

# A. Allen. Shuttle Box.

N<sup>o</sup> 17,912.

Patented Aug. 4, 1857.

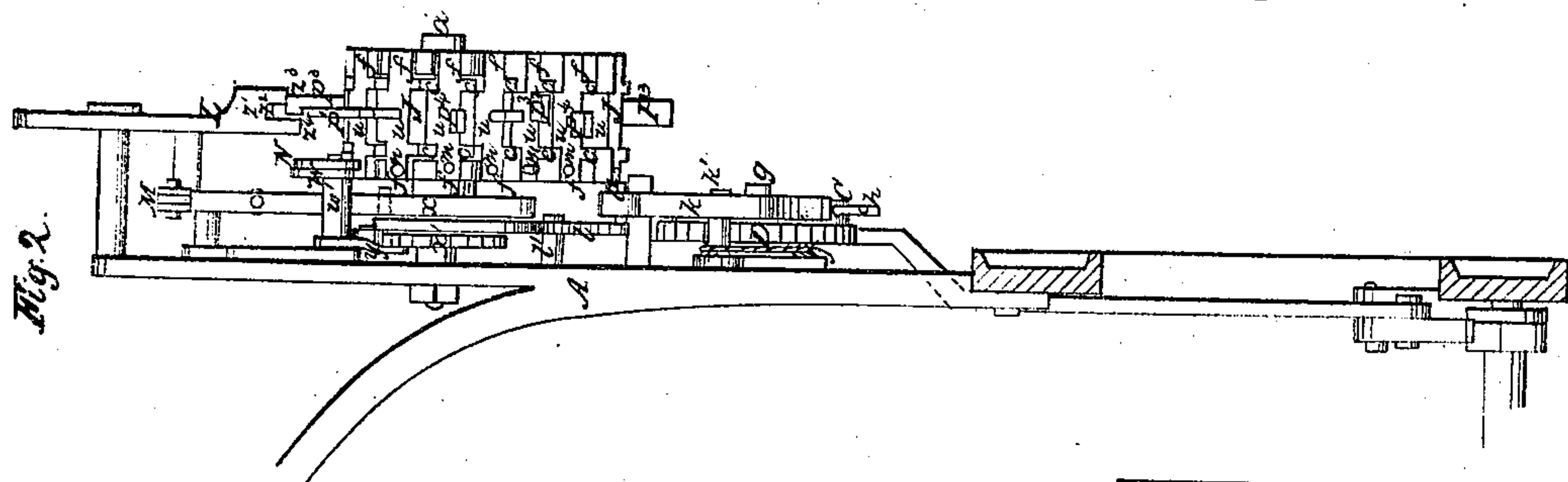


Fig. 2.

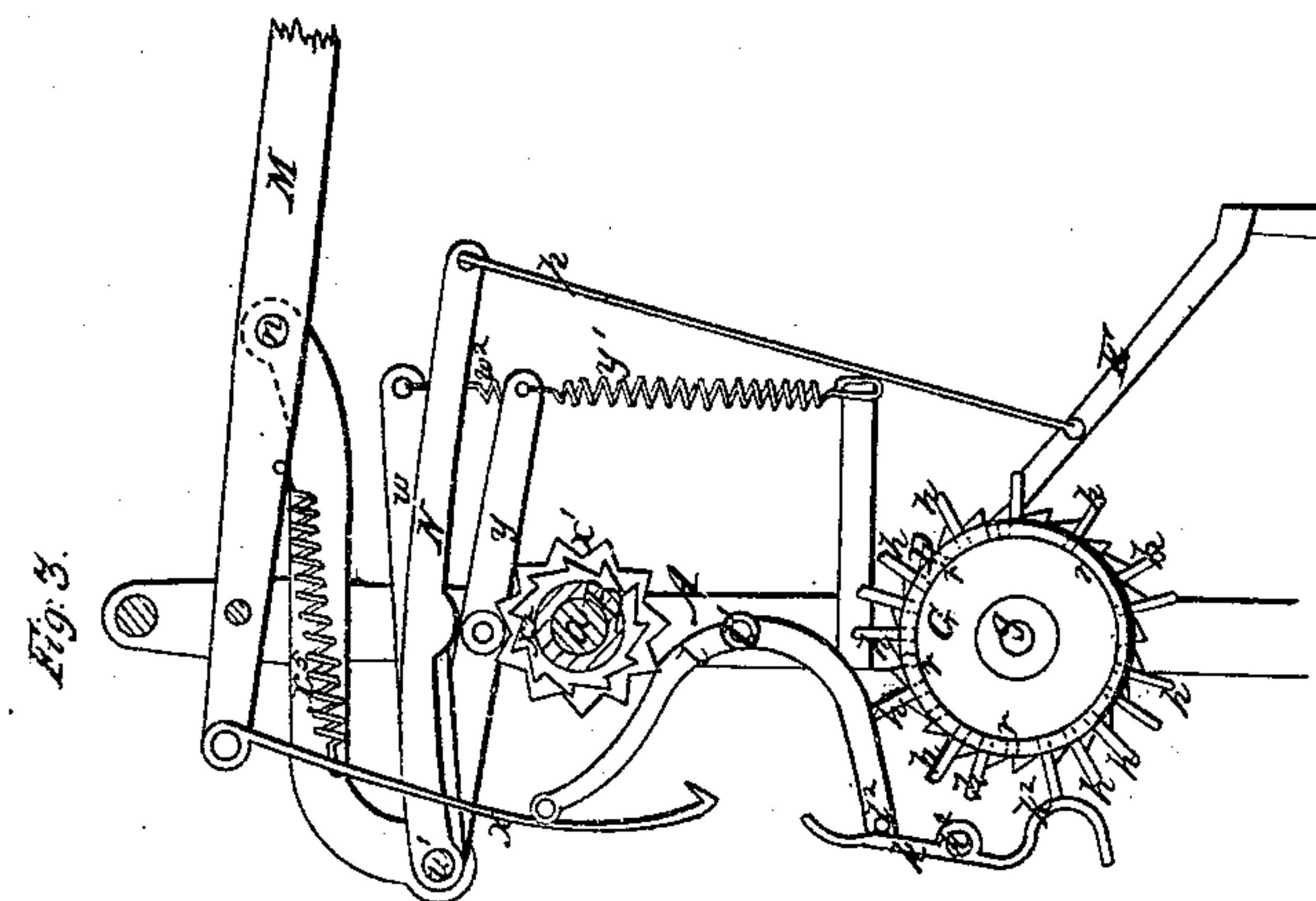


Fig. 3.

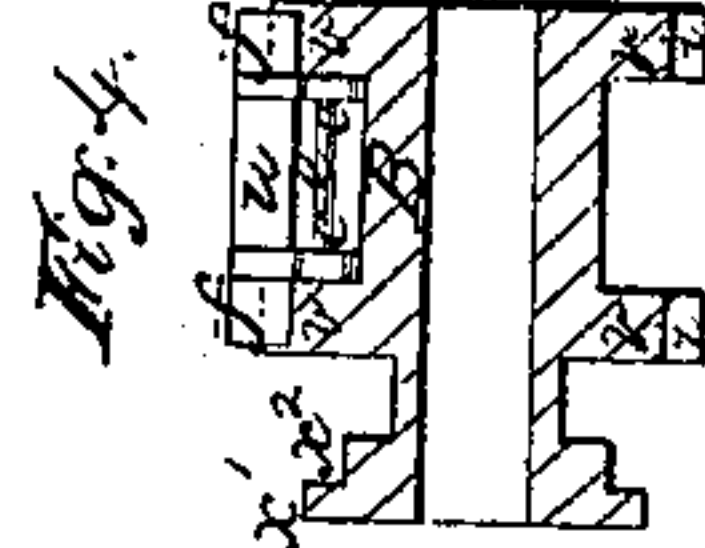


Fig. 4.

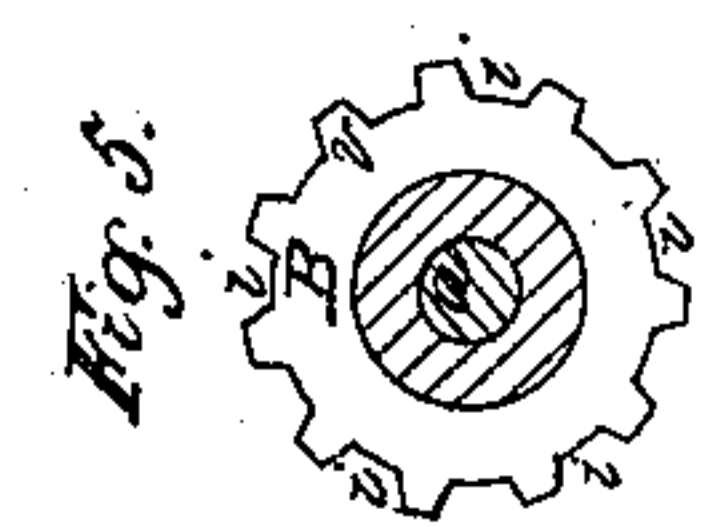


Fig. 5.

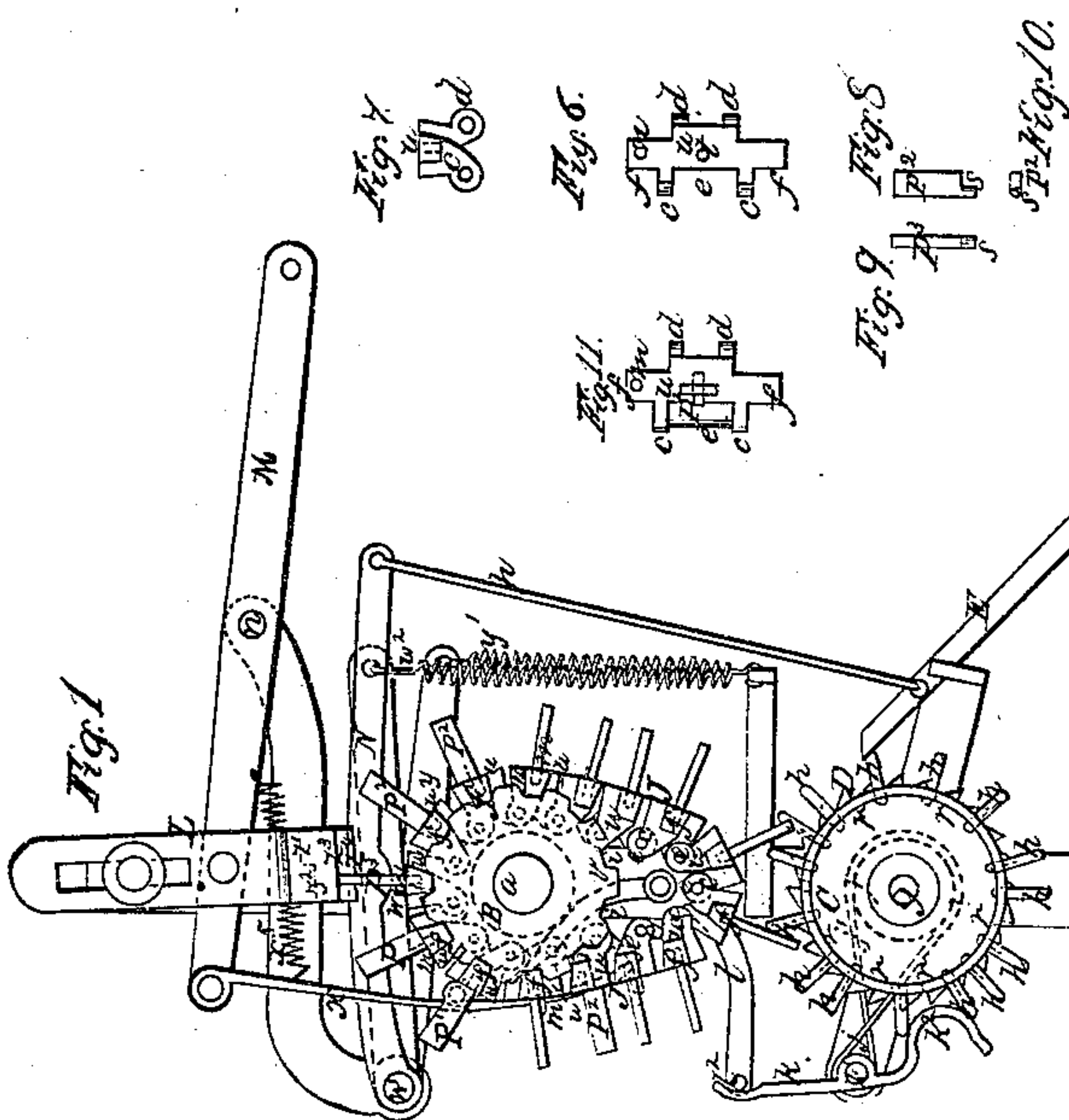


Fig. 1.



Fig. 6.

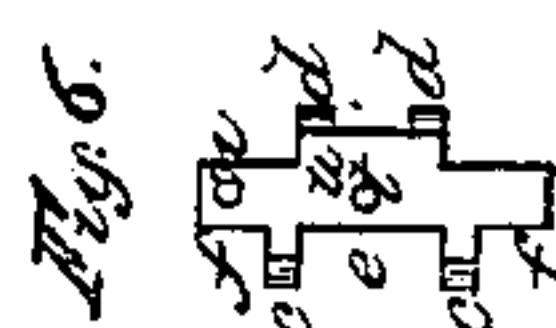


Fig. 7.



Fig. 8.



Fig. 9.

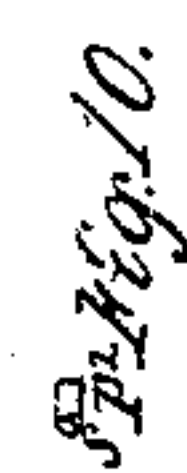
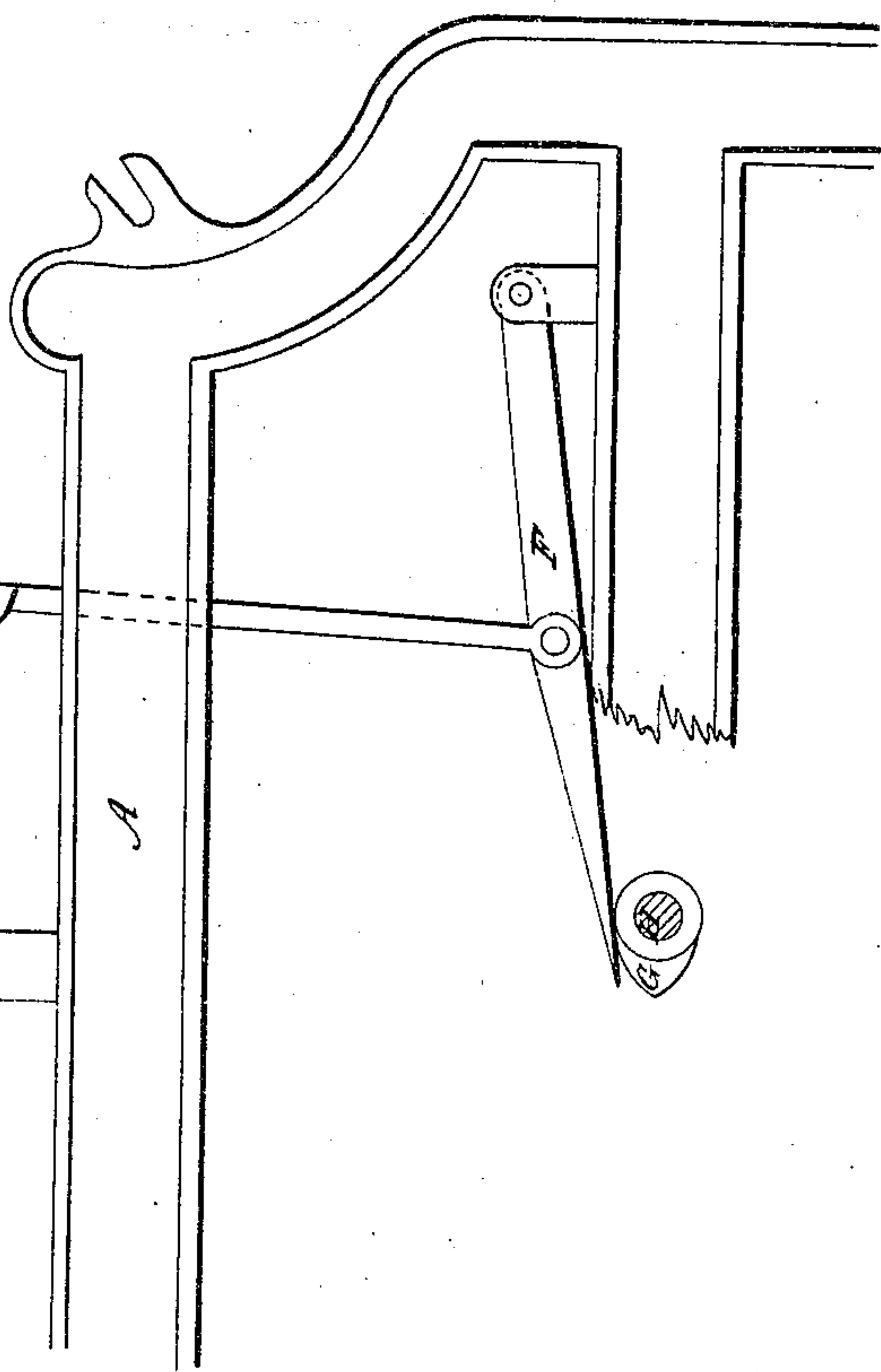


Fig. 10.



A



# UNITED STATES PATENT OFFICE.

ANDREW ALLEN, OF WILMINGTON, DELAWARE.

## POWER-LOOM.

Specification of Letters Patent No. 17,912, dated August 4, 1857.

*To all whom it may concern:*

Be it known that I, ANDREW ALLEN, of Wilmington, in the county of Newcastle and State of Delaware, have invented certain new and useful Improvements in Power-Looms; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, forming part of this specification.

This invention relates to the pattern mechanism for weaving fancy checks, gingham, and other fancy goods, and consists in certain convenient means of providing for variations of the pattern, and of producing a long pattern with a short pattern chain.

Figure 1, in the accompanying drawing, is a side elevation of part of a power loom exhibiting my invention as adapted to control the lifting and dropping of shuttle boxes, in the weaving of gingham, fancy checks, &c. Fig. 2 is a front view of the same. Fig. 3, is a view corresponding with Fig. 1, of some parts of the pattern mechanism; other parts being omitted for the sake of perspicuity. Figs. 4 to 11 are detail views that will be hereinafter explained.

A, is the framing of the loom.

J is the pattern chain, suspended on a wheel B, which rotates on a fixed stud *a*, secured in the framing A, at one side of the loom. This wheel B, has two flanges *v*, *v*, as shown in Fig. 4, which is a central section of the said wheel, with a link of the pattern chain resting on the top thereof; the said flanges containing a number of equidistant notches *i*, *i*, as shown in Fig. 1, and also in Fig. 5, which is a section of the wheel taken perpendicularly to its axis; the said notches being made to receive tenons on the ends of the several links of the pattern chain J, for the purpose of giving motion to the said chain by the revolution of the wheel. The chain J, J, is constructed in a peculiar manner. Its links *u*, *u*, which may be of cast iron or brass, are provided each on one side with two lugs *c*, *c*, as shown in Fig. 6, which is a top view of one of the links detached from the chain, which lugs fit snugly between the two flanges *v*, *v*, of the wheel as shown in Fig. 4, and thus prevent lateral motion of the chain when in operation. On the opposite side to the lugs *c*, *c*, each link is provided with two lugs *d*, *d*, which are so arranged as to fit between the lugs of its next neighbor to form a knuckle-joint, when

a pin *e*, is passed through holes provided in the said lugs to receive them. The parts *f*, *f*, of the links, outside of the lugs *c*, *c*, constitute the tenons which fit the notches *i*, *i*, of the wheel B, which as well as the tenons are made flat-bottomed, so that the latter may come to a solid bearing and sustain the links of the chain in a steady condition upon the wheel; and as the outer faces of the links are flat also, a straight-edged lever *w*, which is hung at one end above the chain wheel B, on a fixed fulcrum pin *w*<sup>1</sup>, secured in the loom framing, and which has a spring *w*<sup>2</sup> applied to pull down its other end, serves to confine the links firmly in the notches *i*, *i*, as they are severally brought to the top of the wheel, which is their operative position, by the revolution of the latter.

The pattern wheel B has attached to it a star wheel *x*<sup>1</sup>, which is operated upon by a roller pawl *y*, to hold it steady when the links are severally brought to their operative positions, said pawl *y*, being held down by a spring *y*<sup>1</sup>, which allows it to rise when power is applied to turn the pattern wheel. The pattern wheel also carries a ratchet-wheel *x*<sup>2</sup>, that has a number of teeth corresponding with a number of notches *i*, *i*, in its flanges *v*, *v*, and with the number of teeth in the star wheel *x*<sup>1</sup>; and on one side of this ratchet wheel there is arranged, for the purpose of moving it one tooth at a time, a hook pawl *x*, which is suspended from one end of a lever M, of the first order, which works upon a fixed fulcrum *n*, on the framing A. The opposite end of this lever M, is to be connected with any suitable mechanism that is so operated by any suitable means, that, at every revolution of the treading shaft of the loom or after every second beat of the lay, the said lever is moved in such a manner that its pawl, if engaged with the ratchet wheel, moves it one tooth and thus presents a new link of the pattern chain at the top of the wheel B, which, as has been before mentioned, is the operative position of the links.

The lever M is intended to be connected with a forked lifting lever, and combined with the other devices which constitute the subject matter of Letters Patent granted to me and bearing date April 15th 1856, and by that means, under the control of the pattern chain as will be presently described, is made to operate upon the shuttle boxes to vary the pattern. The variation of the pattern



is made on the chain J, in the following manner. Each link  $u$ , of the chain carries a single metal pin  $P^1$ ,  $P^2$ ,  $P^3$ , or  $P^4$ , of which Figs. 8, and 9, are side views at right angles to each other, and Fig. 10, a top view, the said pin having a shank  $s$ , which is fitted tightly into a hole  $t$ , (see Fig. 6) that is made in the center of the link to receive it. The head of this pin is made thin in one direction and with two opposite flat sides which are equally distant from the center of the shank, but in one direction parallel with the flat sides, the head leans over the center of the shank, as is indicated in Fig. 8. The pins are severally inserted in the links of the chain in one of four positions, viz., with the heads inclining in either direction lengthwise of the link or in either direction transversely thereto, all which positions are indicated in outlines of different character in Fig. 11, which is a top view of a link and pin, and which are severally represented in Figs. 1, and 2, where the several pins are represented in different positions.

The pins operate upon the lever M, by which the effect of their action is transmitted to the mechanism for controlling the lifting and dropping of the shuttle-boxes, through the agency of what I term an "indicator," L, which is suspended from the said lever M, above the pattern wheel B. This indicator consists of a bar of metal with its lower end forked in a direction transverse to the pattern chain. The inner prong  $z^4$ , of the fork of the indicator, is longer and hangs lower than the inner prong  $z^3$ , as shown in Fig. 2, and the space within the prongs which is situated directly over the shank of that pin P, which is at any time at the top of the chain, is made with two steps  $z^1$ , and  $z^2$ , as shown by dotted outline in Fig. 1, the step  $z^1$ , being higher than  $z^2$ . The faces of the said steps  $z^1$ , and  $z^2$ , and the extremities of the prongs  $z^3$ , and  $z^4$ , thus form four steps at equal distances one below another, and are so situated laterally to each other, that any pin of the pattern chain having its head directed toward the rear of its shank, as indicated at  $P^1$ , in Fig. 1, (where the back of the loom is to the right hand) on its arrival at the top of the pattern wheel B, which is the operative position of every pin, will stand below the highest step  $z^1$ , of the indicator; and a pin having its head directed toward the front of the shank, as indicated at  $P^2$ , in Fig. 1, on its arrival in its operative position, will stand under the next lower step  $z^2$ , of the indicator; and a pin having its head directed away from the side of the loom will, on its arrival at its operative position, stand under the third step  $z^3$ , of the indicator, as is indicated at  $P^3$ , in Fig. 2, and also in Fig. 1; and a pin having its

head directed toward the side of the loom, as indicated at  $P^4$ , will, on its arrival at its operative position, stand under the fourth or lowest step  $z^4$ , of the indicator. The different positions of the pins, as indicated by outline of different character in Fig. 11, are also referred to by letters  $P^1$ ,  $P^2$ ,  $P^3$ ,  $P^4$ , to correspond with Figs. 1 and 2. It is obvious from the foregoing description that according to the positions of the pins, as they are severally brought to their operative position, viz the top of the chain, by the same movement—derived from the treading shaft—by which the indicator is raised, the indicator on its descent will be arrested by the operative pin  $P^1$ ,  $P^2$ ,  $P^3$ , or  $P^4$ , in a higher or lower position, and thus will control the position of the lever M, which, controlling the drop-box mechanism through the agency of the means described and claimed in my aforesaid Letters Patent dated April 16, 1856, brings one or other of the four shuttle-boxes and shuttles—four being the number of boxes and shuttles for which this pattern chain is constructed—to the operative position, according to the pattern.

By the above described arrangement of pins in the pattern chain, combined with the step-formed indicator L, a more ready and convenient method of varying the pattern is afforded than by the ordinary method which consists in the employment of pins of different length; the pins  $P^1$ ,  $P^2$ ,  $P^3$ ,  $P^4$ , never require to be taken out, but to vary the pattern require simply to be turned in their places in the links by means of a pair of pincers or other suitable instrument, which can be done very expeditiously and without any difficulty, while the pins ordinarily used require to be taken out and changed for longer or shorter ones, or to have their positions in the links varied to effect the same result, which is far less convenient.

The above-described novel arrangement of pins in the pattern chain, however, involves the same length of chain or the same number of links as the arrangement of pins heretofore used; but in order to enable a long and complicated pattern to be produced by a short pattern chain, which is very desirable in all looms, I make use of mechanism which I will proceed to describe.

C, in Figs. 1, 2, and 3, is a wheel which I call a retarding wheel, fitted to rotate freely on a stud  $g$ , that is secured on the framing of the loom, some distance below the pattern wheel; said wheel being provided in its rim with any number of holes  $r$ ,  $r$ , shown dotted in Fig. 3, at equal distances apart all around it, to receive pins  $h$ ,  $h$ , which may be made of metal or hard wood. This retarding wheel C, has secured to it a brake-wheel  $j$ , around which is placed a friction strap  $j^1$ , and has also secured to it



a ratchet wheel D, the number of whose teeth corresponds with the number of holes in the rim of the retarding wheel.

$k$ , is a lever of the first order, arranged 5 to work upon a fixed fulcrum pin  $k^1$ , secured in the side of the loom framing near the front side of the retarding wheel, and a little higher than the axis thereof, the said lever occupying a nearly upright position 10 and having a rounded projection  $k^2$ , on the lower part of the side next the retarding wheel, which occupies such a position as to be struck by the pins  $h$ ,  $h$ , of the retarding wheel as they severally pass it. The upper 15 arm of the lever  $k$ , rests against a pin  $l^2$ , that projects forward from the lower end of another lever  $l$ , of the first order, that works on a fulcrum pin  $l^1$ , secured in the side of the loom framing between the two 20 studs  $a$ , and  $g$ , upon which the chain wheel B, and retarding wheel C, rotate. This lever  $l$ , is best shown in Fig. 3, where the pattern chain and wheel B, are omitted to expose it. It is also shown in Fig. 2, and dotted in Fig. 25 1. Its upper end rests against the hook pawl  $x$ , by which motion is given to the chain wheel, on that side of the said pawl that is nearest to the wheel.

E, is a pawl jointed to a lever F, which 30 rests upon a cam G, on the treading shaft H, of the loom, not the same cam by whose agency the lever M, before described, is operated and which is not shown, but the said cam G, being arranged to act intermittently 35 to the other cam. The pawl E, is so arranged that, when not under control of other devices to be presently explained, its point rests upon the ratchet wheel D; and every time the lever F, is raised by the cam 40 G, the said pawl moves the said ratchet wheel one tooth and thus moves the wheel C, so that its periphery rotates a distance equal to the distance from one to another of the holes therein. The holes in the pe- 45 riphery of the wheel C, are not all filled with pins  $h$ ,  $h$ , but pins are inserted in some and not in others, their arrangement being according to the pattern to be produced. When by the movement of the wheel C, a 50 pin  $h$ , is presented opposite the rounded projection  $k^2$ , of the lever  $k$ , the lower end of the said lever is forced away from the wheel, the upper end of said lever is forced against the pin  $l^2$ , of the lever  $l$ , and the upper end 55 of the said lever  $l$ , is forced against the pawl  $x$ , and caused to throw it so far out from the ratchet wheel  $x^2$ , of the chain wheel (as shown in Fig. 3) as to render said pawl  $x$ , inoperative on the chain wheel, and thereby 60 to cause the chain wheel and pattern chain to remain stationary the next time the pawl  $x$ , is raised by the movement of the lever M, derived from the cam on the treading shaft; but as those holes of the wheel C, 65 that contain no pins  $h$ ,  $h$ , pass the lever  $k$ ,

the said lever is not acted upon to throw the pawl  $x$ , out of gear with its ratchet wheel, but the said pawl is held in gear by the spring  $x^5$ , connected with it, and moves the chain wheel and pattern chain at every revo- 70 lution of the treading shaft to present a new link and pin of the pattern chain in the operative position.

The result obtained by the retarding wheel C, and its appendages, is that when 75 several picks of the same color or filling thread are required in succession, the same link and pin of the pattern chain may be allowed to remain in operation, instead of bringing a new link into operation at every 80 pick, as is the usual practice. It will be readily understood that by fitting pins  $h$ ,  $h$ , into any number of successive holes in the retarding wheel C, the movement of the pat- 85 tern chain may be suspended, while one shuttle makes that number of picks back and forth; and hence it is obvious that for a long and complicated pattern, the chain is required to be but a mere fraction of the length 90 of a chain operating in the usual manner. The retarding wheel and levers  $k$ , and  $l$ , may be applied to a pattern cylinder in the same way as to a chain wheel, with the cor- 95 responding advantage of allowing a long and complicated pattern to be produced with a small cylinder.

To enable a greater variety of pattern and a greater length of pattern to be produced, without making the retarding wheel C, of great size, it is desirable that said wheel 100 should not operate to suspend the operation of the chain when only two picks back and forth of one shuttle are required, but that the repetition of the pick should be effected by arranging the pins similarly in two ad- 105 jacent links of the chain, and allowing the chain to move a distance of two links, by suspending the operation of the retarding wheel during one revolution of the treading shaft. This will prevent the retarding 110 wheel completing its revolution during so small a number of picks as it otherwise would. The suspension of the operation of the retarding wheel is controlled by pins  $m$ ,  $m$ , inserted in holes  $n$ ,  $n$ , provided for the 115 purpose in the several links of the pattern chain, and a lever N, working on the same fulcrum  $w^1$ , as the levers  $w$ , and  $y$ , the said lever being connected by a rod  $p$ , with the pawl E. The pins  $m$ ,  $m$ , are only inserted 120 in the first one of any two links carrying similarly arranged pins. When such link comes into its operative position, the pin which it carries lifts the lever N, as shown in Fig. 1, and by that means the rod  $p$ , is 125 caused to lift the pawl E, out of contact with the ratchet-wheel D, so that when the said pawl is actuated by the succeeding upward movement of the lever F, produced by the cam G, it does not move the retarding 130



wheel, which remains stationary till the next upward movement of the lever takes place, before which time the pawl  $\alpha$ , has moved the chain wheel and presented the next link 5 of the pattern chain, which, not having a pin  $m$ , inserted, allows the lever N, to fall low enough to let the pawl E, fall into the ratchet wheel D, again, so that the next time the lever F is raised by the cam G, the re- 10 tarding wheel will be moved again. The operation of the retarding wheel may in like manner be suspended by inserting a pin  $m$ , in any link or links of the chain when the nature of the pattern admits of it; for it 15 will be understood that it is desirable to suspend its operation as often as possible, in order to weave a pattern of great length. The pins  $m$ ,  $m$ , and lever N, may be applied in the same manner to a studded pattern cylinder as to a chain. 20

What I claim as my invention, and desire to secure by Letters-Patent is:—

1. The combination of the step-formed indicator L, attached to the lifting and dropping mechanism of the shuttle boxes; and 25 the adjustable pins  $P^1$ ,  $P^2$ ,  $P^3$ ,  $P^4$ , of the pattern chain, substantially in the manner de-

scribed for the purpose of controlling the pattern and affording a greater facility for varying the same than the means heretofore used. 30

I am aware of the means described in the patent of B. H. Jenks, dated Oct. 24, 1854, for varying the movement of the shuttle boxes by an auxiliary wheel, and this I 35 therefore do not claim, but I do claim—

2. The retarding wheel C, with its pins  $h$ ,  $h$ , combined with the pattern chain wheel or cylinder substantially as described, to arrest the pattern chain or cylinder when sev- 40 eral picks are required to be made by the same shuttle or with the same filling thread.

3. The combination of the pins  $m$ ,  $m$ , on the pattern chain or cylinder, and the lever N, with the pawl E of the retarding wheel, 45 for the purpose of causing the operation of the retarding wheel to be suspended under the control of the pattern chain, when desired, substantially as herein described.

ANDREW ALLEN.

Witnesses:

WILLIAM H. STAATS,  
ABRAHAM STAATS.