

J. Senneff,

Casting Heddle-Eyes.

N<sup>o</sup> 11,589.

Patented Aug. 22, 1854.

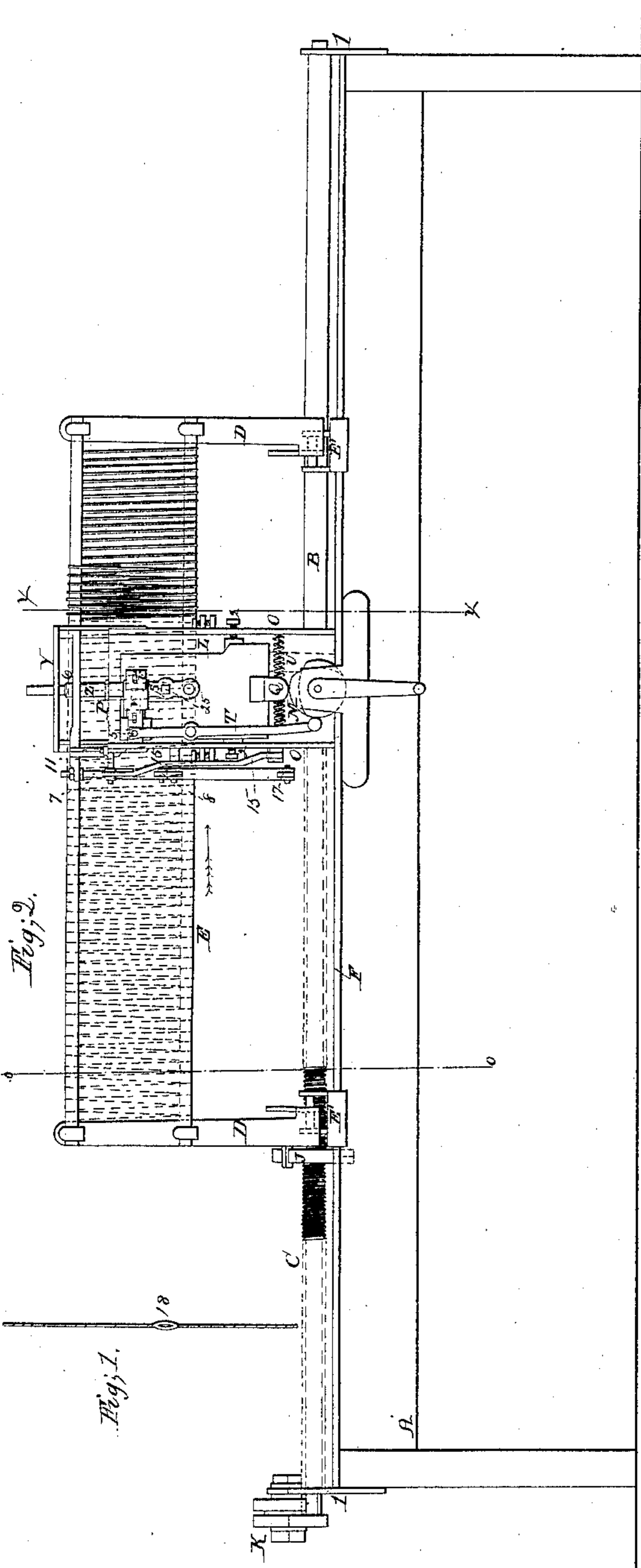
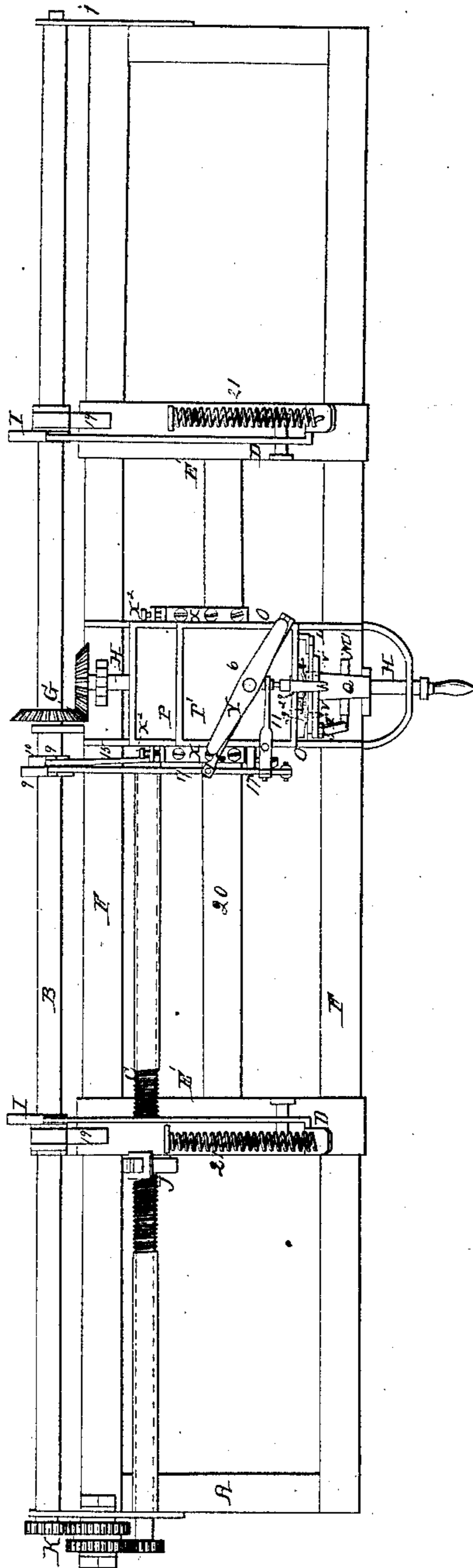


Fig. 3.



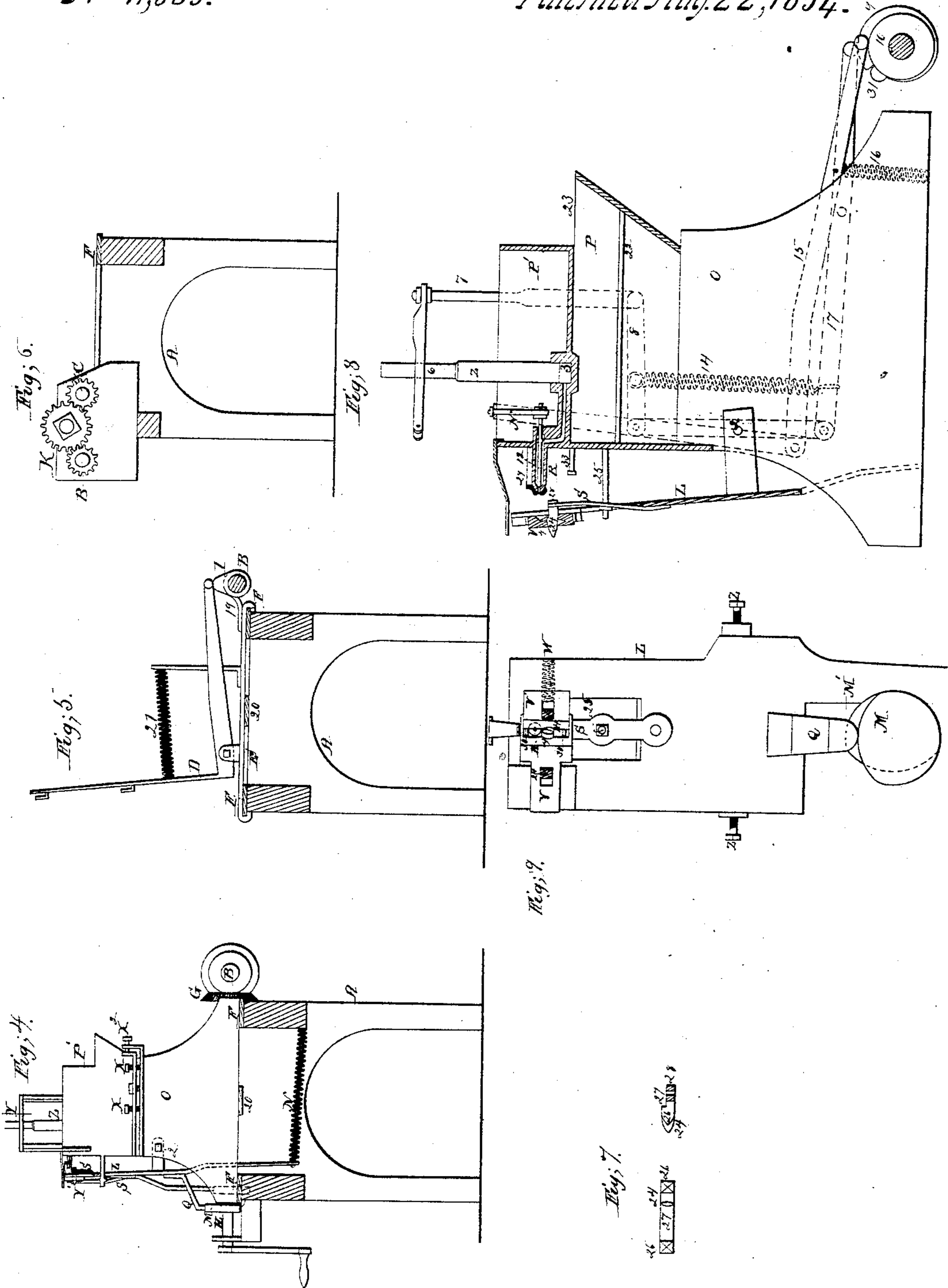
*J. Senneff,*

*2 Sheets. Sheet 2.*

*Casting Heddle-Eyes.*

*N<sup>o</sup> 11,589.*

*Patented Aug. 22, 1854.*



# UNITED STATES PATENT OFFICE.

JACOB SENNEFF, OF PHILADELPHIA, PENNSYLVANIA.

## IMPROVEMENT IN MACHINES FOR CASTING METALLIC EYES OR MAILS OF HEDDLES FOR LOOMS.

Specification forming part of Letters Patent No. **11,589**, dated August 22, 1854.

*To all whom it may concern:*

Be it known that I, JACOB SENNEFF, of the city and county of Philadelphia, and State of Pennsylvania, have invented a new and useful machine for forming the metallic eyes or mails of heddles or harness of looms on the yarn, cord, wire, or other material of which the heddles may be composed; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings of the same, making part of this specification.

Before proceeding to a description of the invention I would observe that I propose to construct the heddles or harness of either single or double yarn or other material to suit the views of the weaver, or the nature of the work for which they are designed; but as in most instances the use of a double yarn is objectionable, I will confine myself in this description to heddles formed of a single yarn. The common heddles formed of double strands of wire or yarn, the former twisted together and the latter knotted, so as to form the eyes at or near the middle, are objectionable, as much difficulty is experienced from the threads of the warp not working freely through harness having eyes formed in this manner, owing to the great liability that exists of the fibers of the warp felting or working into the twist of the wires, or against the knots of the yarn above and below the eyes.

Figure 1 in the accompanying drawings represents a portion of a heddle formed of a single yarn or other material with the eye or mail cast thereon. In order to produce this heddle a suitable mold of the shape of the required eye or mail is prepared, in which the eye or mail is to be cast on the yarn or other material. The yarn, when inserted in the mold to have the eye or mail cast thereon, is, by the introduction of the core, bent slightly at the middle, where the eye or mail is to be cast, and when the said yarn is placed in the mold the molten metal is introduced or forced therein by means of a pump or plunger, and when the metal is sufficiently cool the mold is opened, and the yarn, with the eye or mail cast thereon, is removed from the mold and a second yarn is introduced, and so on until all the yarns throughout the whole length of the

shaft of heddles is completed. The molten metal may be cast over the whole series of yarns simultaneously, and the eyes formed in the cast mails by means of stationary cores; but I prefer to cast the mails on each yarn separate, and for this purpose I have shown in the accompanying drawings a machine whereby this object may be effected with convenience, facility, and dispatch. The eyes or mails may be cast in glass or other suitable material as well as metal, and either of the form represented in the drawings or any other form that may be considered desirable. Owing to the friction being so much reduced by the use of mails or eyes of the form above described, much less sizing will be required on the warp than when ordinary heddles are used. Fig. 2 in the accompanying drawings represents an elevation of the front part of the machine for casting the mail in which the eye is formed on the single yarn or other material. Fig. 3 is a top or bird's-eye view of the same. Fig. 4 is a vertical transverse section of the same at the line *x x* of Fig. 1, showing a side view of the pump-box, vibrating frame, and guide for guiding the yarn or other material into the mold. Fig. 5 is a vertical transverse section at the dotted line *o o* of Fig. 1, showing one of the eccentric cams on the propelling-shaft 2 for moving the handle-holder from the mold and the spiral spring for drawing it toward the mold in order to cast the mail on the yarn. Fig. 6 is an end view of the machine, especially showing the change-gear for regulating the relative speed of the main shaft 2 and screw-shaft according to the space between the yarns on the heddle-frame. Fig. 7 is a vertical and side view (on an enlarged scale) of the core that forms the aperture or eye in the mail through which the warp is to pass. Fig. 8 is a vertical transverse section of the pump-box, furnace, vibrating frame, and other parts adjacent thereto, on an enlarged scale. Fig. 9 is a front elevation of the vibrating frame, also on an enlarged scale.

Where the same letters occur in the different figures they indicate the same parts.

In Figs. 2 and 3, A is the bench or frame upon which the several parts of the machine are mounted.

B is a secondary shaft mounted in bearings 1 1 at either end of the frame.

C is a screw-shaft supported in bearings in the upright plate of the furnace and left end of the frame at 1, and is for feeding the heddle-frame holder longitudinally as the mails are cast on the yarns.

D is the heddle-frame holder, composed of two uprights, D D, to which the heddle-frame E is secured by any convenient means. This heddle-frame holder is mounted upon horizontal transverse sliding plates E', whereby the said heddle-frame holder D is carried horizontally toward and from the mold.

In Fig. 2 a portion of the yarn is removed from the heddle-frame, in order to show the parts in the rear thereof.

G are two bevel cog-wheels, one on the main shaft B and the other on a transverse crank-shaft, H, for actuating the several parts of the machine.

I are two eccentric cams fixed on the shaft directly opposite and on a line with the sliding plate E', for moving the heddle-frame holder from the mold as each mail is cast on the yarn.

J are screw-clamp levers or jaws for clamping the heddle-frame holder to the feeding-screw shaft.

K, Fig. 6, is a series of wheels connecting the shafts B C, at the left ends thereof, whereby the speed of the said shafts is regulated to feed according to the space between the yarns.

L is the vibrating frame for carrying the molds to the pump-nipple, to receive the metal which forms the mail, and back to allow the core to withdraw from the said mold and the latter to open and liberate the cast mail on the yarn. This frame L is mounted upon set-screws 2 2 as centers in the upright plates O of the furnace P and molten-metal box P', and the upper end thereof is moved back and forth by means of an eccentric cam, M, on the shaft H and spiral spring N, as seen in Fig. 4. The cam M operates upon the end of a bent bar, Q, which is secured to the front of the vibrating frame L, which end may be either rounded or provided with a friction-roller, as may be desired, and by being acted upon and raised the frame L is moved toward the pump-nipple R, and when the eccentric cam M in its revolution allows said end of the bar to descend the upper end of the frame L is drawn from the pump-nipple by the elasticity of the spiral spring N, attached to the frame of the machine and to the lower end of a bar secured to the lower part of the vibrating frame.

S is a spring secured to the vibrating frame for withdrawing the core from the mold before the latter is opened, to remove the cast eye or mail in such a manner as to prevent the possibility of the yarn being broken or the form of the mail or eye being injured by first withdrawing the core from the eye when the same is firmly clasped by the mold.

T is a lever suspended on a pivot or fulcrum secured to the vibrating frame L, and having a fork at its upper end, between the prongs of

which is a pin, 5, projecting from the slide of the mold, so as to enable it to work the slide to open and close the mold by means of an eccentric cam, M', on the transverse shaft H, similar to the cam M on the same shaft, operating on the lower end of said lever, to force it one way, and a spiral spring, U, attached to near its lower end and to the upright plate O, supporting the pump-box P', in such a manner as to alternately close and open the mold to receive the molten metal, and disengage the eye or mail therefrom when formed.

V is the slide which is mounted and slides in dovetail guides on the front of the vibrating frame for closing and opening the mold, to one half of which it is attached.

W is the spring for keeping the core within the stationary half of the mold when it is not being acted upon by the end of the slot in the movable mold-plate bearing on the pin 26 of the core-carrier, and for keeping the said pin in contact with said end of the slot when the core is moved with it from the stationary part of the mold, and thus preventing the core and heddle whose eye or mail is cast around the same being thrown violently toward either half of the mold when the mold is opened to relieve the heddle therefrom. When the mold is opened by the lever T, the end of the slot in the movable mold-plate comes in contact with the said pin 26 of the core-carrier, but not until the said movable mold is opened one half of its whole extent of movement, (the relative situations of the end of the slot and pin 26 allowing this result,) and by acting on the pin moves the core-carrier horizontally with the movable mold-plate, (the length of the slot in the stationary mold-plate allowing the other pin 26 to move within it,) and the spring W drawing on the core-carrier, keeping the pin 26 against the end of the slot in the movable mold-plate, prevents the core being thrown violently either way during its movement, and thus removes all danger of the heddle surrounding it being entangled or brought in contact with the molds.

P' is the pump-box for holding the metal, which is heated by a furnace resting upon and secured to the upright plates.

X are adjusting-screws for raising and lowering the pump-box.

2 2 are two set-screws passing through the upright plates to adjust horizontally the position of the nipple of the pump to the mold.

X<sup>2</sup> are two set-screws passing through lugs on the back part of the upright plates O, and pressing against corresponding lugs on the pump-box, for adjusting horizontally the pump-box.

Y is a cross-bar secured between uprights attached to the pump-box to support and guide the plunger Z. This plunger passes into the pump 3, and is for forcing the molten metal into the molds through the nipple of the pump.

4 is the mold in which the mail or eye of each yarn is formed, one half being secured

upon the slide V and moved with the same and the other half secured upon the stationary plate V'.

6 is the rod and lever working the plunger.

7 is the pump-rod connected to the lever 8, which works upon a stud on the side of one of the upright plates O, and is actuated by the eccentric 9. This eccentric 9 is mounted upon and secured to the propelling or main shaft B, and is for working the plunger of the pump through the connection of the rod 7 and lever 8.

10 is an eccentric cam or wheel with a cog on its periphery, mounted upon the main shaft B, for working the stopper-lever 11 to insert and withdraw the stopper or choker from the nipple of the pump. This stopper 12 enters the nipple or spout through the metal, and is provided with a shoulder, 13, near its inner end, so as to form a valve, which fits against the corresponding flared form of the seat or bearing on the inner end of the upper portion of the spout, against which it fits; when the plunger is projecting the metal into the mold, and is made to fit at its outer end the portion of the opening in the nipple R next the enlarged part of the cavity or spout, with which the nipple-tube opening communicates, so as to enable the end of the stopper to close the outlet of the nipple after the metal is forced into the mold, to prevent the metal from running out of the said nipple when the mold is removed therefrom.

16 is a spiral spring attached to the stopper-lever 15. This spring is for keeping the end of the said lever 15 (which may be provided with a friction-roller, if desired) in contact with the wheel 10, having the cog on its periphery.

14 is a spiral spring fastened to the frame of the machine and to the lever 17, and is for keeping the lever 17 of the plunger Z in contact with the eccentric 9, which actuates the plunger of the pump.

18 is the mail or eye cast on or about the middle of the length of each yarn of the heddle-frame, which, with its holder D, is gradually moved by the feeding-screw to the right in the direction of the arrow, Fig. 2, as the mails or eyes become cast.

19 are intermediate bearings or boxes mounted upon bed-plates secured to the transverse slides E', for supporting the central portion of the propelling-shaft.

20 is a bar extending horizontally from one of the slides to the other, whereby the said slides are moved simultaneously by the action of the screw-shaft B upon the clamp-screw levers J.

21 are spiral springs attached to the upright bars D at each end of the heddle-frame holder, and to uprights rising from near the rear ends of the slides E', for the purpose of drawing the heddle-frame holder up to the mold, when the levers of the former shall have been relieved from the eccentric cams I of the propelling-shaft.

M M' are the eccentric cams mounted upon the shafts H. The cam M is situated near the eccentric cam M', and is for the purpose of operating upon the end of the bar Q, thereby causing the same to rock the vibrating frame L with the mold upon its centers toward and from the nipple or spout of the pump.

22 represents the grate of the fire box.

23 is the opening in the fire-box to admit the fuel.

In Fig. 9 a front elevation of the vibrating frame L on an enlarged scale is represented, and in Fig. 8 a cross-section of the same, together with the pump-box P' and its attachments, is shown on the same enlarged scale; and with a view of more fully developing the nature and operation of these parts I will repeat some of the references to them and make the description of them more full than in the body of this specification.

L is the vibrating frame mounted upon its centers in the upright plates O of the pump-box P', on the sides of which are the set-screws and projections for adjusting the pump-box to the mold and securing it in its place.

Q is the bent bar on the lower part of the vibrating frame, and by which it is moved toward and from the mold.

S is the spring fastened by screws or other convenient means at its lower end to the vibrating frame and passes through an opening in the said frame to the back part of the mold. (Seen in Fig. 8.) In a notch at the upper end of this spring the core-carrier (shown detached in Fig. 7) is placed. It is by means of this spring that the core 24, Fig. 7, is pushed into and drawn out of the mold at the proper time by the assistance of the screw. The tension of the spring S forces the core into the mold as the vibrating frame, with the spring attached, moves back to carry the mold up to the nipple, thus enabling the said core to enter the mold the required distance to form the eye when the mail or eye is cast therein. When the vibrating frame carries the mold from the pump-nipple, after the mail or eye is cast on the yarn, then the movable head or nut of the screw 25 comes into action, and by arresting the motion of the spring S or holding it stationary while the frame moves back, the core 24 is withdrawn from the mold, and then the mail, with the eye formed therein, may be removed from the mold.

26 are two pins secured to the face of the slide 27 or core-carrier, to which the core is fastened. These pins work in slots in the sliding and stationary part of the mold-plates, so as to allow the core to yield slightly to any irregularity of motion, and thus prevent any of the delicate working parts from becoming injured. The slide 27 of the core 24, rests, by a projection, 28, in a notch cut for it in the top of the spring.

4 4 are the mold-plates screwed to the stationary and sliding plate V' V, and the ends of each of these mold-plates is cut one half of the mold or die, in which the mails are to be formed.

The two parts of the mold may be made to move simultaneously, if desired; but it is believed to be better to form and secure them in the manner stated, with one half of the mold fixed permanently to the vibrating frame and the other plate to slide in guides, so as to be moved backward and forward, and the mold or die thereby opened or closed by the action of the lever.

29 is an apron resting upon two pins secured to the front of the pump-box. This apron is placed between the mold and nipple to prevent the mold being injured by the pressure against the nipple.

30 are two steadying-pins extending from one of the mold-plates through openings in the other. The valve-rod 12, for opening and closing the outlet to the nipple or spout R and the opening into the pump-box for admitting or shutting off the supply of metal to and from the pump 3, passes through the upper portion of the spout and projects a short distance into the pump-box, where it is attached to the vibrating lever 11. Its outer end is made to fit against the outlet-opening of the spout, to open or close the same, to allow the metal to be projected through it when the mail or eye is formed, or to be entirely shut off when the pump-plunger is rising to receive a fresh supply of metal. When this last operation is being performed, the valve 13 on the rod is opened by the elasticity of the spring 16, operating on the lever 15, so as to allow the free entrance of the metal to the pump and to close the outlet-opening by the end of the rod 13 to shut off the communication from the nipple or spout to the mold; and when the mold is again brought up to form another mail or eye the cog 31 on the wheel 10 striking on the end of the lever 15 opens said outlet and closes the entrance-opening with both quickness and positiveness, and thereby prevents the possibility of the mail or eye being imperfectly formed, or the metal to injure the mold by the too slow or imperfect projection of the metal on account of the choker or stopper being but partially or with too little speed withdrawn from the outlet, as is the case where it is made to open and close in the casting of type by the employment of a spring to open and a cam to close the same.

Instead of depending exclusively upon the elasticity of the spring to force the core into the mold the required distance it is to go before the molten metal is projected into the same, a screw, 33, may be screwed into the face or front of the furnace, so as to cause its head to project from the same immediately behind the spring S, and in such relation to the same as to cause said head to strike the flexible portion of the spring when the vibrating frame is drawn up to bring the mold in communication with the nipple and force the core into the mold.

The balance-weights of Jacquard looms, in-

stead of being tied to their cords as heretofore, may be cast thereon after the manner of casting the mails or eyes on the yarns as above described by detaching the core and otherwise altering the machine to adapt it to the purpose, and the weights so cast will be more easily and expeditiously attached, less liable to wear the cords, and can be moved up and down with less friction than if tied on the cords in the ordinary manner.

Having now described my invention and the means of carrying the same into effect, I would observe, in conclusion, that I do not mean or intend to confine myself rigidly to the precise arrangement of parts herein shown and described, as they may doubtless be varied without departing from the nature and object of the present improvements; but

That which I consider to be new, and therefore wish to claim as my invention, and desire to secure by Letters Patent, is—

1. The method within described of casting the eyes or mails on the strands of yarn or other material by inserting the yarns successively within a mold secured on a vibrating frame, L, operated at the proper intervals of time by means of the eccentric cams I I, said mold being opened at times to disengage the mail therefrom, and provided with a core, 24, for forming the eye in the mail and capable of being withdrawn therefrom before the mold opens, substantially in the manner and for the purpose herein set forth.

2. The manner of operating the core so as to enable it to be so withdrawn from the eye of the mail after the same is formed and while it is firmly embraced within the mold by means of the springs and screws 25 and 33, operating in the manner described.

3. The core-carrier 27, resting in a notch formed in the top of the spring S, and having pins 26 on its face, which pass through slots in the mold-plates, and spring W, for moving the core horizontally from the stationary half of the mold and keeping it midway between the mold-plates when they are opened by the lever T, and preventing it being thrown violently either way, as herein set forth.

4. The manner of operating the heddle-frame holder D by means of the eccentric cams I on the shaft B, capable of being moved longitudinally over the grooves in said shaft, right-angled levers D, to which the heddle-frame is secured, and spiral springs 21, for keeping the ends of the levers always in contact with the eccentric cams, and, in combination therewith, the screw-shaft C and clamps J and the adjustable gearing K at the ends of the screw and main driving shafts, the whole being constructed and operating in the manner and for the purpose herein fully set forth.

JACOB SENNEFF.

Witnesses:

NORMAN GOFF,  
EDMUND MAHER.