(No Model.) 2 Sheets—Sheet 1.

# G. L. JAEGER.

## MATCH MAKING MACHINE.

No. 273,848. Patented Mar. 13, 1883.

Fig. 1.

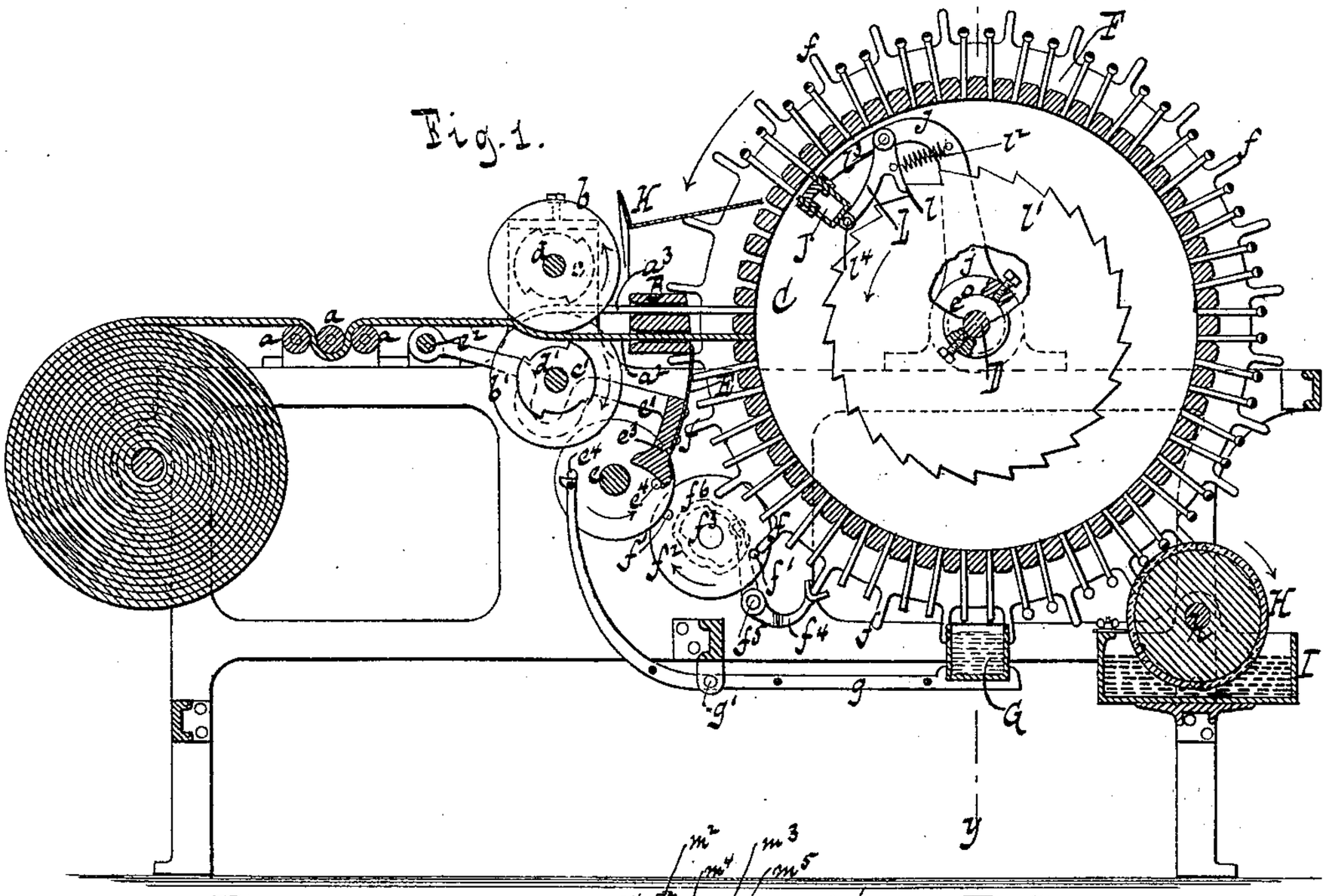
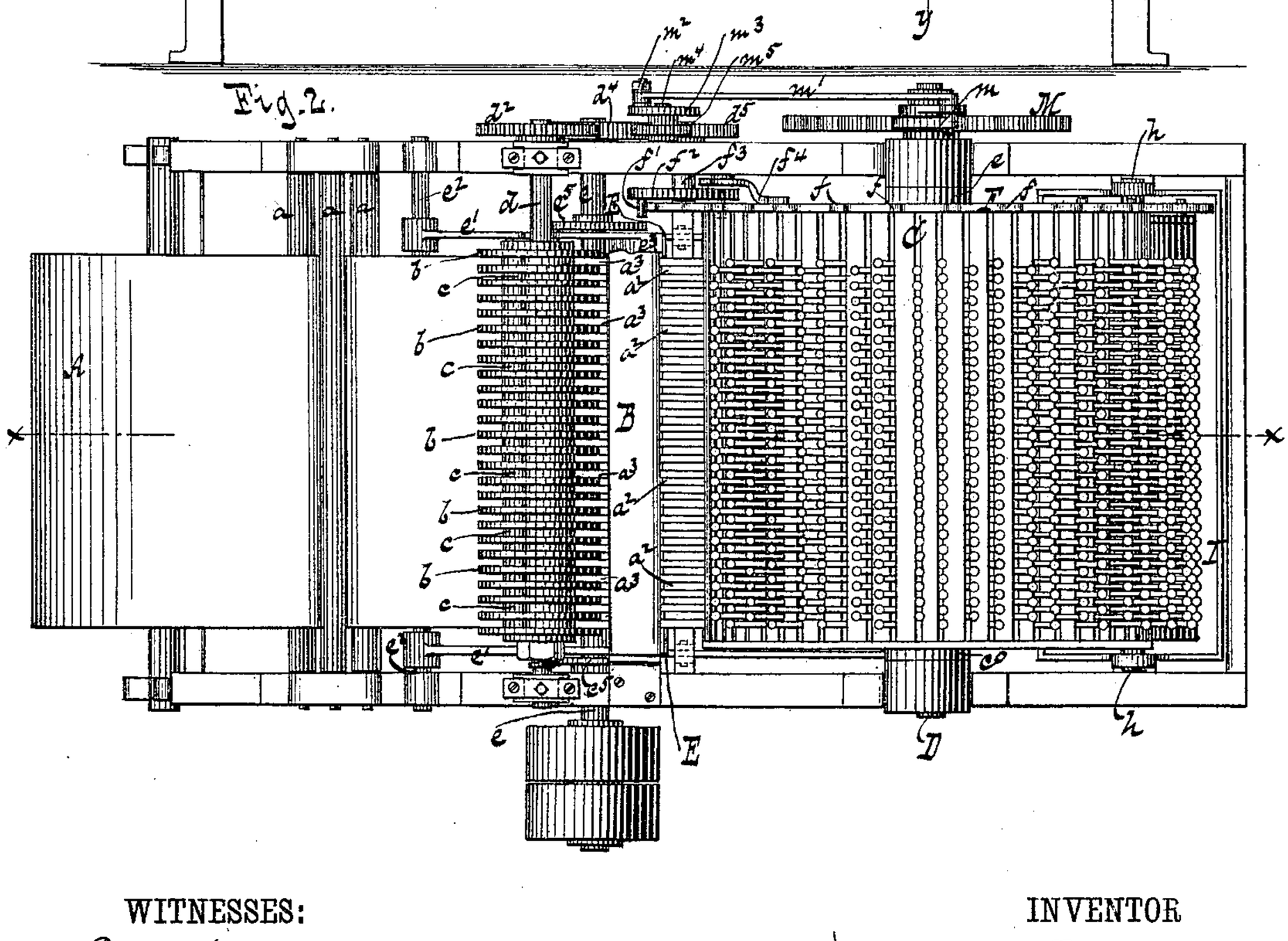


Fig. 2.



WITNESSES:

Otto Hupfeld

William Miller

INVENTOR

Gustav L. Jaeger

BY Van Santvoord & Hauff

ATTORNEYS

(No Model.) 2 Sheets—Sheet 2.

# G. L. JAEGER.

## MATCH MAKING MACHINE.

No. 273,848. Patented Mar. 13, 1883.

Fig. 3.

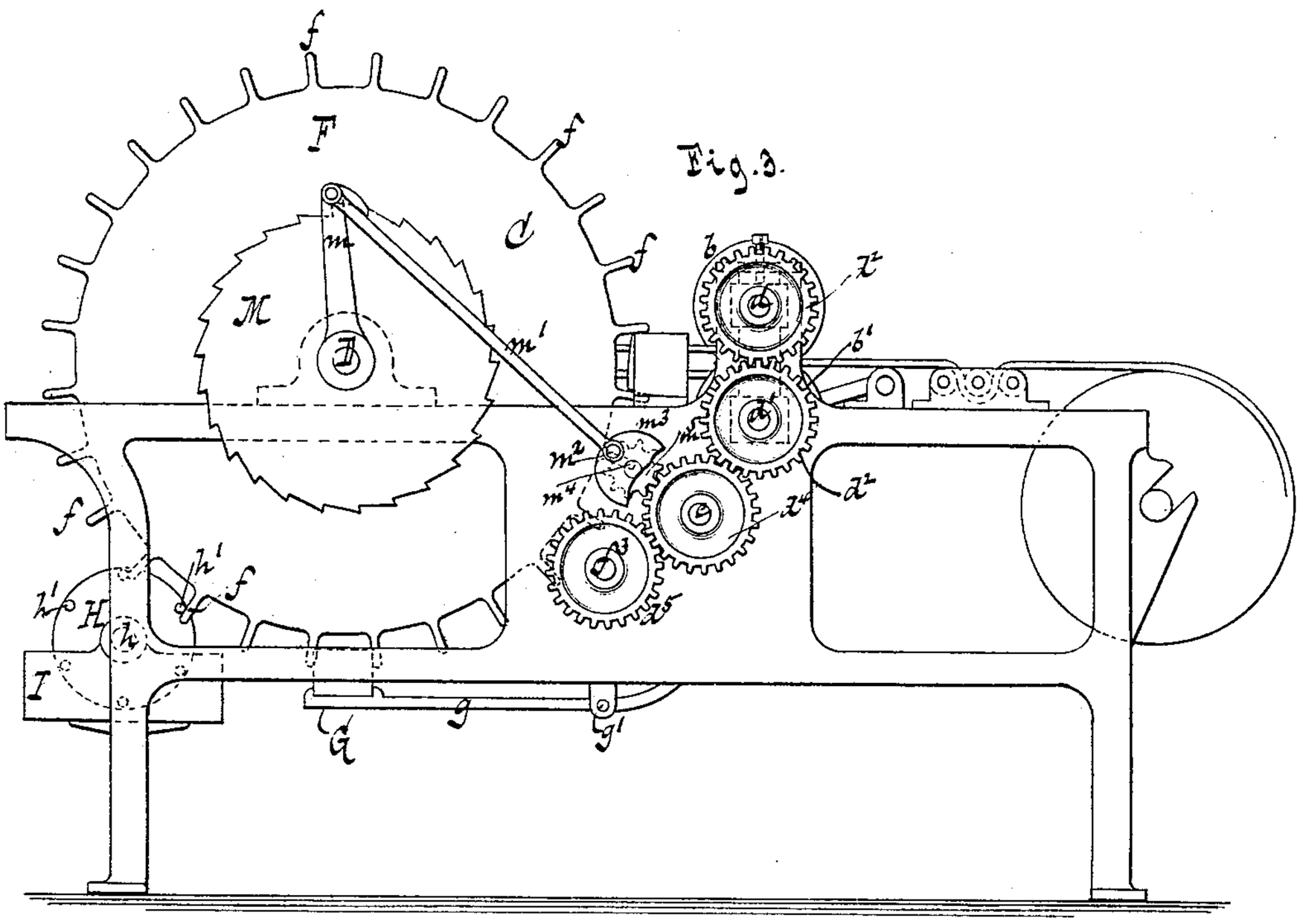



Fig. 5.

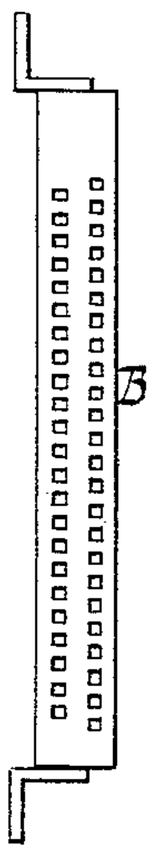



Fig. 4.

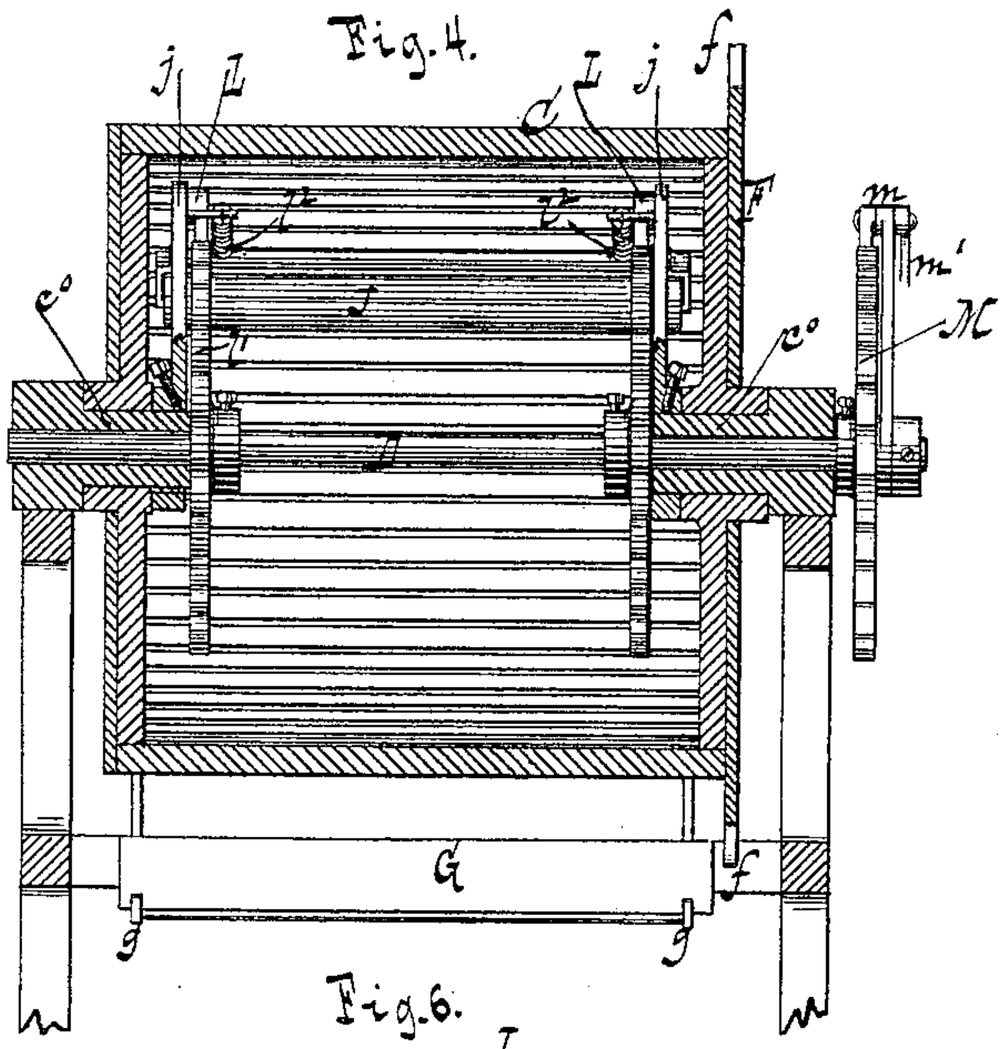
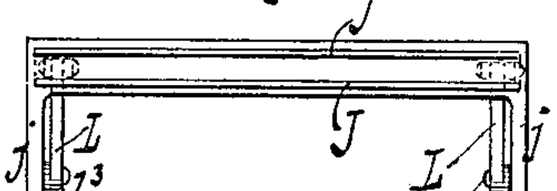



Fig. 6.




WITNESSES:

Otto Hufeland

William Miller

INVENTOR

Gustav L. Jaeger

BY Van Santvoord & Hauff

ATTORNEYS

# UNITED STATES PATENT OFFICE.

GUSTAV L. JAEGER, OF NEW YORK, N. Y.

## MATCH-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 273,848, dated March 13, 1883.

Application filed December 27, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, GUSTAV L. JAEGER, a citizen of the United States, residing at New York, in the county and State of New York, have invented new and useful Improvements in Match-Making Machines, of which the following is a specification.

This invention relates to a machine which cuts the match-splints, sticks them into an endless carrier, applies the sulphur and phosphorus or other chemicals, and finally discharges the finished matches ready to be packed into boxes.

The peculiar construction of my machine is pointed out in the following specification and illustrated in the accompanying drawings, in which—

Figure 1 represents a longitudinal vertical section in the plane *x x*, Fig. 2. Fig. 2 is a plan or top view. Fig. 3 is a side elevation. Fig. 4 is a transverse vertical section in the plane *y y*, Fig. 1. Fig. 5 is a face view of the guide-plate detached. Fig. 6 is a detached view of the ejector.

Similar letters indicate corresponding parts.

In the drawings, the letter A designates a roll of pasteboard, straw-board, or veneer which is to be cut up into match-splints. From this roll the straw-board is drawn off by an intermittent feed mechanism, and it passes through between a set of straightening-rollers, *a a a*, so that the same is presented to the cutters in the proper condition. Instead of drawing the straw-board or other material from a roll, however, it may be introduced in the form of sheets. The feed mechanism consists of a series of circular disks, *b b'*, and a series of cam-disks, *c c'*, the circular disks *b* and cam-disks *c* being mounted on a shaft, *d*, and the circular disks *b'* and cam-disks *c'* on a shaft, *d'*, which is situated beneath the shaft *d* and geared together with the same by cog-wheels $d^2$, Fig. 3, so that both receive a continuous revolving motion from the driving-shaft *e*, which is geared together with the shaft *d'* by a cog-wheel, $d^4$. The cam-disks *c c'* have portions of their peripheries cut away, as shown in Fig. 1, and whenever one of their high portions comes in contact with the corresponding circular disk, *b* or *b'*, the web or straw-board is fed forward, while the feed motion stops during the time the low portions of the cam-disks are opposite the circular disks. These circular disks *b* and *b'* are so placed in relation to each other that they interlock, or, in other words, that the disks *b* fit closely into the spaces between the disks *b'*, and vice versa, and the edges of said disks are sharp, so that by the combined action of the two sets of disks *b b'* the web is cut up into narrow strips equal in width to the thickness of said disks. As will be readily seen by referring to Fig. 1, the strips $a^2$, cut by the disks *b*, are depressed, and the strips $a^3$, cut by the disks *b'*, are raised, so that they pass through slots in the guide-plate B at different levels. A front view of this guide-plate is shown in Fig. 5. The high portions of the cam-disks *c c'* are of such a length that they feed the web forward for a distance equal to the length of the splints or match-sticks to be produced, and the strips $a^2$ $a^3$, after having been pushed through the guide-plate B, enter into openings or slits formed for their reception in the periphery of the carrier C. The carrier is represented in the form of a drum; but it may also be made in the form of an endless apron. As shown in Fig. 4, it is mounted on extensions $c^0$ of the boxes, which form the bearing of a shaft, D, and it has a step-by-step or an intermittent revolving motion, as hereinafter explained. At the moment the strips $a^2$ $a^3$ are fed forward the carrier is stationary, so that the ends of said strips can enter the openings in said carrier, and immediately thereafter the knife E is actuated and the strips $a^2$ $a^3$ are cut off close behind the guide-plate B. Said knife is at least equal in length to the width of the web or straw-board, and it is firmly secured to arms *e'*, which extend from a rock-shaft, $e^2$, and on the outer ends of which are formed toes $e^3$. These toes are situated in the paths of pins $e^4$, (see Fig. 4,) secured in disks $e^5$, which are mounted on the driving-shaft *e*. In the example shown in the drawings, two pins, $e^4$, are in each of the disks $e^5$, so that for each revolution of the driving-shaft the knife is actuated twice to correspond to the feed motion. Immediately after the splints have been cut off the knife recedes and the carrier moves forward one step by the following means: On one end of the carrier is firmly secured a disk, F, provided with a series of teeth, *f*, the number of which is just half that of the splint-receiving openings or slits in the carrier, and these teeth are acted upon by

pins $f'$ $f'$, secured in a disk, $f^2$, which is mounted on a shaft, $f^3$. This shaft is geared together with the driving-shaft $e$ by cog-wheels $d^4$ $d^5$, Fig. 3, so that it revolves with the same velocity. For each half-revolution of the driving-shaft, therefore, the carrier is moved one step, so as to present two new openings or slits to the splints, which are fed forward immediately thereafter. During its position of rest the carrier is locked by means of a dog, $f^4$, which swings on a pivot, $f^5$, and is actuated by a cam-groove, $f^6$, in the disk $f^2$. At the moment the carrier has completed one step the dog $f^4$ is caused to engage with one of the teeth $f$, and it releases this tooth just before the next movement of the carrier commences. As the carrier revolves step by step the splints carried by the same are dipped into sulphur and supplied with phosphorus or other chemicals suitable for the purpose, as follows: The melted sulphur is contained in a trough, G, which is supported by a frame, $g$, mounted on a rock-shaft, $g'$. One side piece of said frame is turned upward, as shown in Fig. 1, so that its upper end stands in the path of the pins $f'$ $f'$ in the disk $f^2$, and as this disk revolves the trough G is moved up twice for each revolution of the driving-shaft. These upward movements take place during the time the carrier is at rest, and the splints which at the moment are above the trough G are dipped into the sulphur. As the carrier advances the dipped splints are brought in contact with the surface of a roller, H, which is covered with felt or other absorbent material, and which dips into the phosphorus or other suitable explosive material contained in a trough, I.

If required, heating-pipes may be placed between the trough G and the roller H, so as to dry the dipped splints before they come in contact with said roller. The roller H is mounted on a shaft, $h$, which has its bearings on the ends of the trough I, and from one end of said roller project a series of pins, $h'$, Fig. 3, which are in the path of the teeth $f$ of the carrier, so that whenever the carrier advances, the roller I receives a partial revolution. During this movement of the roller the dipped splints, which bear on the absorbent covering of said roller, are supplied with the phosphorus. After the splints have been dipped and supplied with phosphorus, the carrier advances step by step, giving ample time to the sulphur and phosphorus to dry, until the successive pairs of matches are thrown out by the action of the ejector J. This ejector is U-shaped, Fig. 1, its legs being guided in the ends of curved arms $j$, Fig. 6, which are firmly secured to the extensions $c^0$, Fig. 4, in such a position that whenever the carrier is at rest the two legs of the ejector are opposite to two slits in the circumference of the carrier, and if the ejector is moved out the matches contained in those two slits are thrown out on a chute, K, Fig. 1. The outward movement of the ejector is produced by levers L, which swing on pivots $l^3$, secured in the curved arms $j$, and which are provided with toes $l$, that are exposed to the action of spur-wheels $l'$, and held in contact with these spur-wheels by springs $l^2$. The outer ends of the levers L are connected to the ejector by pivots $l^4$, so that the springs $l^2$ also serve to retract the ejector to the position shown in Fig. 1. The spur-wheels $l'$ are firmly mounted on the shaft D in the interior of the carrier C, and on one end of this shaft is firmly mounted a ratchet-wheel, M, which is actuated by a lever-pawl, $m$, Figs. 2 and 3. This lever-pawl swings loosely on the shaft D, and it connects by a rod, $m'$, with an eccentric wrist-pin, $m^2$, secured in a disk, $m^3$, which is mounted on a shaft, $m^4$, and receives a revolving motion by a pinion, $m^5$, which is in gear with the cog-wheel $d^4$, mounted on the driving-shaft $e$, Fig. 3. The diameter of the pinion $m^5$ is one-half of the diameter of the cog-wheel $d^4$, so that the lever-pawl $m$ is actuated twice for each revolution of the driving-shaft. By each movement of the lever-pawl the ratchet-wheel M is propelled one tooth, and this movement is communicated by the shaft D to the spur-wheels $l'$, so that the ejector is moved twice for each revolution of the driving-shaft. The finished matches, which are thrown out by the action of the ejector on the chute K, are collected in suitable boxes ready for market.

It must be remarked that, if it is found requisite, heating-pipes may be placed all around or nearly all around the carrier; or, if the lighting compound is of such a nature that it will dry slowly, the splint-receiving openings are made in frames which are detachably fastened to the carrier, so that each frame, after the splints in the openings have been dipped, can be removed and placed in an oven for drying the lighting composition, while an empty frame is adjusted in its place in the carrier. It may also be feasible under certain circumstances to dispense with the intermittent feed mechanism, and to introduce sheets of straw-board or other material by hand; but in this case the person attending to the feeding operation must be careful to push the sheets forward at the proper intervals.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination, substantially as hereinbefore described, of the strip-cutting mechanism, the guide-plate, the transverse cutter, the carrier, and mechanism gearing together the strip-cutting mechanism, the transverse cutter, and the carrier.

2. The combination, substantially as hereinbefore described, of the intermittent feed mechanism for advancing the material to the required distance at the proper intervals, the strip-cutting mechanism, the guide-plate, the transverse cutter, the carrier, and mechanism gearing together the strip-cutting mechanism, the transverse cutter, and the carrier.

3. The combination, substantially as hereinbefore described, of the intermittent feed mechanism for advancing the material to the required distance at the proper intervals, the

strip-cutting mechanism, the guide-plate, the transverse cutter, the carrier, the dog or latch for retaining the carrier in its position at rest, and mechanism gearing together the strip-cutting mechanism, the transverse cutter, and the carrier.

4. The combination, substantially as hereinbefore described, of the intermittent feed mechanism for advancing the material to the required distance at the proper intervals, the strip-cutting mechanism, the guide-plate, the transverse cutter, the carrier, the dipping-trough G, and mechanism for actuating the transverse cutter, the carrier, and the dipping-trough at the proper intervals.

5. The combination, substantially as hereinbefore described, of the intermittent feed mechanism for advancing the material to the required distance at the proper intervals, the strip-cutting mechanism, the guide-plate, the transverse cutter, the carrier, the dipping-trough G, the roller H, for supplying the explosive compound, and mechanism for actuating the transverse cutter, the carrier, the dipping-trough, and the roller H at the proper intervals.

6. The combination, substantially as hereinbefore described, of the intermittent feed mechanism for advancing the material to the required distance at the proper intervals, the strip-cutting mechanism, the guide-plate, the transverse cutter, the carrier, the ejector, and mechanism for actuating the transverse cutter, the carrier, and the ejector at the proper intervals.

7. The combination, substantially as hereinbefore described, of the intermittent feed mechanism for advancing the material to the required distance at the proper intervals, the strip-cutting mechanism, the guide-plate, the transverse cutter, the carrier, the dipping-trough G, the roller H, for supplying the explosive compound, the ejector, and mechanism for actuating these various devices at the proper intervals.

8. The combination, substantially as hereinbefore described, of the smoothing-rollers *a*, the intermittent feed mechanism for advancing the material to the required distance at the proper intervals, the strip-cutting mechanism, the guide-plate, the transverse cutter, the carrier, and mechanism for actuating the transverse cutter and the carrier at the proper intervals.

9. The combination, substantially as hereinbefore described, of the circular disks *b b'*, the cam-disks *c c'*, the shafts supporting all the disks and having a continuous revolving motion, the stationary guide-plate B, the transverse cutter E, the carrier C, and mechanism for actuating the transverse cutter and the carrier at the proper intervals.

10. The combination, substantially as hereinbefore described, of the intermittent feed mechanism for advancing the material to the required distance at the proper intervals, the strip-cutting mechanism, the guide-plate, the transverse cutter, the hollow carrier, the ejector situated in the interior of the hollow carrier, and mechanism for actuating the transverse cutter, the hollow carrier, and the ejector at the proper intervals.

11. The combination, substantially as hereinbefore described, of the intermittent feed mechanism for advancing the material to the required distance at the proper intervals, the strip-cutting mechanism, the guide-plate, the transverse cutter, the carrier, the teeth *f*, formed on one end of said carrier, the pins $e^4$, for actuating the transverse cutter, and the pins *f'*, for actuating the carrier.

12. The combination, substantially as hereinbefore described, of the intermittent feed mechanism for advancing the material to the required distance at the proper intervals, the strip-cutting mechanism, the guide-plate, the transverse cutter, the carrier, the dipping-trough G, the pins $e^4$, for actuating the transverse cutter and the dipping-trough, and the pins *f'*, for actuating the carrier.

13. The combination, substantially as hereinbefore described, of the intermittent feed mechanism for advancing the material to the required distance at the proper intervals, the strip-cutting mechanism, the guide-plate, the transverse cutter, the carrier, the teeth *f* on the carrier, the dipping-trough G, the pins $e^4$, for actuating the transverse cutter and the dipping-trough, the pins *f'*, for actuating the carrier, and the supply-roller H, actuated by the teeth *f* of the carrier.

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

GUSTAV L. JAEGER. [L. S.]

Witnesses:

W. HAUFF,

E. F. KASTENHUBER.