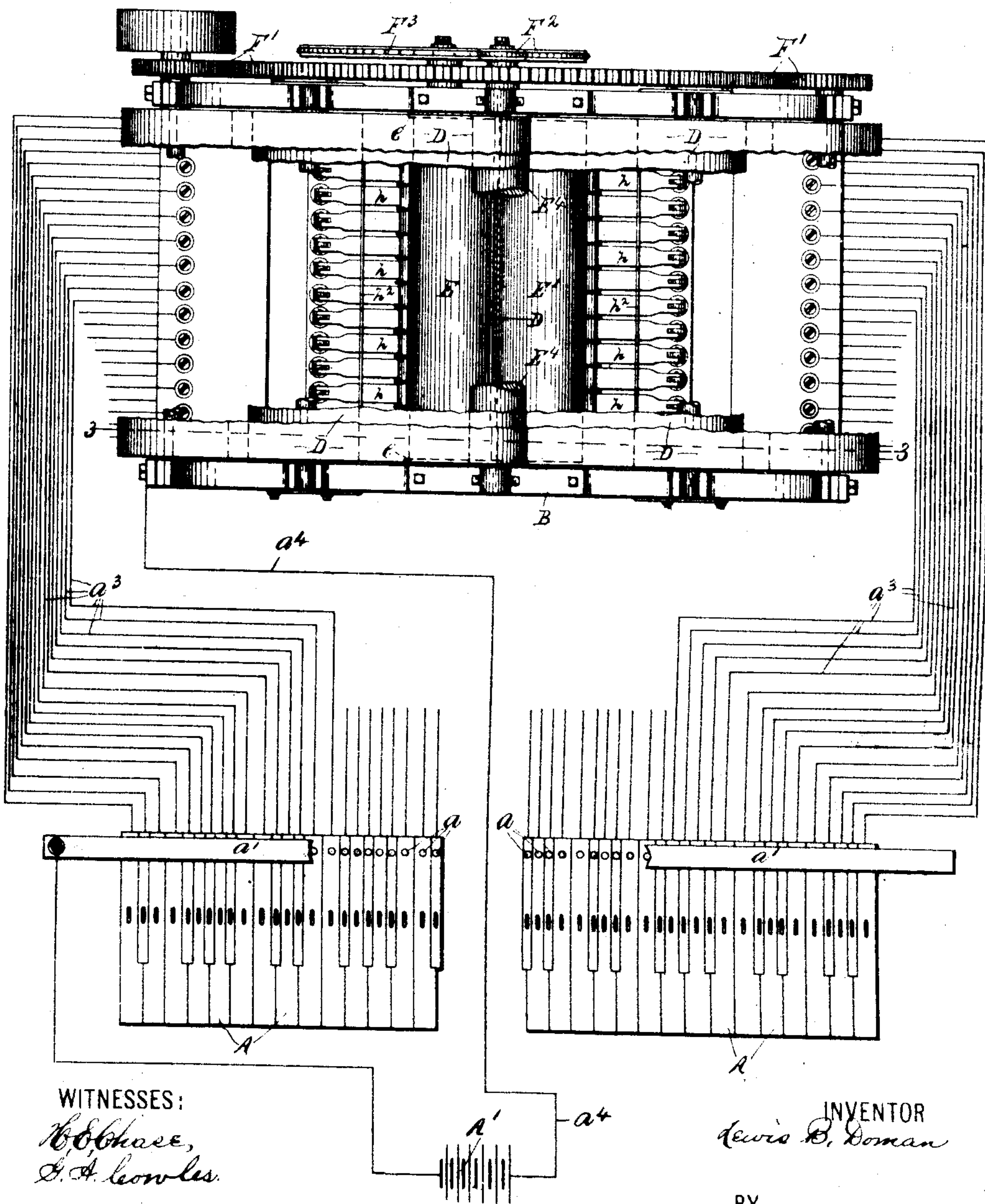


No. 866,920.

PATENTED SEPT. 24, 1907.

L. B. DOMAN.
PERFORATING MACHINE.
APPLICATION FILED MAR. 7, 1899.

5 SHEETS—SHEET 1.

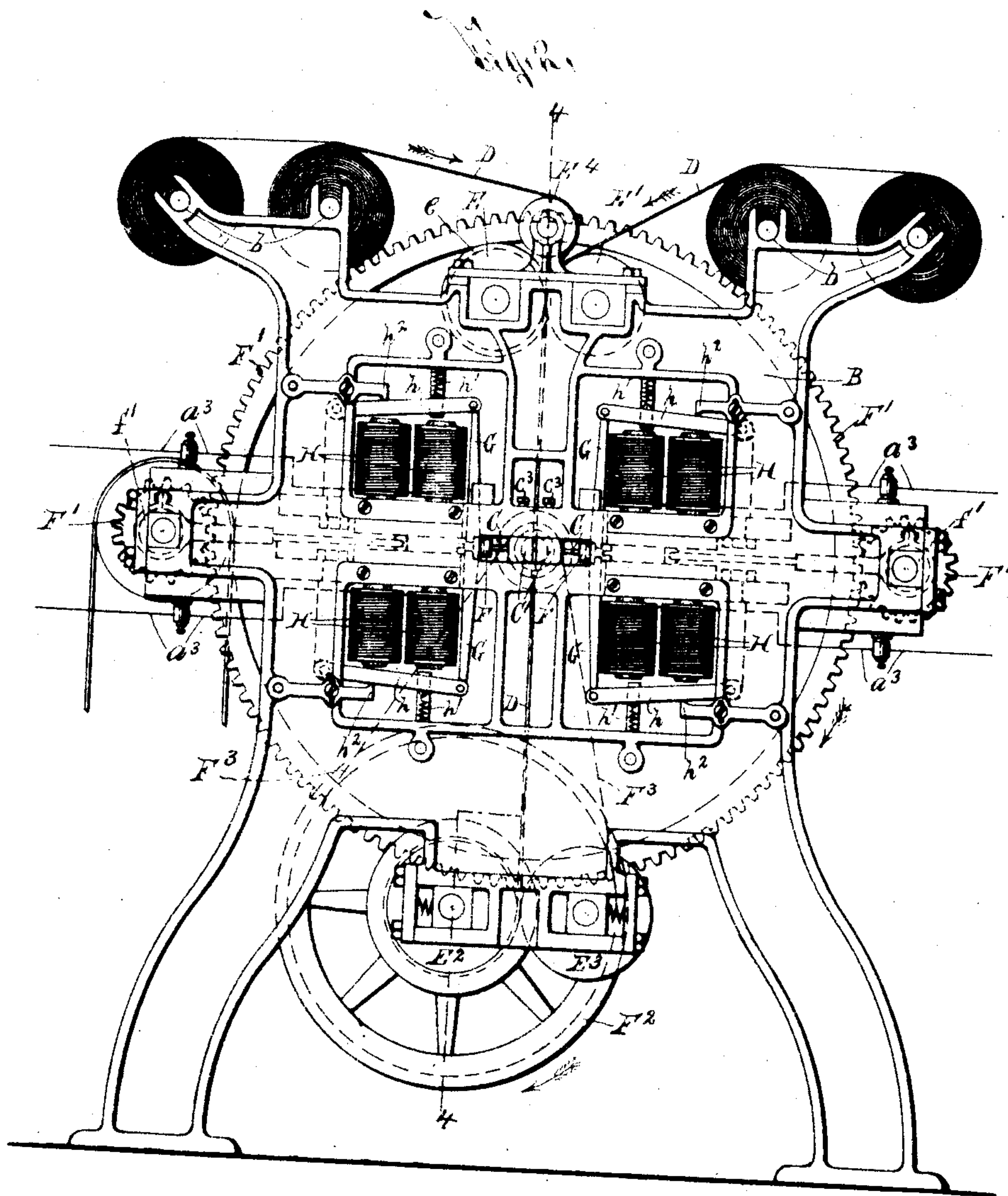


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5 SHEETS—SHEET 2.



WITNESSES:

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INVENTOR

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BY

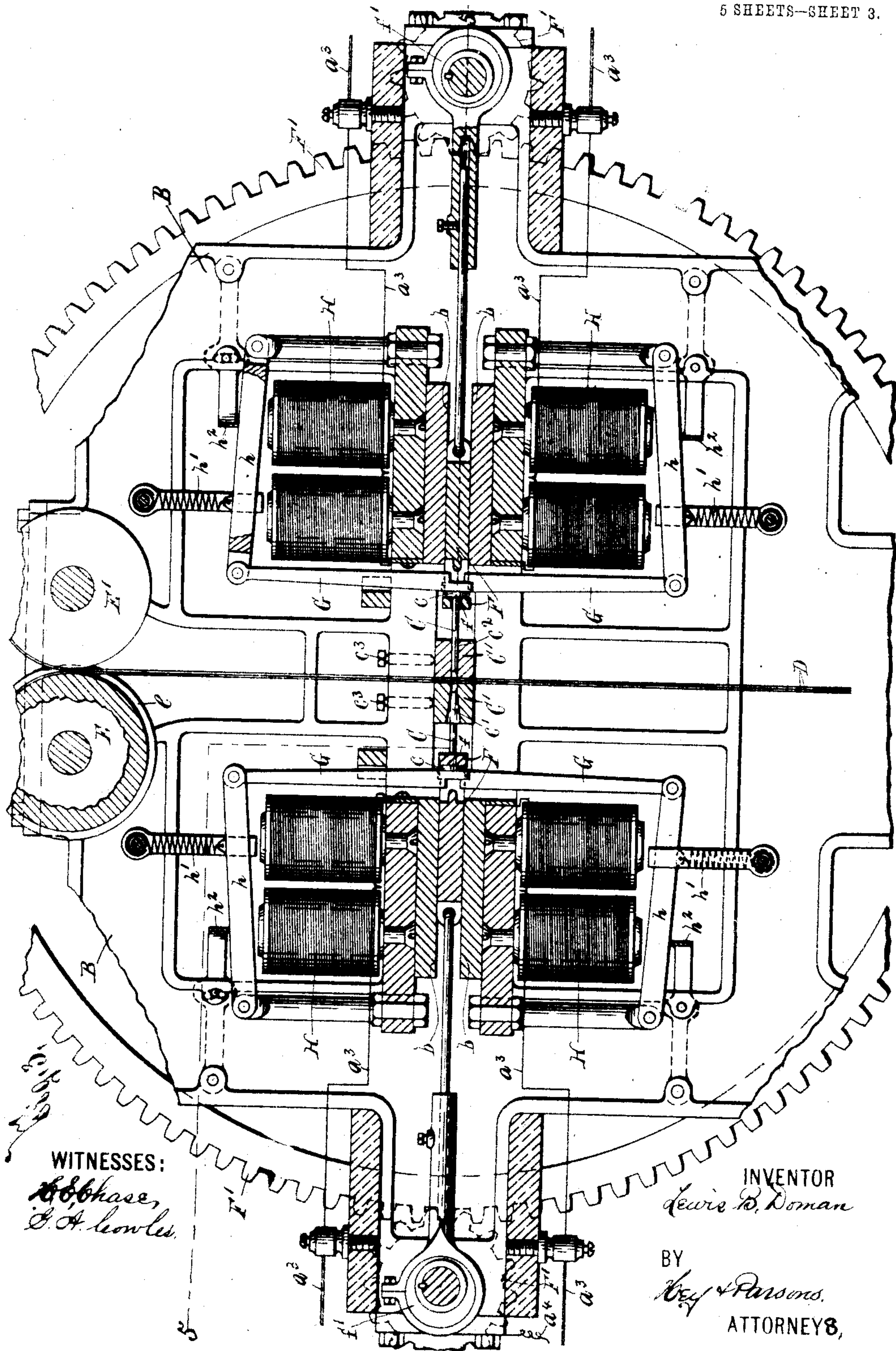
Ray & Parsons
ATTORNEYS.

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5 SHEETS—SHEET 3.

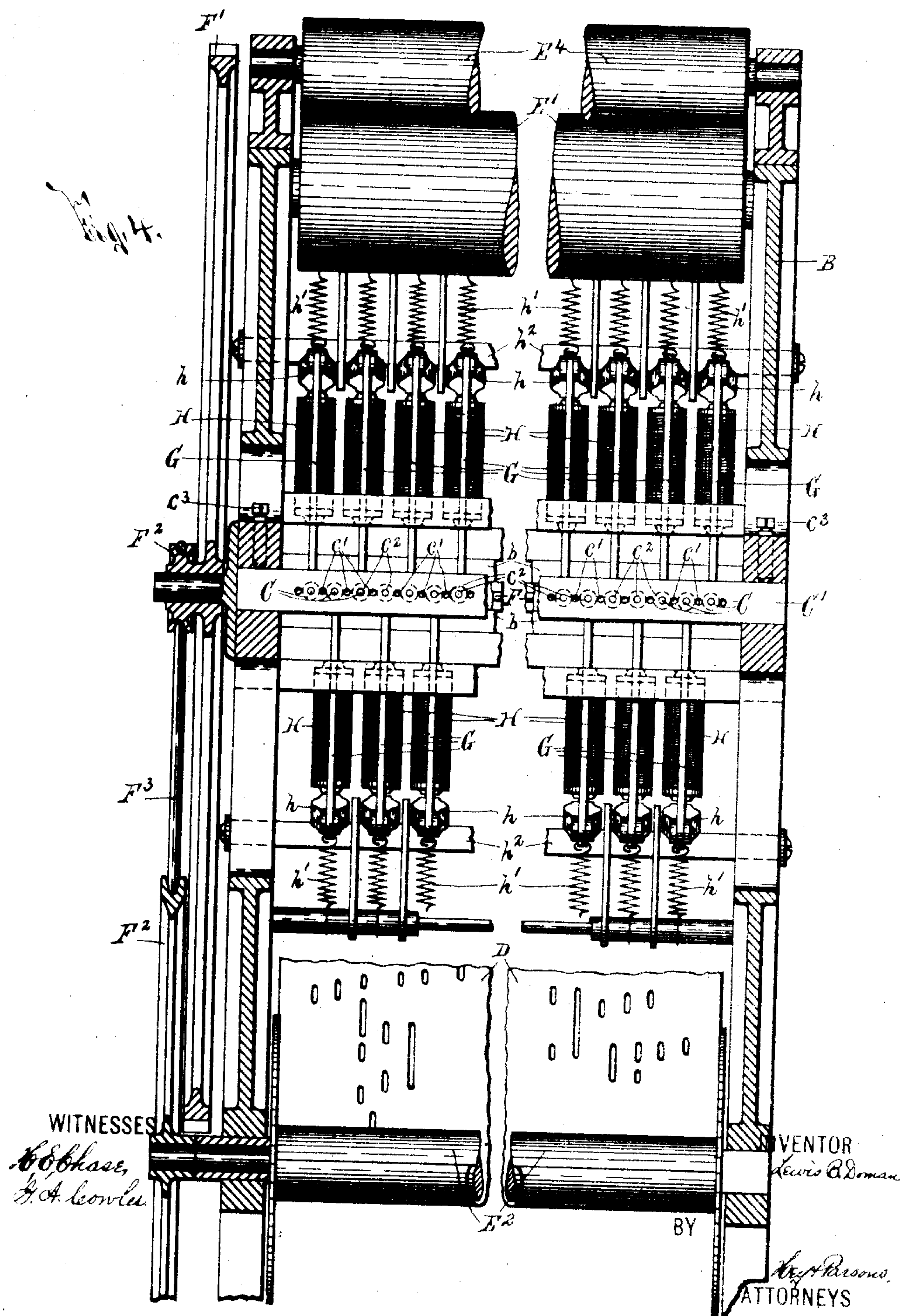


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5 SHEETS—SHEET 4.

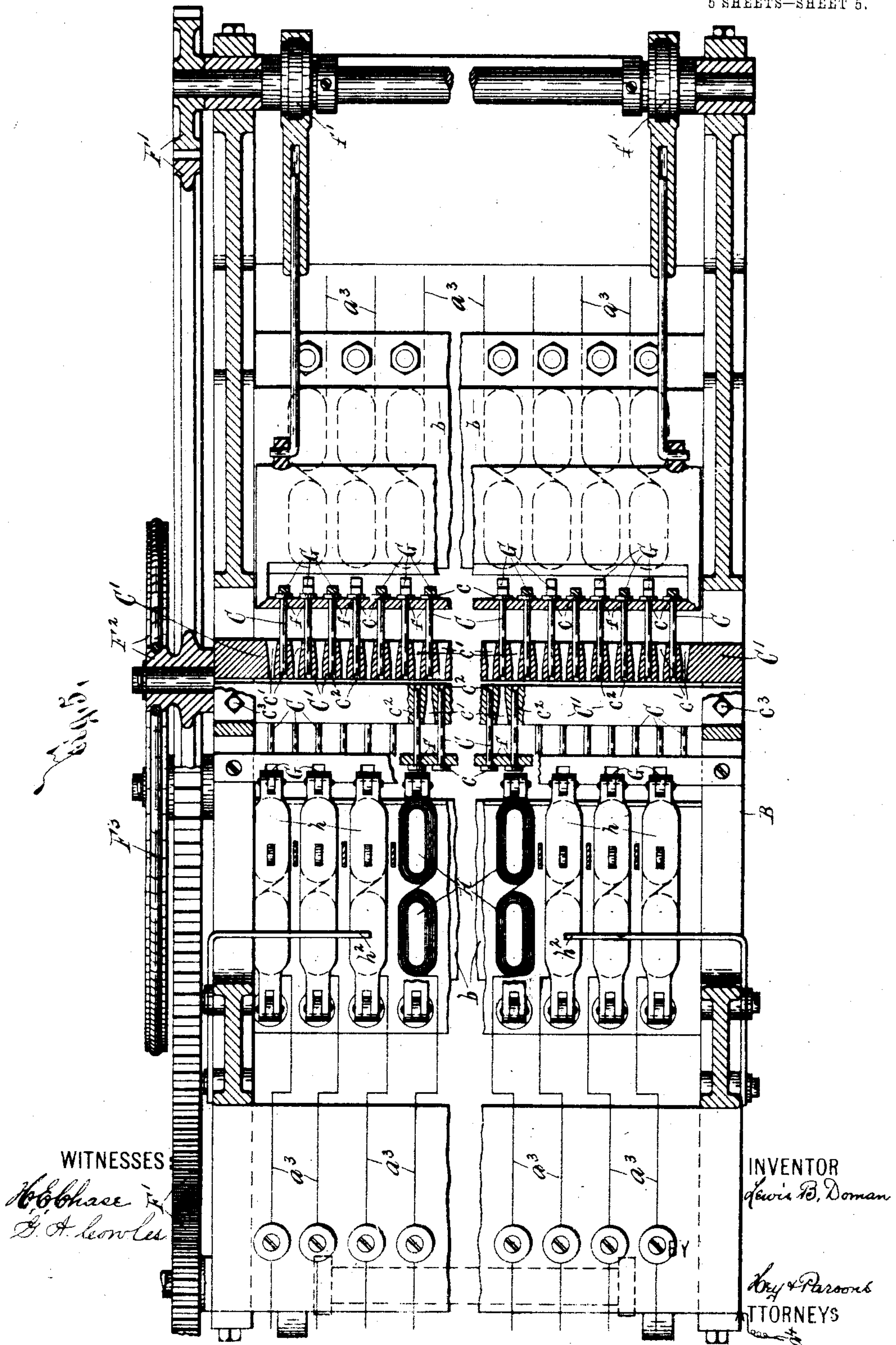


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APPLICATION FILED MAR. 7, 1899.

5 SHEETS—SHEET 5.



UNITED STATES PATENT OFFICE.

LEWIS B. DOMAN, OF ELBRIDGE, NEW YORK, ASSIGNOR TO WILLIAM C. RANNEY, TRUSTEE,
OF ELBRIDGE, NEW YORK.

PERFORATING-MACHINE.

No. 866,920.

Specification of Letters Patent.

Patented Sept. 24, 1907.

Application filed March 7, 1899. Serial No. 708,070.

To all whom it may concern:

Be it known that I, LEWIS B. DOMAN, of Elbridge, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Perforating-Machines, of which the following, taken in connection with the accompanying drawing, is a full, clear, and exact description.

My invention has for its object, the production of a perforating machine, which is particularly applicable for making perforated music-sheets, and is simple and compact in construction, and highly efficient in use; and to this end, it consists in the combination, construction and arrangement of the parts of a perforating machine, as hereinafter fully described and pointed out in the claims.

In describing this invention, reference is had to the accompanying drawings, forming part of this specification, in which, like letters indicate corresponding parts in all the views.

Figure 1 is a top plan, partly broken away, of my improved perforating machine, and a portion of the keyboard of a musical instrument operatively connected thereto, the source of electric energy, and the greater portions of the electric circuits being shown diagrammatically. Fig. 2 is a side elevation of the perforating machine, seen in Fig. 1. Fig. 3 is an enlarged vertical sectional view, partly broken away, taken on line 3—3, Fig. 1. Figs. 4 and 5 are enlarged sectional views, taken, respectively, on lines 4—4, Fig. 2 and 5—5, Fig. 3.

As preferably constructed, my improved perforating machine is actuated by the keys A of a musical instrument, as a piano or organ, and consists of a frame B, punches C, dies C', means for guiding and feeding the sheet or other article to be perforated, actuating and controlling members, electrically-operated means for controlling the operation of the controlling members, and connections between said keys and the electrically-operated means.

The keys A are of any suitable form, size, and construction, and are usually provided with terminals a movable into contact with a terminal a' for completing or opening a series of circuits, which are independently connected, as presently described, to electrically-operated means for controlling the operation of the punches C. Said keys A, although preferably used in connection with the action of a musical instrument, may be entirely removed or disconnected from said instrument, or its action, and used solely for the purpose of effecting the operation of my improved perforating machine. The frame B is of any suitable form, size, and construction, and may, if desired, form a part of the frame, which supports the keys A.

The punches C are usually arranged in a substantially horizontal plane at opposite sides of the path of

the sheet or other article D to be perforated, are movable in opposite directions toward and away from the dies C', and are generally provided with shoulders c. Said dies C' are also generally arranged at opposite sides of the path of the sheet or other article D and are formed with openings c' increasing in diameter from their ends adjacent to said path. In the preferable construction of my invention, the dies at each side of the path of the sheet or other article D are generally formed integral with each other, being here shown as consisting of a single bar formed with a series of openings c' arranged alternately with the openings c' in the opposite bar and alined with the punches C at the opposite side of the path of said sheet or article. Each of said bars is preferably provided with a series of additional openings or guides c², which alternate with the openings c' in said bar, are alined with the openings c' in the opposite bar, and receive the punches C movable toward said opposite bar. The bars provided with the openings c' c² are suitably secured to the frame B, being here illustrated as held in position by set-screws c³. The described arrangement of punches and dies for perforating the sheets or other articles D is particularly efficient, but it is apparent that my invention is not limited thereto, since the punches and dies may obviously be arranged at one side of the path of the sheet or other article D.

The means for guiding and feeding the sheet or other article D usually consists of a pair of guide-rollers E E' supported at one side of the punches C, and having contiguous surfaces engaged with said sheet or other article, and a pair of feeding and presser-rollers E² E³ supported at the opposite or lower side of said punches. The sheet or other article D is guided and fed by said rollers in a substantially vertical plane, and may be wound upon one of the rollers, as the one E², or upon additional rollers, not illustrated. I usually perforate several sheets or other articles D simultaneously, support rolls of said sheets or other articles in suitable separated bearings b b arranged at opposite sides of the rollers E E', and provide an additional guide-roller E⁴ above the contiguous surfaces of the rollers E E'. I also preferably provide one of the rollers E E', as the roller E, with knives e for trimming the sides of the sheet or other article D. The described construction of feeding means for the sheet or other article D is particularly applicable for use with the remaining parts of my perforating machine, but my invention is not limited thereto.

The members for actuating the punches C preferably consist of plungers F F arranged at opposite sides of the path of the sheet or other article D, and movable constantly in the normal use of the machine simultaneously toward and away from each other in suitable guides b provided upon the frame B. Said actuating

members are generally formed with eyes *f*, which encircle the adjacent ends of the punches *C*, and are formed with engaging faces for detachably engaging the shoulders *c* and returning said punches to their normal position. The means for reciprocating the plungers or actuating members *F* preferably consists of eccentrics *f'* suitably connected to said plungers or actuating members, and connected together by any desirable power-transmitting mechanism, as gears *F'*, Fig. 3, which are also connected to suitable means, as pulleys *F''* and a belt *F'''*, Fig. 4, for revolving the feeding roller *E''* previously described.

The members *G* for controlling the operation of the punches *C* preferably consist of oppositely arranged substantially vertical fingers supported at opposite sides of the path of the sheet or other article *D*. In the preferable construction of my invention, the adjacent ends of the members *G* at each side of said path are movable in opposite directions in substantially vertical planes between the punches *C* and engaging faces of the contiguous actuating member *F*, and the extremities of said ends are reduced in thickness and arranged side by side. The opposite ends of the controlling members are suitably connected to any desirable electrically-operated means for controlling their operation, being here illustrated as pivoted to the armatures *h* of electro-magnets *H* supported at opposite sides of the guides *b* for the actuating members *F*. Said armatures *h* are suitably connected to springs *h'*, which retract the armatures from the electro-magnets *H* into engagement with adjustable stops *h''*. The electro-magnets *H* are usually so connected to the controlling members *G* that the electro-magnets at one side of one of said guides *b* control the operation of alternate members *G* at the same side of the sheet or other article *D*, and the electro-magnets at the other side of said one of the guides control the operation of the remaining members *G* at the same side of said sheet or other article.

When the controlling members *G* are in their normal position, the reduced extremities of their adjacent ends are alined with the actuating members *F*, and no movement of the punches takes place, but, as soon as one of the electro-magnets *H* attracts its armature *h*, the controlling member *G* connected to said armature is moved lengthwise until the portion thereof adjacent to said reduced end is alined with the corresponding actuating member, whereupon said actuating member moves said portion of the controlling member toward the sheet or other article *D* and actuates the corresponding punch *C* to perforate said sheet or other article. The described actuating and controlling members and electrically-operated means are particularly suitable for use in connection with the remaining parts of my perforating machine, but it is obvious that any other suitable means may be used to actuate and control the punches *C*, and that, if punches are arranged only at one side of the sheet or article *D*, the actuating and controlling members and the electrically-operated means at the other side of said sheet or other article are unnecessary.

The electro-magnets *H* forming the electrically-operated means of my invention are generally connected independently to the terminals *a* by conductors *a'*, and are connected to a common conductor, as

the frame *B*, which is connected by a conductor *a''* to one pole of a suitable source of electric energy *A'*, as a battery or dynamo-electric machine. The opposite pole of said source of electric energy is connected to the terminal *a'*. Consequently, whenever one of the keys *A* is actuated, the terminal *a* provided on said key is engaged with the terminal *a'* and the normally broken electric circuit connected to said key is complete or open from the source of electric energy to the electro-magnet for controlling the operation of the corresponding controlling member and punch. Said circuit remains complete or open as long as the finger-piece of said one of the keys *A* is depressed, and during the depression of said finger-piece, one of the members *F* successively actuates said punch for perforating the sheet or article *D*. The length or size of the perforations in the sheet or article *D* made by any one of the punches and the intervals between successive perforations made by said punch thus correspond to the length of time that the corresponding key is held out of its normal position, and to the interval of time between the successive operations of said key during the execution of a musical selection upon the instrument provided with said key.

The construction and operation of my improved perforating machine will now be readily understood upon reference to the foregoing description and the accompanying drawings, and, as the construction and arrangement of the component parts of said machine may be more or less varied without departing from the spirit of my invention, I do not herein specifically limit myself to the exact construction and arrangement of said parts.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. The combination of punches arranged at opposite sides of the path of the article to be perforated and provided with engaging shoulders, oppositely arranged actuating members movable toward each other for actuating the punches, said actuating members having faces for engaging the shoulders of the punches and returning the same to their normal position, and controlling members movable between the punches and engaging faces of the actuating members, substantially as and for the purpose set forth.
2. The combination of punches arranged at opposite sides of the path of the article to be perforated, constantly moving mechanical means for moving the punches in opposite directions for perforating said article, electrically-operated controlling members movable between the punches and engaging faces of said means, and a plurality of movable keys for regulating the operation of the respective members, substantially as and for the purpose set forth.
3. The combination of punches arranged at opposite sides of the path of the article to be perforated, oppositely arranged actuating members movable toward each other for actuating the punches to perforate said article, said actuating members being provided with means for returning the punches to their normal position, and oppositely arranged controlling members supported at each side of the path of said article and movable in opposite directions between the punches and engaging faces of the actuating members, substantially as and for the purpose described.
4. The combination of a frame provided with guides arranged at opposite sides of the path of the article to be perforated, punches supported by the frame at opposite sides of the path of said article, actuating members movable in the guides for actuating the punches to perforate said article, oppositely arranged controlling members supported at each side of the path of said article and movable in opposite directions between the punches and engaging

faces of the actuating members, electro-magnets arranged at opposite sides of the guides, and connections between the electro-magnets and the controlling members, said connections operating to transmit motion from the armatures of the electro-magnets at one side of either of the guides to alternate controlling members movable between engaging faces of the adjacent actuating member and the punches actuated thereby, substantially as and for the purpose described.

- 10 5. The combination of punches arranged at opposite sides of the path of the article to be perforated, oppositely arranged actuating members movable simultaneously toward each other for actuating the punches to perforate said article, oppositely arranged controlling members movable between the punches and engaging faces of said actuating members, and a plurality of movable keys independently connected to the controlling members for controlling their operation, substantially as set forth.

6. The combination of punches arranged at opposite sides of the path of the article to be perforated and movable in opposite directions for perforating said article, oppositely arranged actuating members movable simultaneously toward each other for actuating the punches, controlling members for controlling the operation of the punches, electro-magnets for controlling the operation of the controlling members, and movable keys for controlling the action of the electro-magnets, substantially as and for the purpose set forth.

In testimony whereof I have hereunto signed my name in the presence of two attesting witnesses, at Syracuse, in the county of Onondaga in the State of New York this 20th day of May 1898.

LEWIS B. DOMAN.

Witnesses:

K. H. THEOBALD,
E. A. WEISBURG.