

No. 735,952.

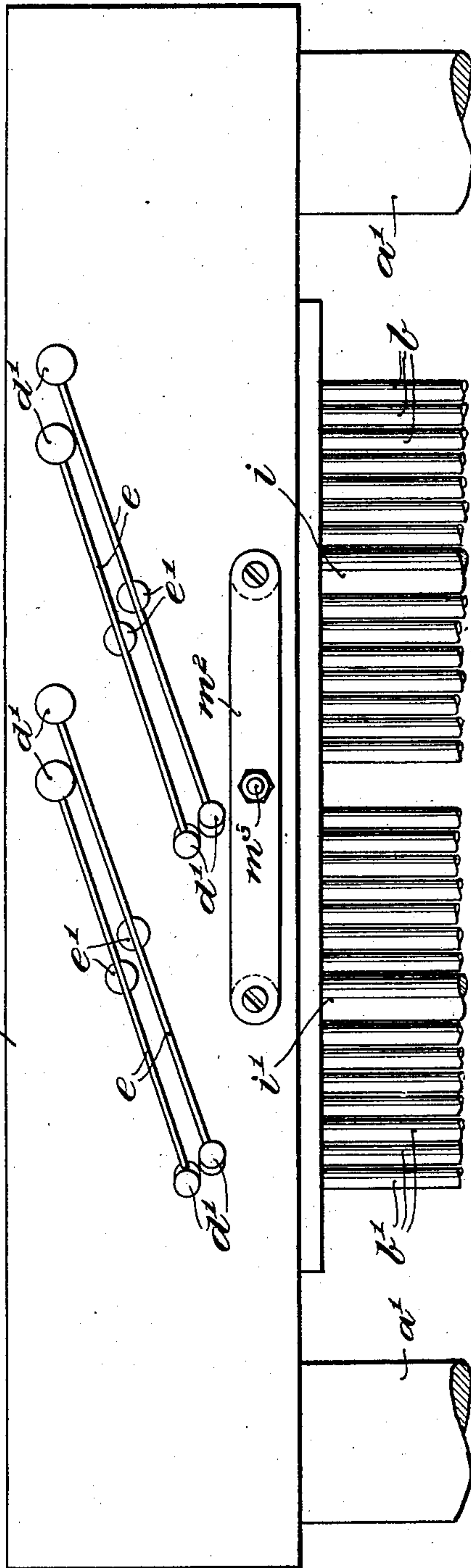
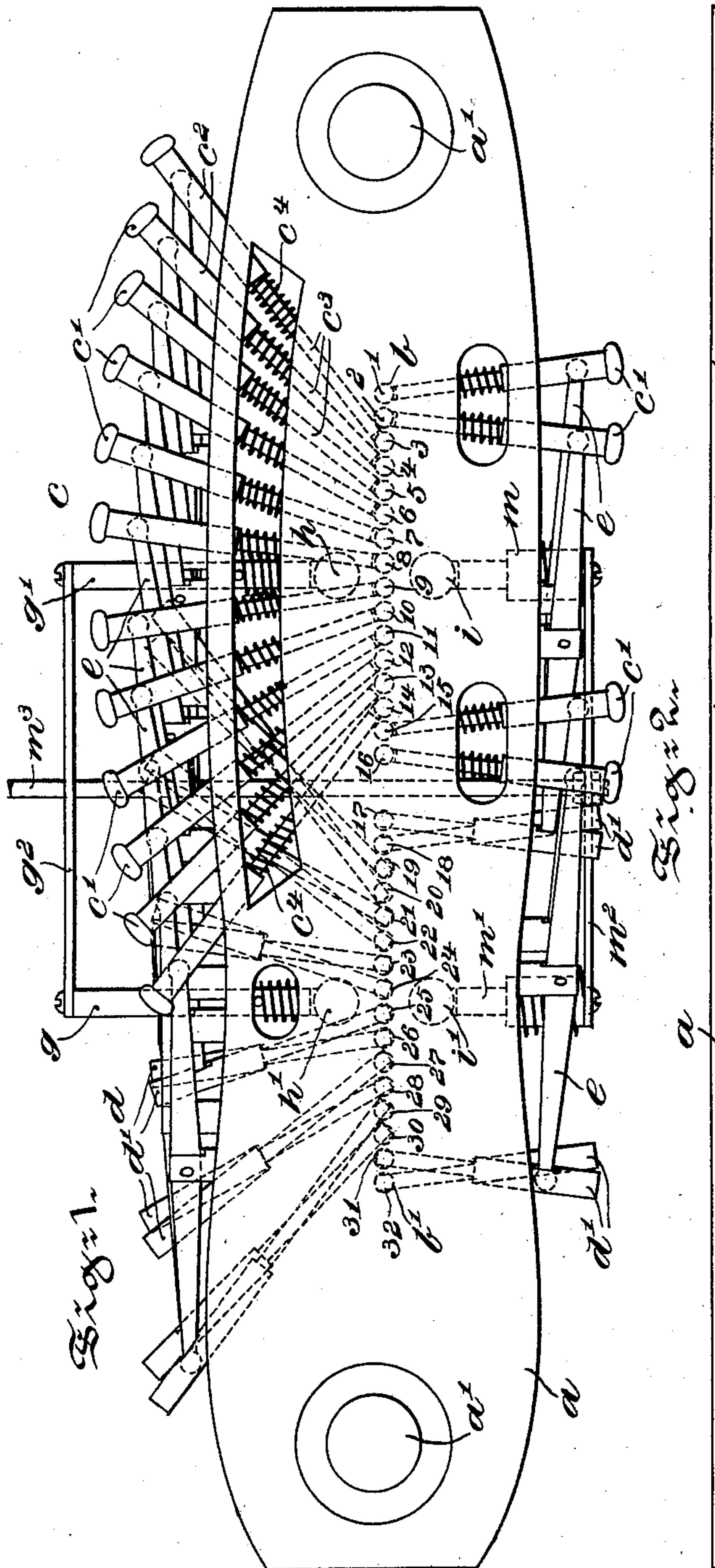
PATENTED AUG. 11, 1903.

J. B. DAVIDSON.
PIANO CARD PUNCHING MACHINE.

APPLICATION FILED JUNE 1, 1903.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses:
Jas. C. Woburnsmith.
Thomas M. Smith.

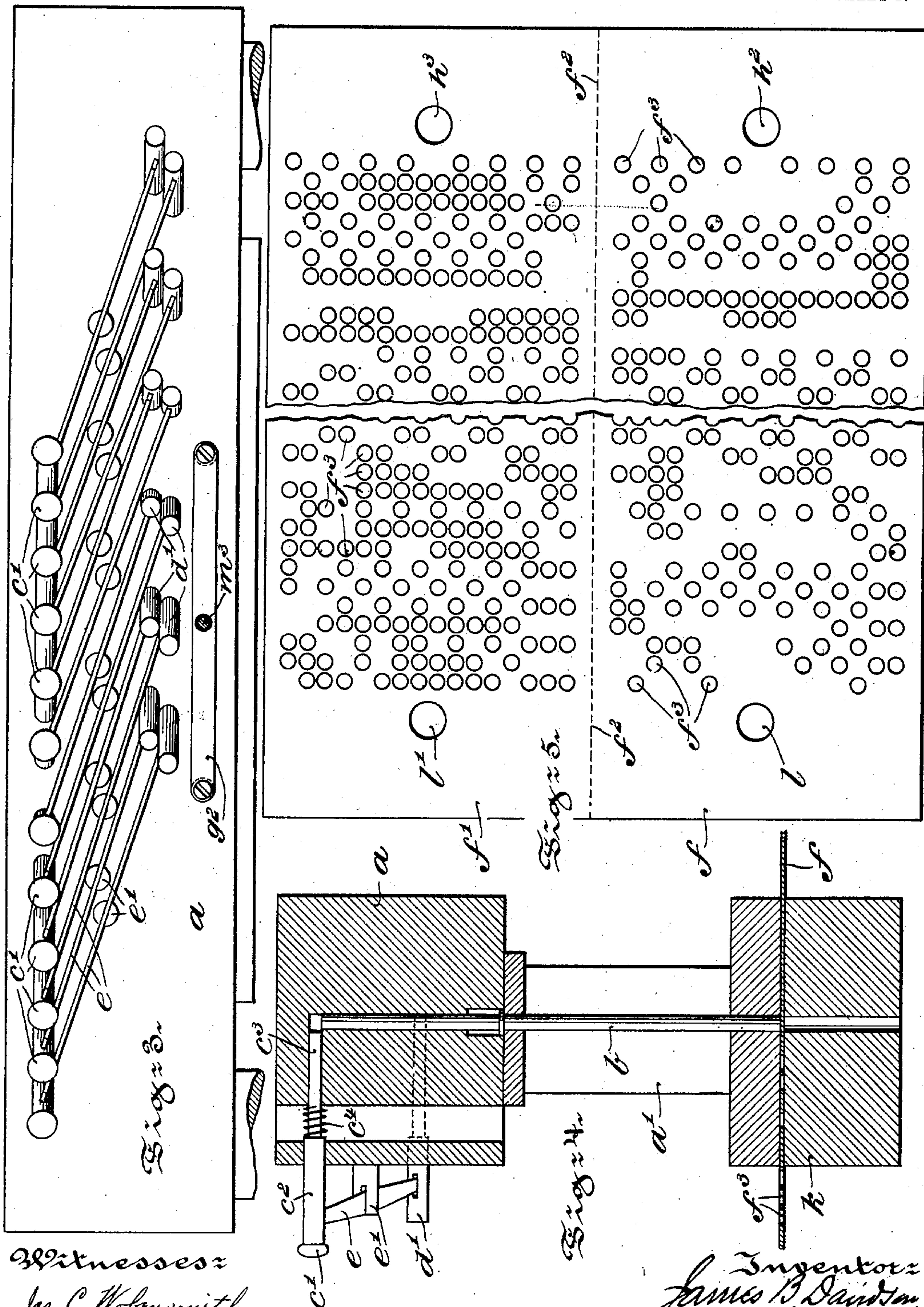
Inventor:
James B. Davidson,
By J. Walter Douglas
Attorney.

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3 SHEETS—SHEET 2.



Witnesses:
Jas. C. Wolmsmith.
Thomas M. Smith.

Inventor:
James B. Davidson,
By J. Walter Dugan,
Attorney.

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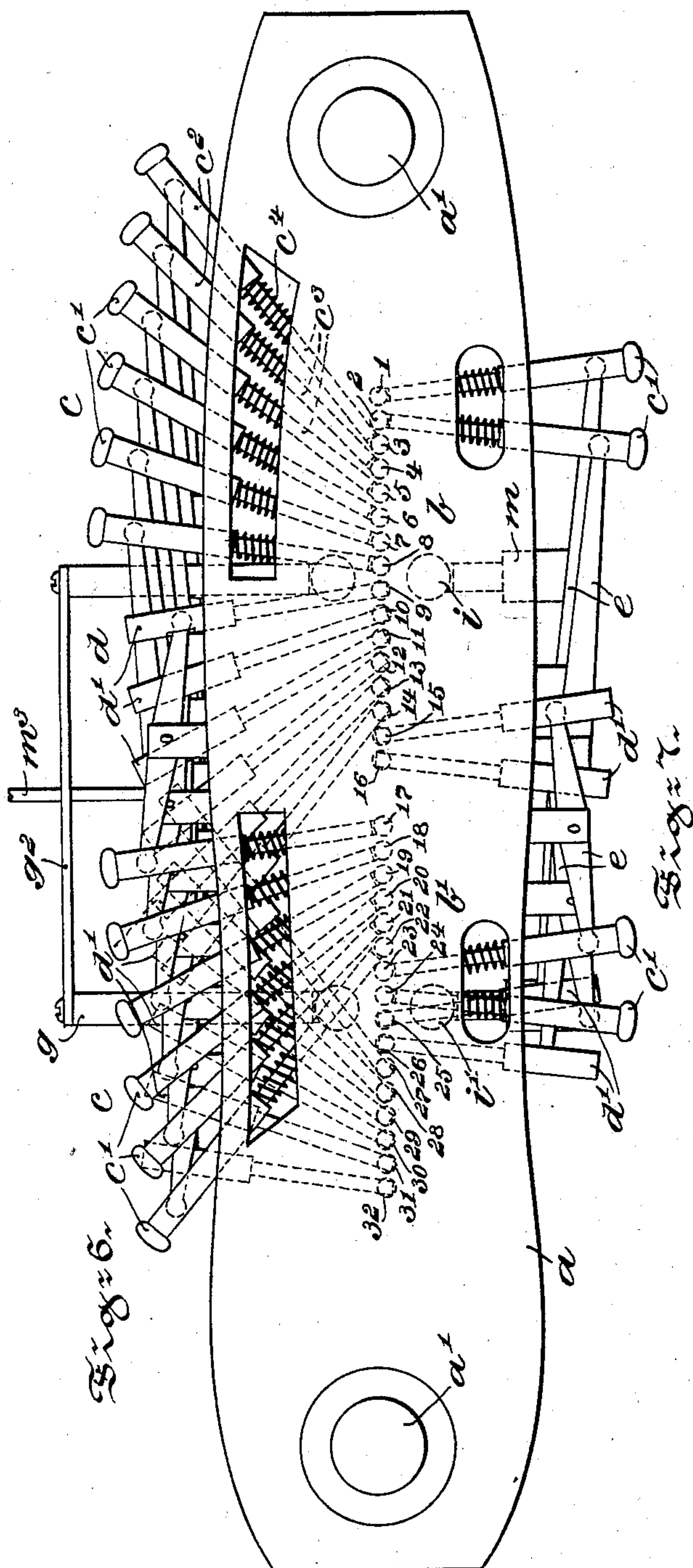
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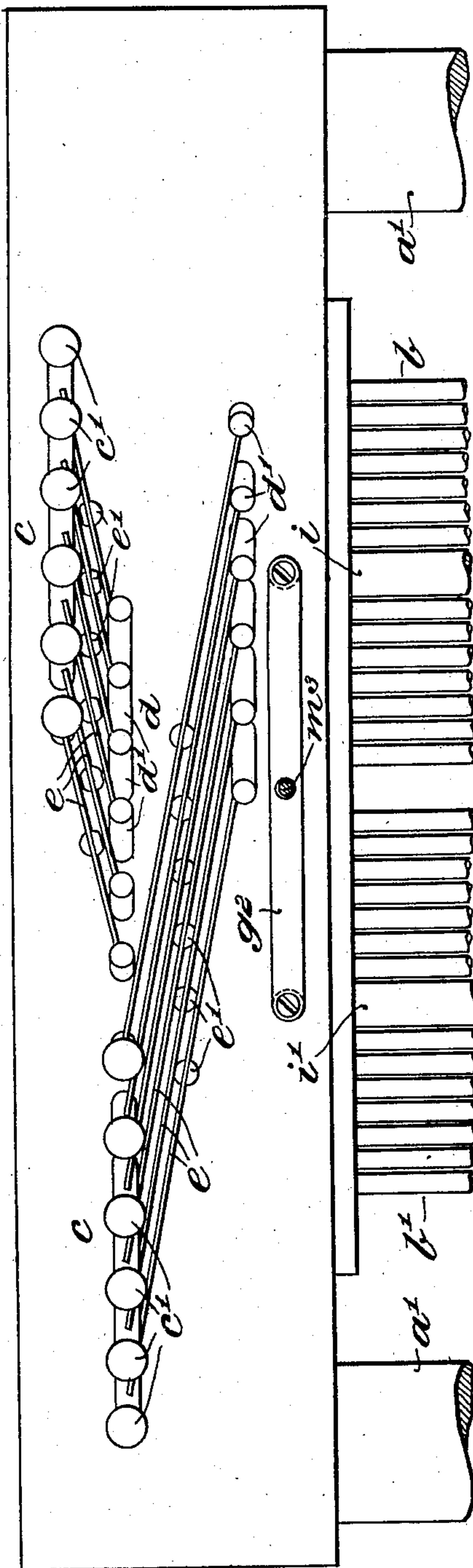
NO MODEL.

3 SHEETS—SHEET 3.



38 witnesses:

Jas. C. Wolensmith.
Thomas M. Smith.



Inventor:
James B. Davidson,
By J. Walter Dugan
Attorney.

UNITED STATES PATENT OFFICE.

JAMES B. DAVIDSON, OF PHILADELPHIA, PENNSYLVANIA.

PIANO CARD-PUNCHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 735,952, dated August 11, 1903.

Application filed June 1, 1903. Serial No. 159,418. (No model.)

To all whom it may concern:

Be it known that I, JAMES B. DAVIDSON, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Piano Card-Punching Machines, of which the following is a specification.

My invention has relation to a card-punching machine, which has become known as a "piano-machine," and in such connection it relates to the head, the arrangement of punches, and mechanism for controlling the same.

The principal objects of my invention are, first, to provide a head with punches and keys by means of which either one, two, or more cards may be simultaneously punched by the machine; second, to provide the head with two or more groups of punches separated from each other, one group of punches being adapted to punch a card and another group of punches adapted to punch a card having a certain relationship to the first card; third, to provide the head of such a machine with keys and arranging the keys in said head so that one group of punches may be actuated with a portion of the keys hitherto required for such purpose, or a key of one group of punches may control two punches of the two or more groups of punches; fourth, to provide mechanism by means of which a key of one set of keys controlling a certain punch of one group may be connected with a key of another set of keys controlling a certain punch of another group of punches, and, fifth, to provide in a card-punching machine a head, with groups of punches separated from each other in said head, and keys, one of said keys being adapted to control two punches of the groups of punches of said head.

My invention, stated in general terms, consists of a piano card-punching machine constructed and arranged in substantially the manner hereinafter described and claimed.

The nature and scope of my present invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, in which—

Figure 1 is a top or plan view of the head or block of a piano card-punching machine,

illustrating two groups of punches and two sets or groups of keys for operating the same embodying main features of my invention; Figs. 2 and 3 are respectively front and rear elevational views of the head of Fig. 1. Fig. 4 is a vertical sectional view of the head and punching-table arranged below the same. Fig. 5 illustrates in plan view two cards simultaneously punched by the head. Fig. 6 is a top or plan view of a head or block, illustrating a modified arrangement of keys; and Fig. 7 is a rear elevational view of the head.

In the drawings only the head or punch carrying portion of the machine, together with such auxiliary parts as are necessary to an understanding of my present invention, have been illustrated. The head *a* is connected with the machine by means of rods *a'* and is operated in the usual manner. In the head *a*, as an exemplification of my invention, are arranged groups of punches *b* and *b'*, separated from each other and ranging in numbers from 1 to 16 and from 17 to 32, inclusive, as shown in Figs. 1, 2, 3, 6, and 7. With reference to Figs. 1 to 4, inclusive, the group of punches *b* is controlled by a set of keys *c*, preferably twelve keys *c'* engaging punches 3 to 14, inclusive, from the back of the head *a*, and preferably four keys *c'* engaging punches 1 and 2 and 15 and 16 from the front of the head *a*. Each of the keys *c* is movably arranged in openings or channels of varying diameters traversing the head *a* and terminating above each of the groups of punches *b* and accommodating the finger portion *c²*, engaged by the operator, and the contracted or locking portion *c³* of the key engaging a punch proper. A spring *c⁴*, arranged on each of the contracted portions *c³* of the keys *c'* of the set of keys *c*, bears with one end against the finger portions *c²* thereof and with the other end against the head *a* to retract the keys *c'* and hold their locking ends *c³* out of engagement with the punches of the group of punches *b*. This group of punches *b* so freed from their controlling-keys *c'* will not punch holes in a card when the head *a* is depressed unless each of said keys is actuated by the operator. The second group of punches *b'* is controlled by a set of keys *d*, which in the same manner as the keys *c'* are engaged in openings travers-

ing the head *a* and terminating above each of the group of punches *b'*. Preferably twelve of the keys *d'* of the set of keys *d* control in a similar manner the punches 19 to 30 of the second group of punches *b'* from the back of the head *a*, and preferably four keys *d'* engage punches 17 and 18 and 31 and 32 of the group *b'* from the front of the head *a*. These keys *d'*, however, are not provided with retracting-springs and are controlled with respect to their position in the head *a* by the set of keys *c* and their springs *c'*. For this purpose each of the keys *c'* of the set of keys *c* is engaged by a lever *e*, which with its other end engages a certain key *d'* in a manner as shown in Figs. 2 and 3. Each of the levers *e* is pivotally arranged in a bracket *e'*, suitably secured to the head *a* and is adapted to hold the keys *d'* of the set of keys *d* in a locked position above the group of punches *b'*, so that these punches are normally locked to the head *a*, as shown in Fig. 1.

The arrangement of the groups of punches *b* and *b'* in the head *a*, as shown, is equal to the width of two cards having sixteen holes each and also allowing for the necessary margin between the holes and the edges of the cards. Two independent cards might therefore be punched separately by the head *a*. It is, however, preferable to employ a card of double width, such as shown in Fig. 5, which after the completion of the punching operation may be divided in any suitable manner by cutting the same at the point indicated by the dotted lines *f'* in Fig. 5.

In the preferred arrangement of the groups of punches *b* and *b'* and the sets of keys *c* and *d*, as shown in Fig. 1, only the group of punches *b'* would punch a row of sixteen holes in the portion *f'* of the card *f*. It follows, therefore, that when one of the keys *c'* of the set of keys *c* is operated so as to bring its locking end *c'* above a punch of the groups of punches *b* one of the keys *d*, connected with the actuated key *c'* by a lever *e*, will at the same time be withdrawn, so as to free one punch of the group of punches *b'* from the head *a*. The same action takes place when more than one of the keys *c'* are operated, in which instance a corresponding number of keys *d'* are moved into an inoperative position to thereby free their respective punches. If the head *a* is depressed with certain of the keys *c'* actuated by the operator, there will be punched on the card *f* a number of holes which will not appear in the same place on the card *f'*. The card *f*, punched by the group of punches *b*, will, however, have a certain relationship to the card *f'*, punched by the group of punches *b'*.

The preferred arrangement of the groups of punches *b* and *b'* and their controlling sets of keys *c* and *d* in the head *a*, as shown in Fig. 1, is as follows: The punch 1 of the group of punches *b* is connected, by its key *c'*, a lever *e*, and a key *d'*, with the punch 18 of the

group of punches *b'*, the punch 2 with the punch 17, the punch 3 with the punch 20, the punch 4 with the punch 19, and so on throughout the entire groups of punches *b* and *b'* in regular sequence.

The punch 1 of the group *b* represents an irregular or odd punch, the punch 2 of the group *b* a regular or even punch, and so on in pairs through the entire groups of punches. The punches in the group *b'* are arranged in pairs of regular and irregular punches; but in this instance, however, the regular punches precede the irregular punches. The connection of the two groups of punches in Fig. 1 is such that all the irregular or odd punches of the group *b* are connected with all the regular or even punches of the group *b'* to suit the draw-in of the loom.

In the modified arrangement of the keys in the head *a*, as shown in Figs. 6 and 7, the sets of keys *c* and *d* are not arranged each in a distinct group, as shown in Fig. 1, but are divided. A portion of each of the sets of keys *c* and *d* are in this instance adapted to control a group of punches, as shown in Fig. 6. In this arrangement of keys the punch 1 of the group of punches *b* is connected with the punch 25 of the group of punches *b'*, the punch 2 of the group *b* with the punch 26 of the group *b'*, the punch 3 with the punch 27, and so on in regular sequence up to the punch 8 of the group *b*, which is connected with the punch 32 of the group *b'*. The punch 9 of the group *b* is connected with the punch 17 of the group *b'*, and so on in regular sequence until the last punch 16 of the group *b* is reached, which is connected with the punch 24 of the group *b'*.

Instead of connecting the punches of each group of punches *b* and *b'* in the manner illustrated and described the same may be connected differently—for instance, the punch 1 of the group *b* may be connected with the punch 17 of the group *b'* or with any other key, or vice versa. At the same time the set or group of keys *d*, or a portion thereof, may be provided with retracting-springs instead of the set *c*. A single card may also be punched by the head *a*, if required, in which instance only the group of punches *b* will be operated. In the drawings two separated groups of punches are illustrated, each containing sixteen punches. If only eight punches are required for a group of punches, four groups of punches may be placed in the head. Instead of two cards, as shown, four cards may be simultaneously punched.

In addition to the sets of keys shown the head *a* is, moreover, provided with spring-controlled keys *g* and *g'*, connected with each other by a bar *g'*. These keys are normally held out of engagement with peg-hole punches *h* and *h'*, arranged in rear of the groups of punches *b* and *b'*, as shown in Fig. 1. When the cards are introduced into the punching table or bed *k* of the machine, as shown in

Fig. 4, and when the first row of holes f^3 are punched by certain punches of the groups of punches b and b' , the punches h and h' are simultaneously operated by means (not shown) and will punch the peg-holes h^2 and h^3 in the cards f and f' . In the same manner when the last row of holes f^3 are punched in the cards f and f' the peg-holes l and l' are at the same time punched in the cards f and f' by means of punches i and i' , arranged in front of the groups of punches b and b' , which peg-hole punches are controlled by keys m and m' , connected with each other by a bar m^2 . To this bar m^2 is attached a wire m^3 , passing through the head a , by means of which and by mechanism (not shown) the keys m and m' and peg-hole punches i and i' are operated.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a card-punching machine, a head, groups of punches separated from each other in said head, and means carried by said head and adapted to control said groups of punches separated from each other so as to punch more than one card at a time.

2. In a card-punching machine, groups of punches separated from each other, and keys, whereof one of said keys is adapted to control the action of two punches of the groups at a time simultaneously.

3. In a card-punching machine, a head, groups of punches separated from each other in said head, sets of keys arranged in said head, each set of keys adapted to control certain of the punches in each group of punches of said head.

4. In a card-punching machine, a head, groups of punches separated from each other in said head, and keys, one of the keys adapt-

ed to control two punches of the groups of punches of said head.

5. In a card-punching machine, a head, groups of punches separated from each other in said head, sets of keys arranged in said head, each set being adapted to control punches of each group of punches in said head, and means adapted to hold certain keys in an inoperative position with respect to their punches, and certain other keys in an operative position with respect to their punches.

6. In a card-punching machine, a head, groups of punches separated from each other in said head, sets of keys arranged in said head, each set of keys adapted to control certain of the punches of each group of punches of said head, and means adapted to connect a key of one set of keys with a predetermined key of another set of keys.

7. In a card-punching machine, a head, groups of punches separated from each other in said head, sets of keys arranged in said head, each set of keys adapted to control a group of punches or certain of the punches of said groups, means adapted to connect a key of one set of keys controlling a certain punch of one of the groups of punches, with a predetermined key of the other set of keys controlling a certain punch of another group of punches, and means adapted to control the connected keys in respect to their position in said head so as to free one of said keys from its punch and to lock the other to its punch.

In testimony whereof I have hereunto set my signature in the presence of two subscribing witnesses.

JAMES B. DAVIDSON.

Witnesses:

J. WALTER DOUGLASS,
THOMAS M. SMITH.