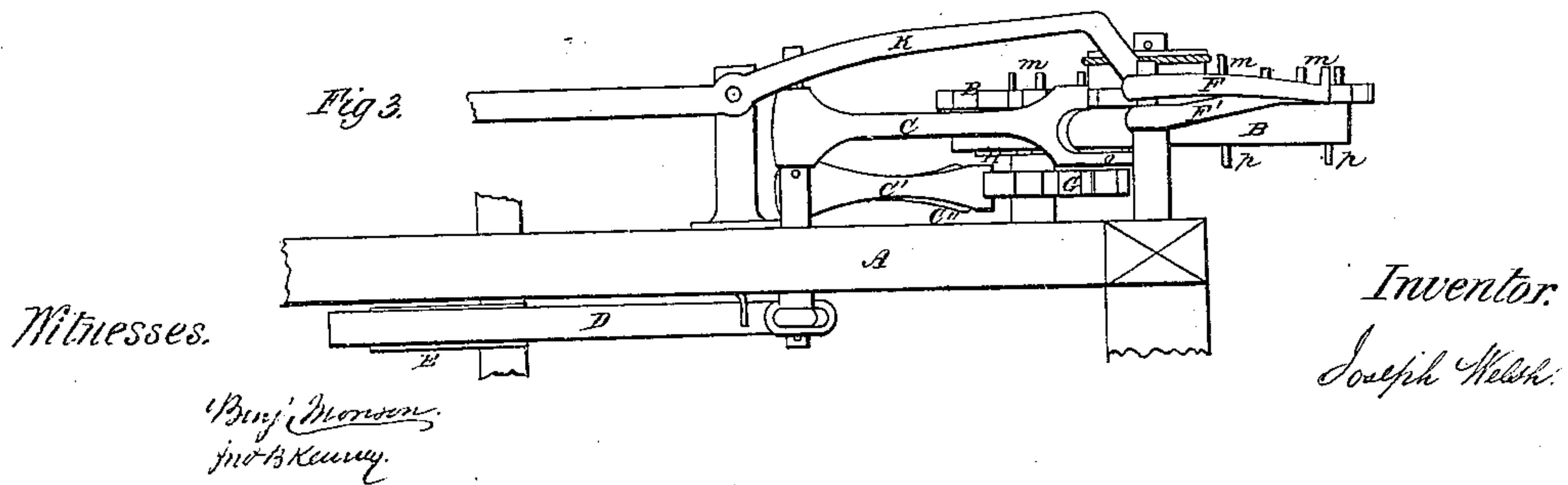
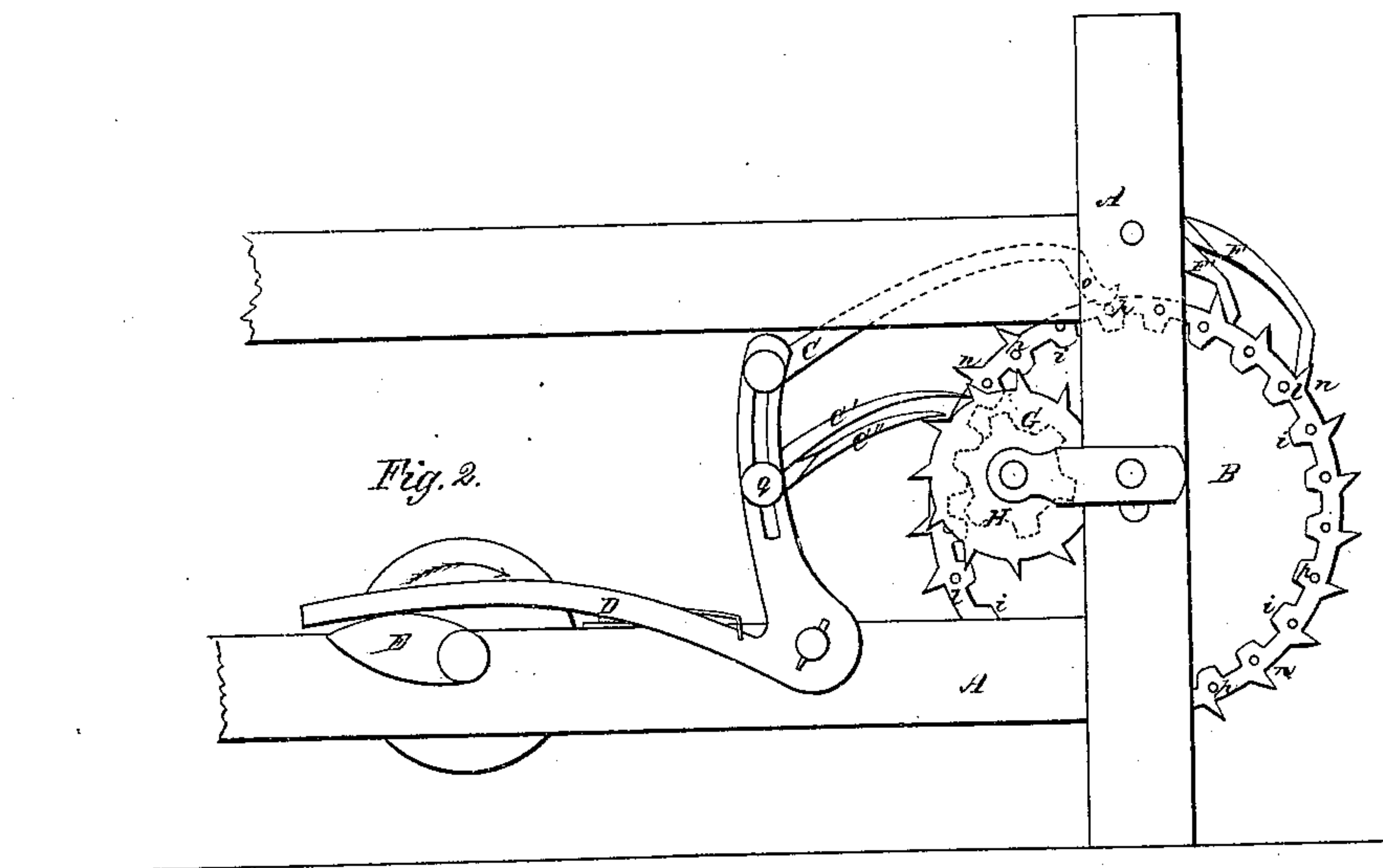
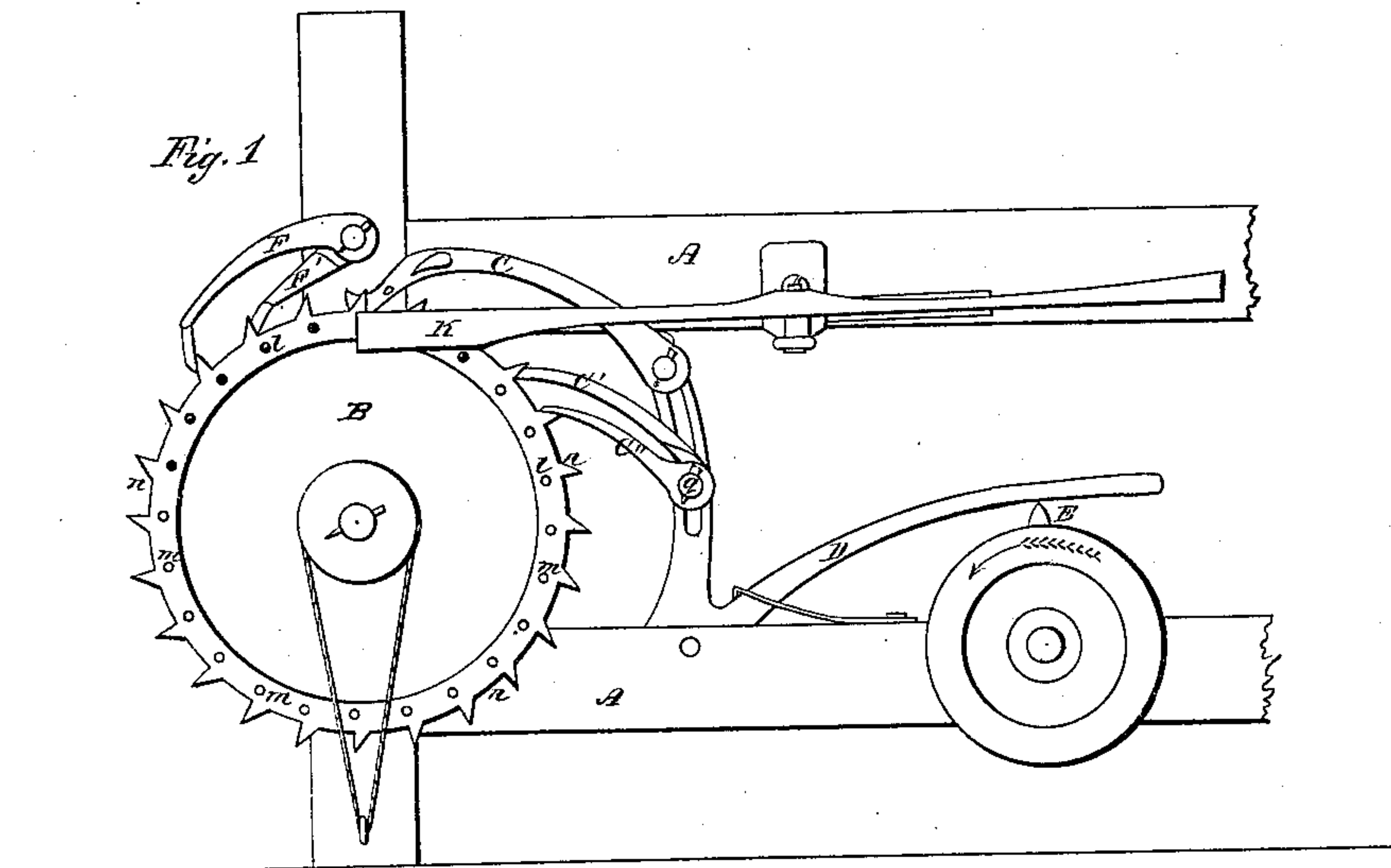


J. Welsh.
Shuttle Box.

N^o 20,969.

Patented Jul. 20, 1858.



UNITED STATES PATENT OFFICE.

JOS. WELSH, OF PHILADELPHIA, PENNSYLVANIA.

LOOM.

Specification of Letters Patent No. 20,969, dated July 20, 1858.

To all whom it may concern:

Be it known that I, JOSEPH WELSH, of the city of Philadelphia, in the State of Pennsylvania, have invented a new and useful Improvement in the Apparatus for Multiplying in Looms; 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 accompanying drawings, making a part of this specification, in which—

Figure 1, is an outer-side view; Fig. 2, an inner-side view, and Fig. 3, a top view, of the invention as applied to a loom—like letters in the several figures indicating the same objects.

My invention has for its object the making one pattern wheel of a loom produce, during each complete rotation of the same upon its axis, any increase in the number of "shots" over its normal capacity that may be required in forming the various patterns of check, or cross-barred cloth to be woven upon the loom—whether the said patterns require an increase of two "shots" only, or a greatly larger number, at any given point or points of the periphery of the said pattern wheel; and also the rendering the said multiplying apparatus, self adjusting, or so as to become reset by the usual simple resetting of the pattern wheel alone, after the picking out of such defects in the filling of the cloth as require it.

It consists in the arrangement and combination of two alternately acting pawls with an actuating lever operated by any suitable part of the loom, so that the said pawls shall operate upon the pattern wheel ratchet notches alternately with the usual single pawl, to move it as occasion may require; and also in the arrangement and combination with the said pattern wheel of an extra ratchet wheel having an uninterrupted series of regular notches around its periphery, and also a pinion connecting by teeth on, or connected with the pattern wheel, so that the said extra ratchet-wheel may be operated by the two pawls and move the pattern wheel, as occasion may require.

In the accompanying drawings, A, represents a section of the loom frame; B, the pattern wheel; C, C', C'', the operating pawls; D, the lever which actuates the operating pawls; E, a cam which gives motion to the said lever (D); F, and F', retaining pawls of the pattern wheel; G, the extra

ratchet wheel; H, its pinion (shown by the dotted lines in Fig. 2) as geared into teeth, $i-i$, on the inner side of the said pattern wheel; and K, the pattern lever.

The outer side of the pattern wheel is provided with through holes, $l-l$, for receiving the pattern studs or pins $m-m$, in the usual manner; and also with the usual ratchet notches $n-n$, whereby either the usual operating pawl (C), or the pair of pawls (C' and C'') alternately move it around upon its axis as the actuating lever (D) is operated by the cam (E); and so operate the pattern lever (K) to produce in the usual manner the required change in the shuttles. In this instance the pattern wheel (B), has 24 ratchet notches and gives exactly 48 shots of the shuttles on each rotation of the wheel, when the same is operated by means of the usual pawl (C) alone. But it is frequently the case that a pattern of cloth is required to be produced which has more shots in the pattern than the pattern wheel of the loom is capable of producing during its complete rotation, and in such case it has been necessary to substitute either another pattern wheel having the required greater number of notches, or to apply thereto a multiplier of some kind to produce the effect required. To produce this result I make the operating pawl (C) with a prolongation, o , which projects downwardly therefrom on the inner side of the pattern wheel so that the pawl shall be raised up out of contact with the ratchet notches ($n-n$) of the said wheel (B) when the lifting pins ($p-p$) (which are inserted horizontally on the inner side of the pattern wheel at the discretion of the operator, to suit the particular pattern of cloth required) are passed under it by the rotary motion of the said wheel; and also apply two other alternately acting pawls (C' and C'') to the actuating lever (D), so as to turn on a horizontal arm, q , (which I adjust at a point on the said lever about half way between the fulcrum of the latter and the pawl (C) above) and so that the said two operating pawls (C' and C'') shall have but half the length of forward and back motion upon the pattern wheel notches which the usual pawl (C) has—the lower one (C'') being about half the space which is between the said notches (n) shorter than its fellow (C'); consequently at each complete vibration of the actuating lever (D), these two pawls (C' and C'') alternately

move the pattern wheel forward only half the space which is between any two notches, and thus allow double the number of shots for each space so passed; which, if the pawl (C) is kept continually lifted up out of contact with the notches (n), as described, during the whole rotation of the wheel, would be 96 shots; but as so large an increase of shots may not be required in the particular pattern to be produced, it is only necessary to insert such a number of the lifting pins (p) as the peculiarity and increase desired may require. This arrangement is seen in Fig. 1.

Should a still greater increase in the number of shots be required, to work any pattern of cloth than the pattern wheel is capable of allowing when it is operated as just described, resort can be had to the extra ratchet wheel (G), by slipping the two pawls (C' and C'') inwardly on their axis (q), so that they shall come in contact with and operate upon the ratchet notches of the said extra wheel (G), precisely in the same manner as their action has been described to be on the notches (n) of the pattern wheel (B)—the spaces between their respective notches being alike. This extra ratchet wheel (G) has only half the number of notches contained in the pattern wheel (B), and its pinion (H) but half as many teeth as the wheel (G) has notches. The ring of teeth (i—i) on the inner side of the pattern wheel and with which the pinion (H) gears, are the same in number as the ratchet notches on its periphery—viz. 24; hence it will require four full vibrations of the lever (D) to cause the two pawls (C' and C'') to move the pattern wheel (B) the distance between each ratchet notch and its next; and thus therefore, I am enabled to again double the former capacity of the pattern wheel, or to cause it to allow 192 shots during each full rotation of the same—the usual operating pawl (C) being out of contact with the teeth of the pattern wheel (B), during such rotation. But as so large an increase would seldom, perhaps never, be required, any increase by means of the extra ratchet wheel (G) below the whole amount, is easily attained by withdrawing such a number of the lifting pins (p) as the peculiarities of the pattern may require, as mentioned in the other case. This arrangement of the two operating pawls (C' and C'') on the extra ratchet wheel (G) is seen in Figs. 2 and 3.

The drawings represent the pattern wheel as fitted with 12 pattern pins (m) each so arranged in length and position as to produce four changes of the shuttles at each rotation of the said wheel—consequently if there were no lifting pins (p), in the opposite side of the wheel the operating pawl (C) alone would rotate it and produce 48 shots of the shuttles—as for instance 24 blue, 10

white, 4 red, and 10 white; but on the inner side of the wheel there are 6 lifting pins (p) consequently these pins lift the pawl (C) at these points only, and so allow the two pawls (C' and C'') to act in its stead, thus increasing the number of shots to 60 at each rotation—as thus, 30 blue, 12 white, 6 red, and 12 white, as seen in Fig. 1. Now suppose the two operating pawls (C' and C'') be shifted inwardly so as to operate the extra ratchet wheel (G), as seen in Figs. 2, and 3, the preceding capacity of the pattern wheel will be doubled and a pattern of cloth produced containing 60 blue, 24 white, 12 red, and 24 white, or 120 shots at each rotation of the pattern wheel.

In the application of the extra ratchet wheel (G), it is obvious that its pinion (H) may be made to move the pattern wheel in the same direction and manner, by means of a spur wheel fixed in the hub of the pattern wheel and connected to the pinion (H) by means of an intermediate wheel; but as the mode of gearing shown is efficient and more simple, it is preferred. I am aware that a multiplying ratchet wheel has been used before, and patented by Barton H. Jenks October 24th, 1854, but as constructed, applied, and operated, it is not competent to increase the number of shots from, say two, to any number within its greatest capacity, at any given point or points of the pattern wheel, because it must always be made with one or more breaks in its series of notches, and if it has but one break, all the rest of its notches must be worked in multiplying before the break can release them from the acting pawl; and if the said wheel be made with several such breaks in its series of notches, it renders it incompetent to produce a greater increase in the number of shots at any point of the pattern wheel, than may be produced by any one of the regular series of notches left between the said breaks; and therefore the said device is not competent to produce an increase of any number of shots from two upward, at any point or points of the periphery of the pattern wheel; and hence therefore, an almost infinite variety of such multipliers are required for a loom to make it capable of working every variety of pattern above the normal capacity of the pattern wheel. Besides, this multiplier has necessarily to be reset back independently of the pattern wheel (after the picking out of such defects in the filling of the cloth as are frequently made) whenever the pawl is working on it, which resetting causes a great deal of vexatious trouble from the accuracy required in resetting and delay, whereas by means of my invention the workman can increase, at pleasure, the number of shots required at any given point or points of the periphery of the pattern wheel, whether it be only two shots, or a number equal to the

whole capacity of the multiplying apparatus; besides, as my extra ratchet wheel has no break in its series of notches, it becomes necessarily reset with the pawls in connection with it, by the simple resetting of the pattern wheel alone, in the usual manner, after the picking out of the defects in the cloth before mentioned.

As a multiplier of the pattern wheel of looms has been used before, and patented by Barton H. Jenks on the 24th of October 1854, I do not claim, broadly, increasing the capacity of the said pattern wheel by means of a multiplier; but

I claim as my invention, and desire to secure by Letters Patent—

As an improvement in the said multiply-

ing apparatus, the arrangement and combination consisting of the extra ratchet wheel (G) and its pinion (H) in connection, either directly or indirectly, with the pattern wheel; the adjustable pawls (C' and C'') on their actuating lever (D); and the prolongation (o) on the usual operating pawl (C) of the pattern wheel—the said devices, or their equivalents, being arranged so as to effect the changes as desired, in number, at any given point of the pattern wheel during its rotation, substantially as set forth and described.

JOSEPH WELSH.

Witnesses:

BENJ. MORRISON,
JNO. B. KENNEY.