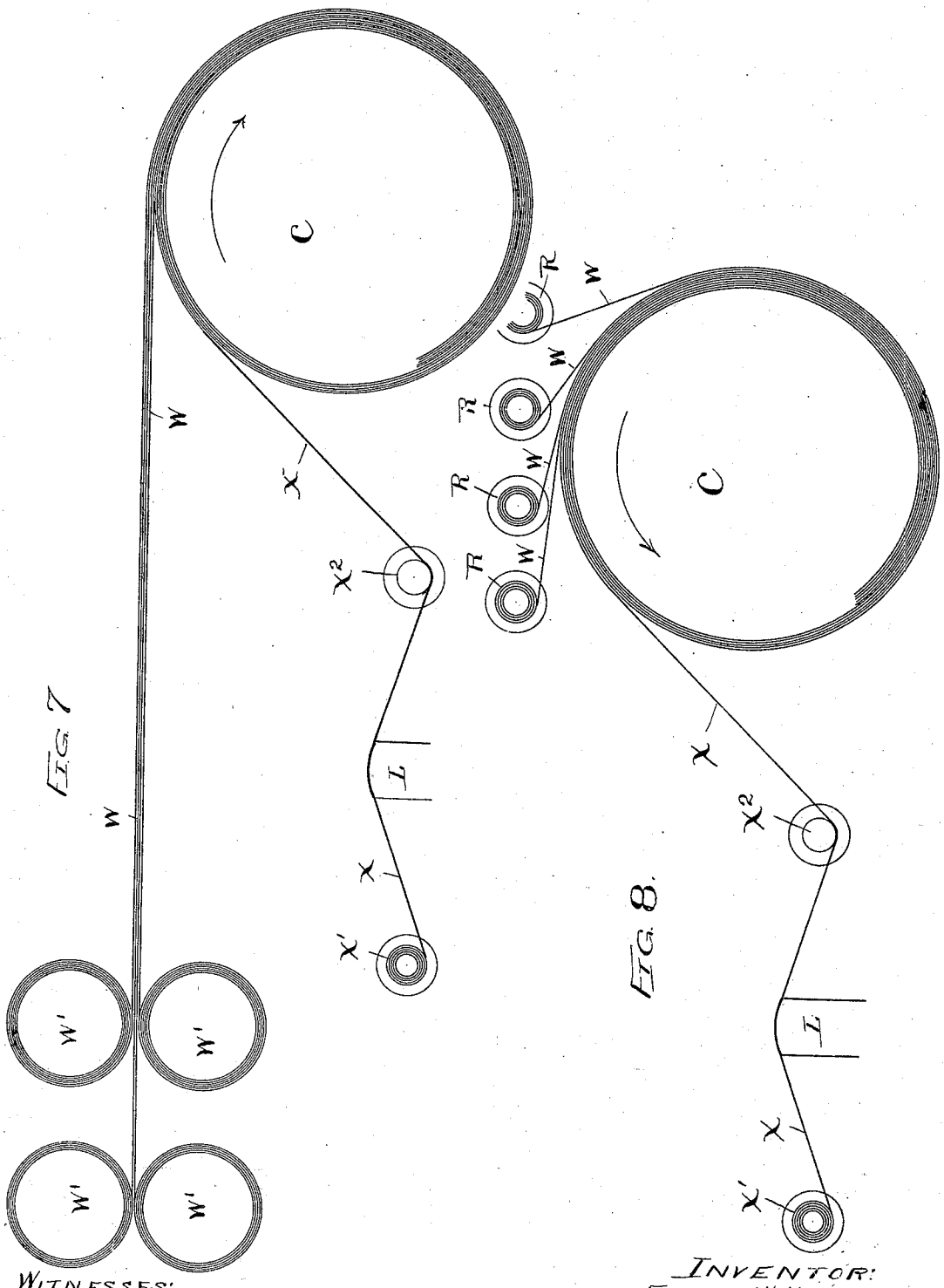


FIG. 7

FIG. 8.

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UNITED STATES PATENT OFFICE.

FREDERICK W. HEDGELAND, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE W. W. KIMBALL COMPANY, OF SAME PLACE.

PERFORATING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 638,242, dated December 5, 1899.

Application filed July 22, 1898. Serial No. 686,577. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK W. HEDGELAND, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Perforating-Machines, of which the following is a specification.

This invention relates to certain improvements in the means employed for controlling the punches in paper-perforating machines, and particularly in the machine shown in the patent to me, No. 599,560, dated February 22, 1898; also to the means for moving the sample or pattern sheet, as well as the perforating-sheets, both during the perforating operation and during the rewinding.

The nature of the invention is fully disclosed in the description given below and is also illustrated in the accompanying drawings, in which latter—

Figure 1 is a side elevation of a perforating-machine with my present improvements attached thereto. Fig. 2 is a partial vertical section. Fig. 3 is a side elevation, and Fig. 4 a plan, of a portion of the paper-controlling mechanism; and Figs. 5 and 6 are detail sections looking in opposite directions and taken upon the line 5 6 of Fig. 4. Fig. 7 shows the arrangement of the rolls used while perforating, and Fig. 8 shows the same of the rolls used in rewinding the paper after perforating.

The perforating-machine with which my present improvements are used may be almost precisely like that shown in my said patent, and A may represent one of the side uprights thereof, B the table over which the paper to be perforated is drawn, and C a large drum upon which both the paper perforated by the machine and the sample-sheet are wound, as hereinafter stated.

D represents one of the series of punches working vertically in stationary guides D′, and each of the series is provided with and lengthened preparatory to operating by a toggle D^2, inserted between the ends of each punch. When the toggles are extended, the upper extremities D^3 of the punches are engaged by a cam E upon a rotating shaft E′, journaled in the uprights A and rapidly driven by the pulley E^2, the punches thus receiving their downward thrust from said cam. This cam-shaft extends over the series of punches and operates upon all of them whenever their toggles are extended. A stop D^4 limits the upward movement of the upper part D^3 of the punches, and a balance-wheel E^3 is preferably employed on the shaft E′. The toggles are straightened by connecting each of them to rocking elbow-levers F′, one arm of each of which serves as the armature of an independent electromagnet F, these parts being so arranged that the energizing of any one of the magnets rocks the armature-lever of that magnet and draws the corresponding toggle to its extended position. Light springs G act upon the several armature-levers in directions contrary to the magnets.

After each perforating operation the punches are lifted out of the paper by the lifter H engaging the pins H′ inserted in the punches. This lifter is pivoted at its ends and is rocked constantly and rapidly by suitable mechanism. (Not shown in the present case, but fully illustrated in my said patent.) A counterbalance-weight H^2 is preferably attached to the lifter outside of the pivots. The lifter rises immediately after the cam has depressed the punches, and consequently the punches are withdrawn from the paper instantly upon the completion of the perforation. A guide J immediately over the table and close to the line along which the perforations are made prevents any lifting of the paper by the punches, and the table is provided with openings B′, registering with the punches and having cutting edges.

In duplicating music or other sheets by the perforating-machine described I employ the following devices for controlling or selecting the punches which are to operate upon the paper: A pattern-sheet (shown at X) is passed over a tracker-range L, controlling a series of pneumatics M by means of air-ducts M^2, each carrying a spring electric contact M′. When a perforation in the pattern opens the air-duct M^2 of any one of these pneumatics, it causes the expansion of that pneumatic and causes the spring-contact M′ to wipe against a bar N, which is common to all the spring-contacts and is connected to all the toggle-magnets and to the battery N′ by the common return-wire N^2. The spring-contacts M′

of the pneumatics are connected to their respective magnets F by wires F^2, as illustrated. The series of ducts M^2 are connected to exhaust-chambers O by minute passages O', so that both the ducts and the pneumatics M are normally exhausted. With this mechanism for controlling the operation of the punches it will be seen that the operation will be as follows: Supposing the cam-shaft and lifter H to be in full operation and the chambers O to be exhausted of air, motion is given to the pattern-sheet X. Whenever a perforation in the pattern-sheet exposes one of the ducts M^2, the pneumatic corresponding to such duct is immediately expanded, so that its spring-contact M' completes the circuit between the corresponding toggle-operating magnet and the battery, causing the operation of the magnet-armature, the straightening of the toggle, and the operation of the punch. As soon as the duct is closed the pneumatic is exhausted and destroys the electric circuit. Should the note or perforation in the sample-sheet be a long one, the punch may be operated several times by the cam in rapid succession before the electric current is broken, and in such cases the toggle remains extended until the last perforation is given, because the circuit is not broken until that time.

Instead of winding the paper up after perforation upon the small drum shown in my said patent I now employ the large drum C and wind both the pattern-sheet X and the newly-perforated sheet or sheets W one on top of the other and simultaneously upon it in a plurality of courses or plies. I thus secure a practically uniform movement and speed by both the pattern-sheet and the newly-perforated sheets. This drum is operated intermittently from the cam-shaft by a connecting-rod P, operated by an eccentric P^{10} upon the shaft, an arm P', actuated by the connecting-rod, a ratchet-wheel P^2, receiving motion from said arm by means of the pawl P^3, a pinion P^4, carried by said ratchet-wheel, and a gear P^5, fast upon the shaft of the drum C. A spring-pawl P^6 engages the ratchet-wheel and prevents any backward rotation thereby. The sheets to be perforated are supplied by the spools W', and the pattern-sheet is fed from the spool X'. The latter also passes under a guide pulley or roller X^2.

After the sheets have been perforated and collected on the drum C they are taken off onto spools R, (shown in Figs. 1 and 3,) one sheet on each spool. To this end they are attached to their respective spools by hand, and the spools are provided with a train of pinions R', and one of them is also provided with a pulley R^2, driven by a belt, as shown, so that all of them may be driven at a uniform speed by the power from the pulley R^2. Of course it will be understood that each alternate pinion R' is an idler. At the same time the newly-perforated sheets are thus wound upon separate spools the pattern-sheet is returned to its supply-spool X'. For this purpose said supply-spool is actuated at a speed corresponding to that given to the spools which receive the newly-perforated sheets by means of a belted pulley X^3. It will be understood that the spools upon which the newly-perforated sheets are wound should be removable and that ordinarily they will be the spools upon which the sheets are furnished to users.

I find it desirable in the rewinding of the sheets to relieve them of much of the labor of operating the drum C, and thus to avoid straining them, and for this purpose a weight S is connected to the shaft of the drum by a cord S'. During the perforating operation this cord is wound on the shaft, so that when the time arrives for rewinding and the drum C is released by throwing pawls P^3 and P^6 out of operation the weight immediately acts upon the drum in the direction in which the latter turns in unwinding the sheets. The weight is not powerful enough to operate the drum; but it assists the unwinding sheets in that operation and prevents any undue strain on the paper. The stop-brake (shown at T, Fig. 6,) creates friction upon the drum-shaft, and is employed to steady the movements of the drum in both directions and also to prevent such quick actuations of the drum by the feeding mechanism as would cause a jumping by the weight.

I claim—

1. The combination with the perforating-machine and the punch-selecting devices embracing a pattern-sheet, of a large drum to which both the paper to be perforated and the pattern-sheet are attached and upon which they are simultaneously wound one upon another in a plurality of courses, and means for actuating said drum so it will feed the paper and pattern through the machine, substantially as specified.

2. The combination with the drum receiving the perforated sheets from the punches, of spools, one for each sheet, serving to draw the sheets from the drum, and means for assisting in turning the drum during the drawing off, substantially as specified.

3. The combination with the drum C receiving the perforated sheets from the punches, and the spools upon which the sheets are separately wound as they are drawn from the drum, of means such as a weight and cord for operating the drum during the winding upon the spools, substantially as specified.

4. The combination in a paper-perforating machine, of a drum receiving the closely-associated sheets in a plurality of courses or plies, means for winding the sheets on the drum, a series of spools on which the perforated sheets and the pattern-sheet may be rewound from said drum, and means for actuating all of said spools at a uniform speed while rewinding, substantially as specified.

5. The combination in a paper-perforating machine, of a drum receiving the perforated paper from the punches in a plurality of

courses or plies, means for winding the paper on the drum, spools for drawing the paper from the drum, means for actuating said spools, and a weight and cord attached to and wound up by the drum while the perforation is going on, substantially as specified.

6. The combination with the punch-toggles of a perforating-machine and the magnets for straightening said toggles, of a tracker-range for the pattern-sheet, a series of pneumatics controlled by said range, and a series of electrical wiping-contacts controlled by said pneumatics and acting to complete the magnet-circuits, substantially as specified.

7. The combination with the series of magnets F and the series of toggles controlled by said magnets, of the series of pneumatics M, the series of electrical spring-contacts M′ carried by said pneumatics, and the contact N receiving the wiping-contact of all said contacts M′, substantially as specified.

8. The combination in a perforating-machine, of a drum receiving a series of the perforated sheets from the punches and winding the same upon itself in a plurality of courses, devices detachably connected to the drum and serving to actuate it during the perforating, and spools, one for each individual sheet, upon which the sheets are wound as they are drawn off the drum, substantially as specified.

9. The combination with a perforating-machine, of a drum receiving the associated perforated sheets from the punches, devices detachably connected to the drum and serving to actuate it during the perforating, spools, one for each individual sheet, for drawing the sheets off the drum, and means for assisting the sheets in operating the drum, substantially as specified.

10. The combination in a perforating-machine with the drum and means for actuating it intermittently while winding up the associated sheets, of the weight and cord for assisting in the rewinding, the cord being wound up while the sheets are being wound on the drum, and a brake acting to steady the drum, substantially as specified.

FREDERICK W. HEDGELAND.

Witnesses:
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