

(No Model.)

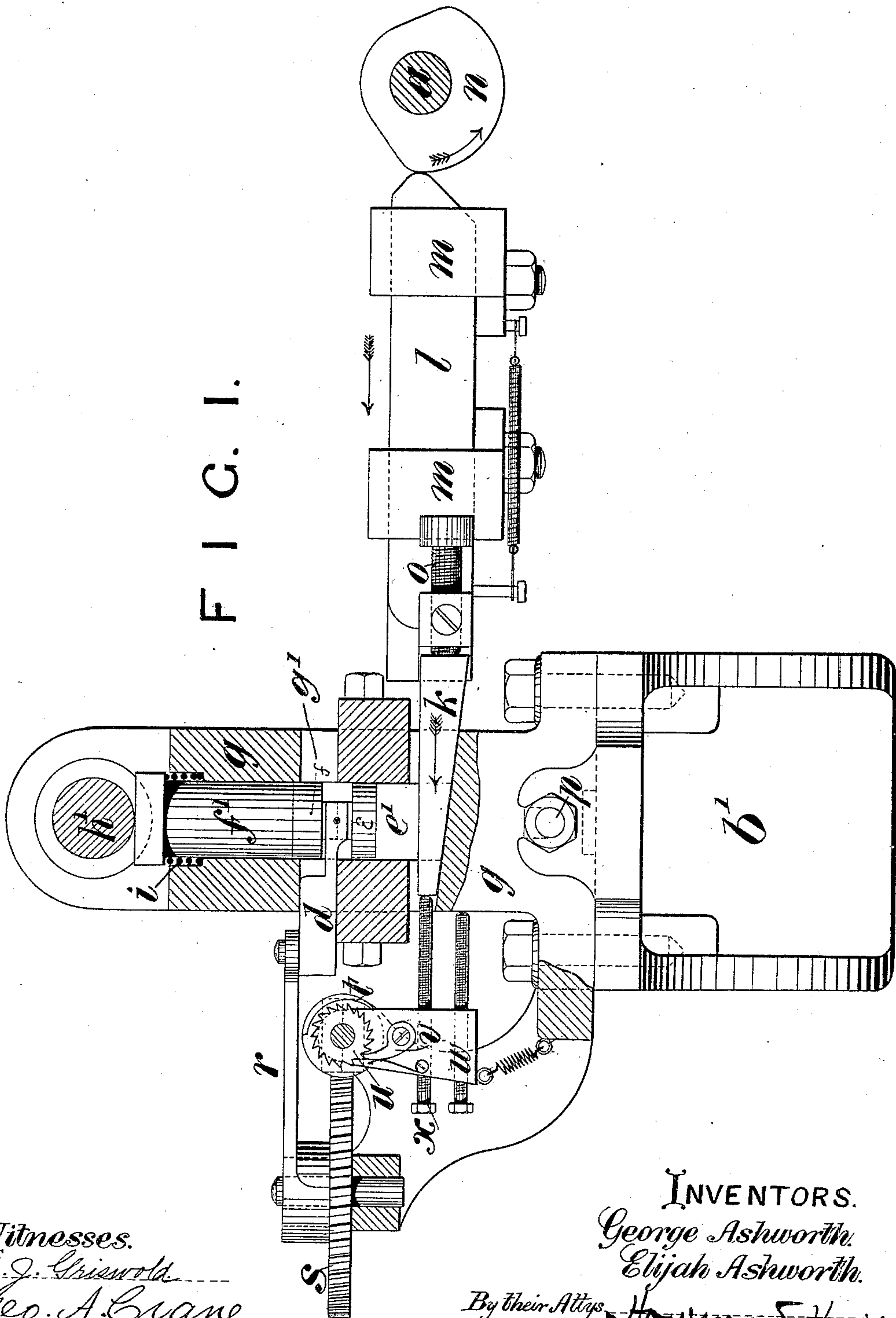
3 Sheets—Sheet 1.

G. & E. ASHWORTH.

APPARATUS FOR FLATTENING CARD WIRE AT INTERVALS.

No. 398,212.

Patented Feb. 19, 1889.



Witnesses.

E. J. Griswold
Geo. A. Crane

INVENTORS.

George Ashworth
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By their Attys *Howson and Howson*

(No Model.)

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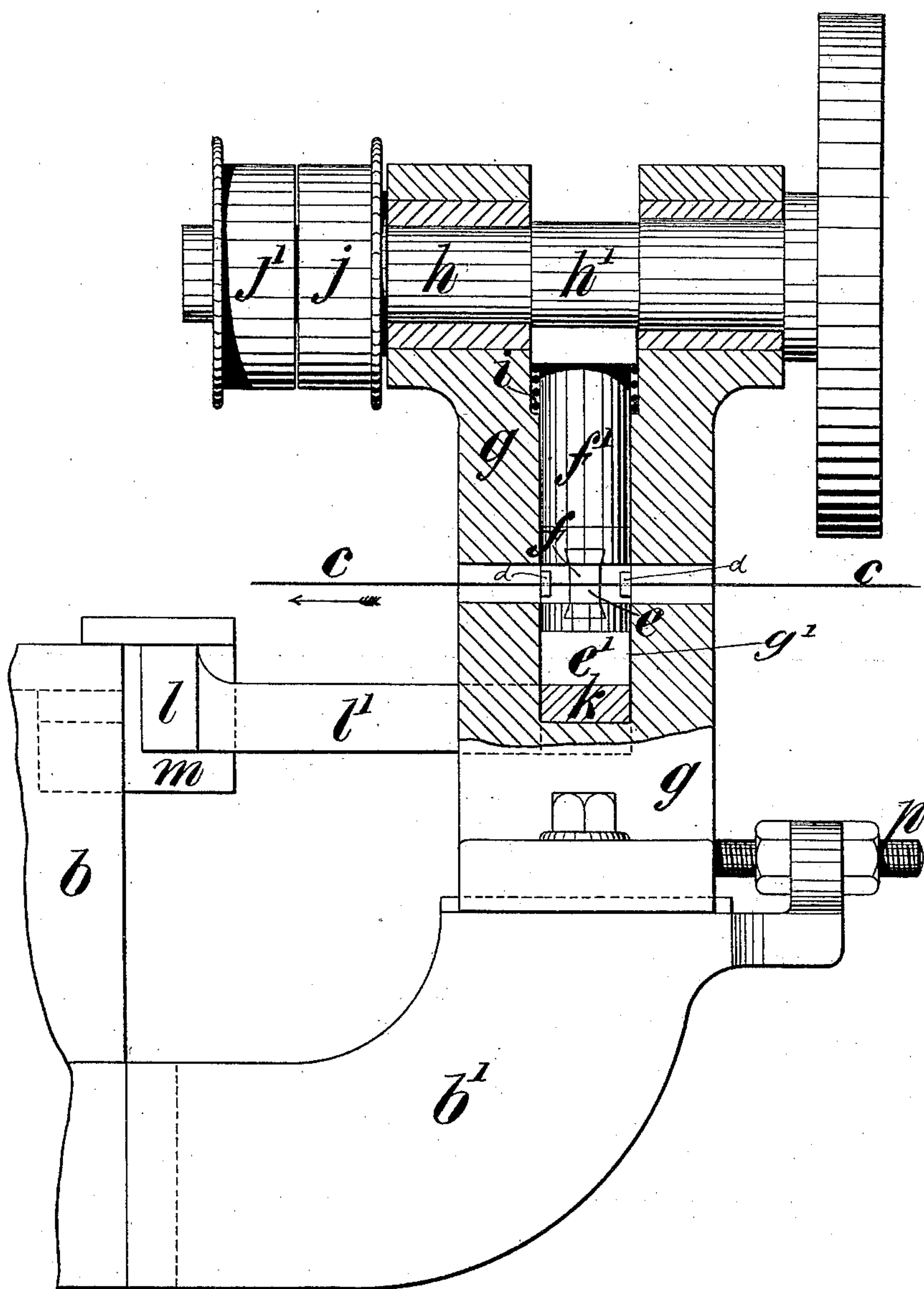
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F I G. 2.



Witnesses.

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(No Model.)

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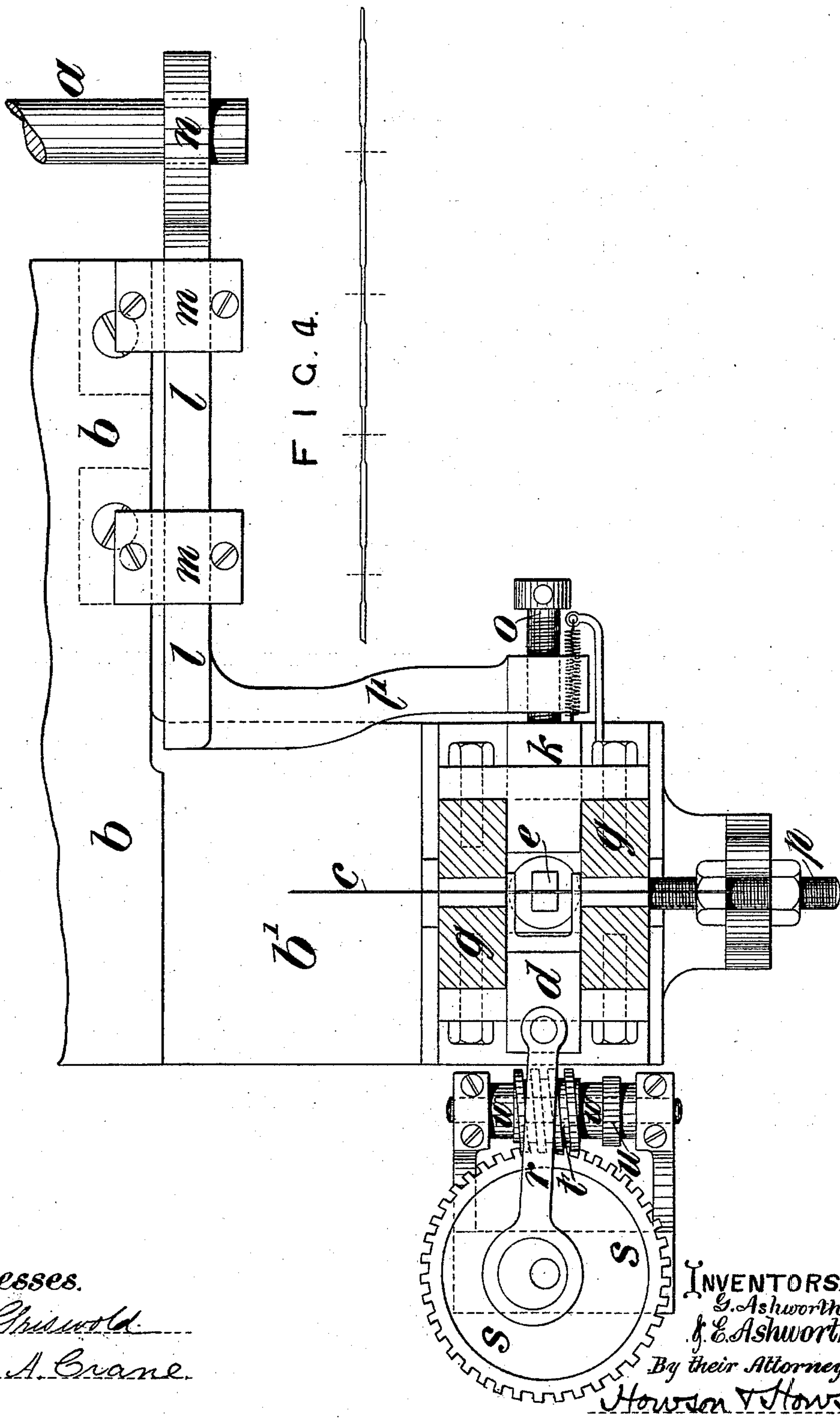
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FIG. 3.



Witnesses.

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UNITED STATES PATENT OFFICE.

GEORGE ASHWORTH AND ELIJAH ASHWORTH, OF MANCHESTER, COUNTY OF LANCASTER, ENGLAND.

APPARATUS FOR FLATTENING CARD-WIRE AT INTERVALS.

SPECIFICATION forming part of Letters Patent No. 398,212, dated February 19, 1889.

Application filed June 25, 1888. Serial No. 278,086. (No model.)

To all whom it may concern:

Be it known that we, GEORGE ASHWORTH and ELIJAH ASHWORTH, engineers, subjects of the Queen of Great Britain and Ireland, residing at Manchester, county of Lancaster, England, have invented certain Improvements in Apparatus for Flattening or Shaping Card-Wire at Intervals, of which the following is a specification.

Our invention relates to the flattening at intervals of the wire used in the manufacture of wire cards. By the use herein of the term "flattening" we do not exclude the ovalizing of round wire or other not specified alterations of the section of the wire. In the manufacture of wire cards staples have been used which have been flattened from the points to the bend of the staple or thereabout, the wire used having been flattened at intervals by pressure between dies. When using the hard-steel wire, the said method of flattening is not suitable, and the object of our invention has been to devise a method which would be more effective. We flatten the wire by means of a rapidly-vibrating hammer or presser, which we will term the "flattener," and which effects the alteration in section by means of a number of successive blows or squeezes, so that the alteration is gradually produced. We move the anvil toward the flattener as the flattening of any part proceeds, or otherwise move the part which acts upon the flattener, so as to cause the flattener to approach nearer to the anvil while the wire is not being fed forward, in order to effect the flattening gradually.

We will describe our invention more fully with reference to the accompanying drawings.

Figure 1 is a side elevation, partly in section, of the apparatus which we have designed for application to an ordinary card-setting machine, the plane of the view being at right angles with the axis of the cam-shaft of such machine. Fig. 2, also partly in section, is a front elevation of the same apparatus. Fig. 3 is a plan of the apparatus with the upper part removed to show the anvil over which the wire traverses. Fig. 4 represents a piece of wire flattened at intervals.

In Figs. 1 and 3 the cam-shaft of the card-setting machine is indicated by *a*, and in Figs.

2 and 3 a part of the table which carries the acting parts of such machines appears at *b*. The apparatus which we employ for flattening the wire is bolted to a bracket, *b'*, which we secure to the side of the machine-framing. The wire which is being fed to the setting-machine is indicated by *c*. The said wire passes through eyes in a forked guide, *d*, and between an anvil, *e*, and a vibrating presser, *f*. This presser is secured to or formed upon the lower end of a presser-piece, *f'*, which is fitted to slide vertically in a bored cavity in the standard *g*. The anvil-block *e'* is also fitted to slide in a square chamber below the said cavity, the walls of the said chamber being formed by the two sides of a cross-slot in the standard *g* and the inner ends of two blocks, *g'*, which are secured to the standard. A horizontal shaft, *h*, is mounted to revolve in bearings in the upper part of the standard, and is formed with an eccentric or cam, *h'*, against which a head upon the presser-piece *f'* is forced by a spring, *i*. A rapid revolving motion is imparted to the shaft *h* by means of a belt-pulley, *j*, a corresponding loose pulley, *j'*, being mounted upon the shaft. The part *h'* has a very slight amount of eccentricity, and the speed of revolution is very high, so that during the time required to form and insert one card staple several to and fro movements are imparted to the presser, the spring *i* reacting against the pressure of the eccentric. The anvil-block *e'* is supported by a wedge, *k*, which is fitted to slide horizontally in the bottom of the cross-slot *g'*. A sliding bar, *l*, mounted in bearings *m m*, is acted upon by a cam, *n*, which is fixed upon the cam-shaft of the setting-machine, and which appears in Fig. 1. The said bar is formed with an arm, *l'*, which is provided with an adjustable screw, *o*. The end of this screw bears upon the thicker end of the wedge *k*, which is kept in contact with the screw by means of a spring. The cam *n* is formed to impart a sliding movement in the indicated direction to the bar *l*, and such movement is transmitted to the wedge. A spring effects the return movement of the bar. As the wedge slides to and fro, the anvil is raised and lowered. Preparatory to the wire being fed forward the wedge makes a rapid movement in the direc-

tion contrary to that indicated by the arrow, whereby the anvil is lowered for the free passage of the wire. The wedge next makes a quick return movement in the indicated direction, and the anvil is thereby raised, the parts being so adjusted as that the wire is nipped between the anvil and the vibrating presser and slightly flattened. During nearly half a revolution of the cam-shaft the wedge is gradually moved in the indicated direction by the slightly eccentric part of the cam *n*, which is just ceasing to act in Fig. 1, the anvil being thus gradually raised. This gradual raising of the anvil takes place during the time required for the parts of the ordinary machine to sever a length of wire, bend it into a staple, and insert it in the foundation. It will be seen that during this gradual lifting of the anvil the wire will become gradually flattened between the vibrating presser and the anvil, the change in section being effected by a number of successive squeezes. Preparatory to the ordinary forward movement of the wire the anvil is lowered. The wire is then fed forward in the indicated direction by the ordinary mechanism.

In Fig. 1 the parts are in the position they assume when a flattening operation is complete, the next movement being the quick return movement of the wedge. The length of each flat formed in the wire is less than the length of wire which is severed to form a staple, so that parts of the wire extending between the flat places are left round, as seen in Fig. 4. The flattening apparatus is so adjusted in position as that the cutting-dies shall sever the wire in the center of the flat places at the point indicated by the dotted lines. To enable this adjustment to be effected with nicety, the standard *g* is mounted to slide in a straight line upon the bracket *b'* in a direction parallel with the line of movement of the card-wire, the adjustment being effected by means of a fine threaded screw, *p*.

The apparatus as so far described is complete for the purposes of our invention; but it will be readily understood that if the wire passed over the anvil in a fixed line the faces of the anvil and presser would in time become grooved, however hard such surfaces might be made. We therefore prefer to shift the line of movement of the wire either at intervals or by a continuous to-and-fro movement. For this purpose we have devised a mechanism which slightly moves the guide *d* after each flattening operation. The said guide is fitted to slide in a direction at right angles to the general line of movement of the wire. To the guide *d* is hinged one end of an eccentric-link, *r*, which is mounted upon an eccentric which is formed or fixed upon a worm-wheel, *s*, which revolves upon a fixed stud. A worm, *t*, engages with this worm-wheel, and upon the worm-shaft is fixed a ratchet-wheel, *u*. A catch, *v*, which engages with this ratchet-wheel, is mounted to swivel upon a stud which is fixed to a lever, *w*, which

swings upon the worm-shaft. This lever is provided with an adjustable screw, *x*. At each forward movement of the wedge to lift the anvil-block the thin end of the wedge strikes the end of the screw *x*, whereby the lever *w* is moved in the indicated direction and the catch *v* turns the ratchet-wheel to the extent of a tooth. It will be seen by repetitions of these movements that the wire will be traversed to and fro over the face of the anvil. The guide *d* might be moved at intervals by the attendant; but we prefer the self-acting mechanism for the purpose. The anvil and the presser are fitted into dovetail grooves in the parts *e'* and *f'*, as seen in Fig. 2, in order that they may be readily changed or removed for repairs. The apparatus is such as we propose to use in the formation of the card-tooth, for which we made application for a patent on March 18, 1887; but it may be used in the production of any other card-tooth which is flattened, ovalized, or changed in section for a part of its length. In some cases the apparatus would be applied to the card-setting machine in such a manner as that the presser would vibrate horizontally instead of vertically.

It will be understood that when using the apparatus to ovalize the wire, or to otherwise change the section of the wire at intervals, the anvil and presser would be prepared to effect the required change in section instead of being flat upon their faces.

We have shown and described our apparatus as being attached to the card-setting machine, so as to work in concert with the same, because we are adopting this arrangement in our own practice; but it must be understood that in some cases the machine might be quite independent of the setting-machine, it being only necessary to provide it with a cam-shaft corresponding to the shaft *a* and with a motion for drawing forward the wire. The means for raising the anvil may be modified or varied; or, if preferred, the anvil might be fixed and the presser gradually lowered, either by lowering the bearings of the shaft *h* or by interposing a sliding wedge between the eccentric *h'* and the head of the presser-piece *f'*.

Having fully described our invention, we state that what we claim is—

1. In a machine for flattening or altering the section of card-wire by pressure, a rapidly-vibrating presser and an anvil, in combination with parts for decreasing the mean distance between the presser and anvil during each flattening operation and increasing the distance after the operation, and with a feeding mechanism timed to be inoperative while that distance is so diminished, whereby the wire is flattened or shaped by a succession of squeezes or blows, substantially as set forth.

2. In a machine for flattening or altering the section of card-wire, a rapidly-vibrating presser and an anvil, in combination with the wire-guide, the eccentric-link, the worm-wheel

carrying an eccentric, the worm, the ratchet-wheel and catch, and a moving part of the machine to act on the latter at each flattening operation, substantially as and for the purpose set forth.

3. In a machine for flattening or altering the section of card-wire, the rapidly-vibrating presser and the anvil, in combination with parts for gradually moving the said anvil toward the presser during the operation and from it after such operation, and a feeding mechanism timed to be inoperative while the anvil is so moved toward the presser, so that the flattening is effected by a succession of squeezes or blows, substantially as set forth.

4. In a machine for flattening or altering the section of card-wire, the rapidly-revolving eccentric h' , the presser-piece f' , the spring l , the presser, and the movable anvil, in combination with the sliding wedge for moving the anvil toward the presser, substantially as set forth.

5. As applied to a card-setting machine, the rapidly-vibrating presser, the movable anvil, the sliding wedge, the sliding bar l , and the

cam for acting upon the said bar, substantially as and for the purpose set forth.

6. As applied to a card-setting machine, the wire-guide traversed to and fro, the rapidly-vibrating presser or hammer, and the anvil, the last two parts shorter on the face than the length of wire cut off to form a card-staple, combined with means for rapidly vibrating the said presser, and with means for lessening the distance between the presser and the anvil during the times when the wire is at rest, substantially as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

GEO. ASHWORTH.

ELIJAH ASHWORTH.

Witnesses to the signature of George Ashworth:

JAS. L. SKIDMORE,

HUBERT HOWSON.

Witnesses to the signature of Elijah Ashworth:

DAVID FULTON,

JOSHUA ENTWISLE.