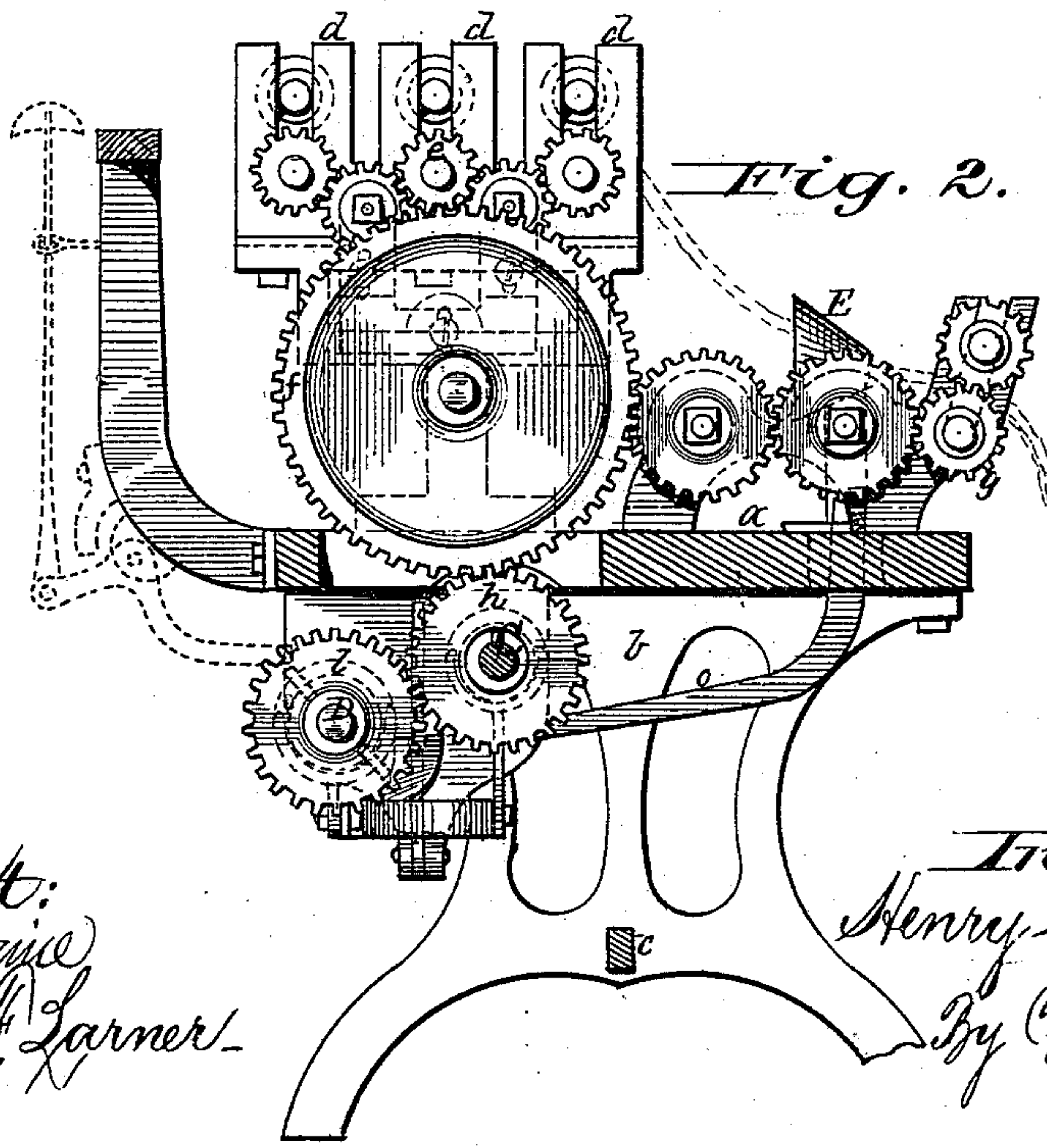
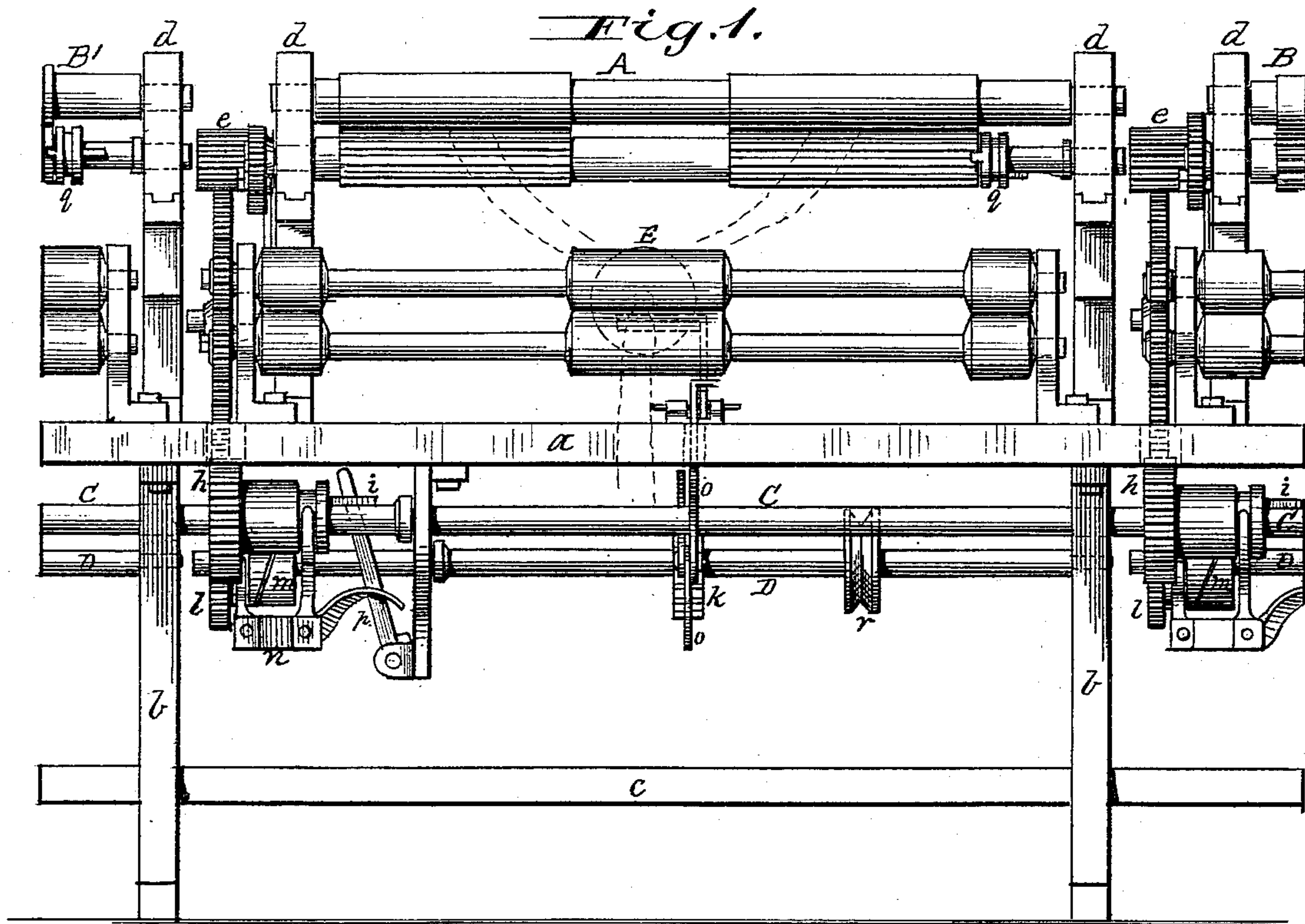


H. C. GRAYSON.  
Drawing Frame.

No. 211,903.

Patented Feb. 4, 1879.



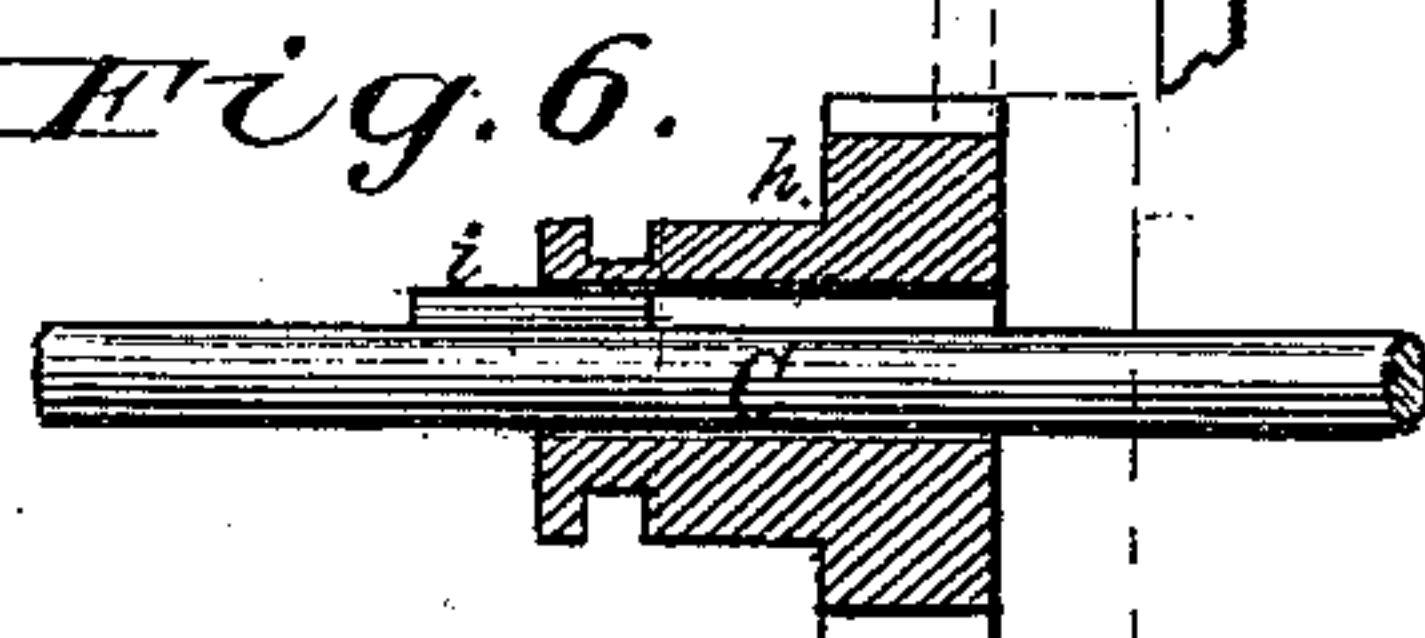
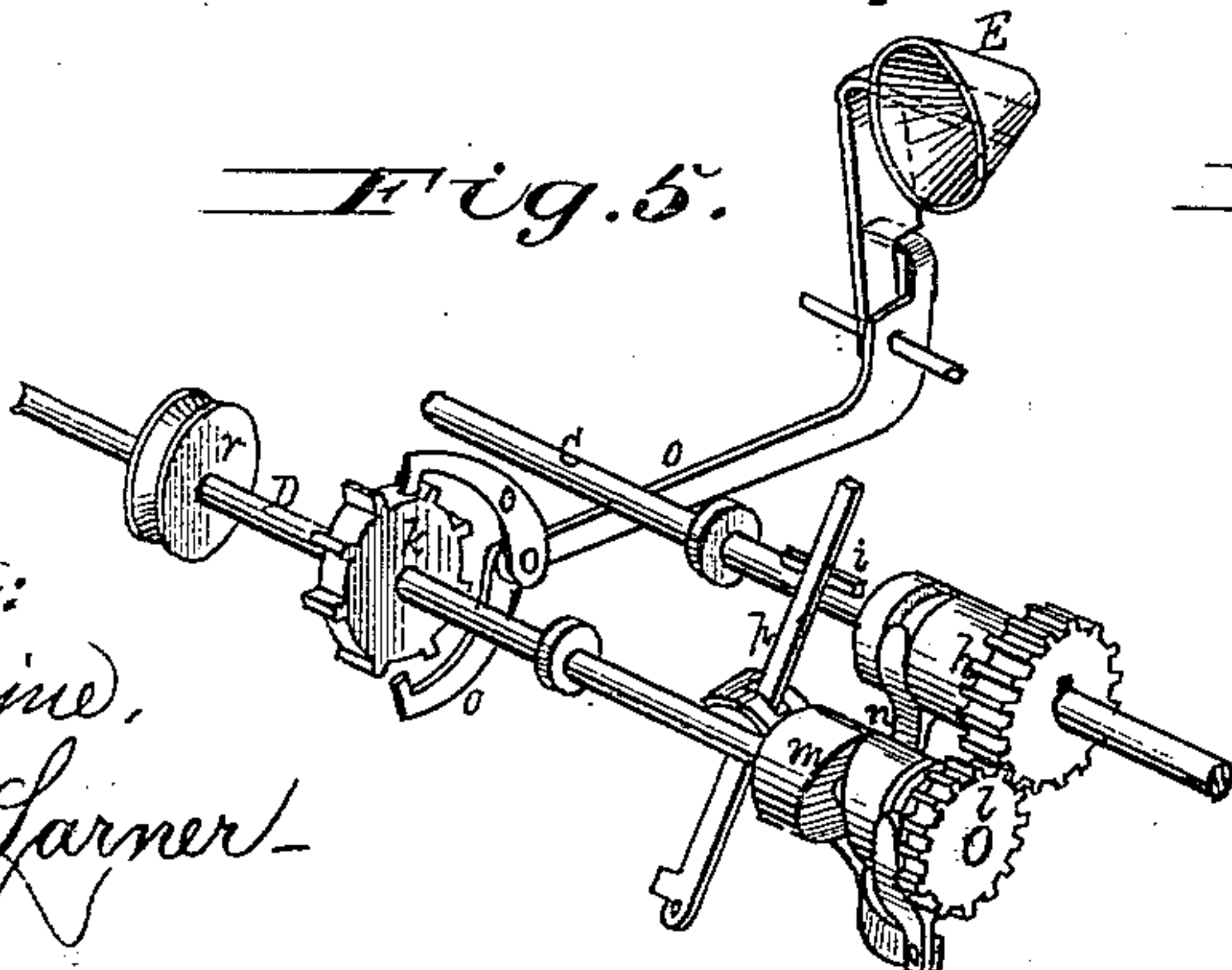
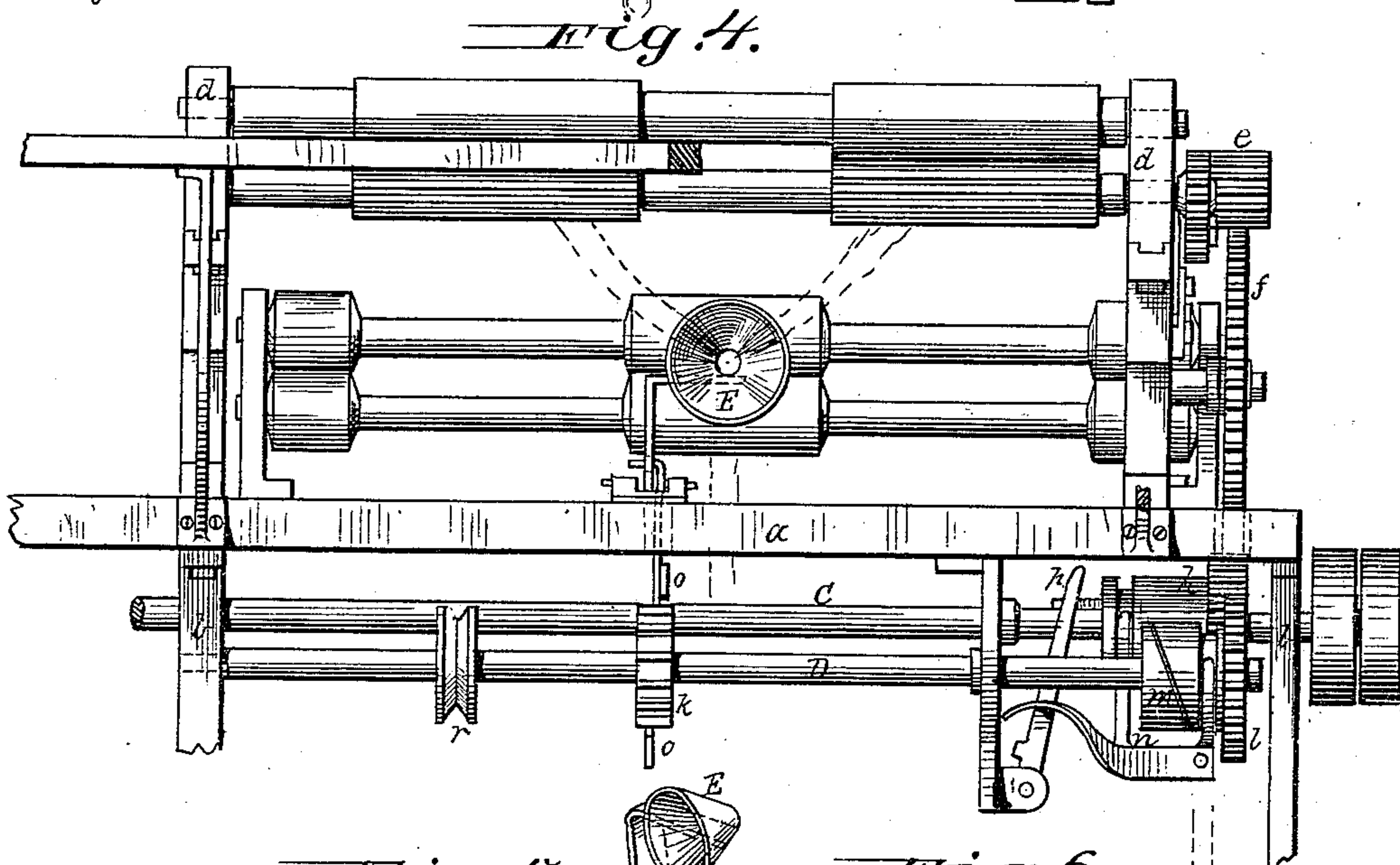
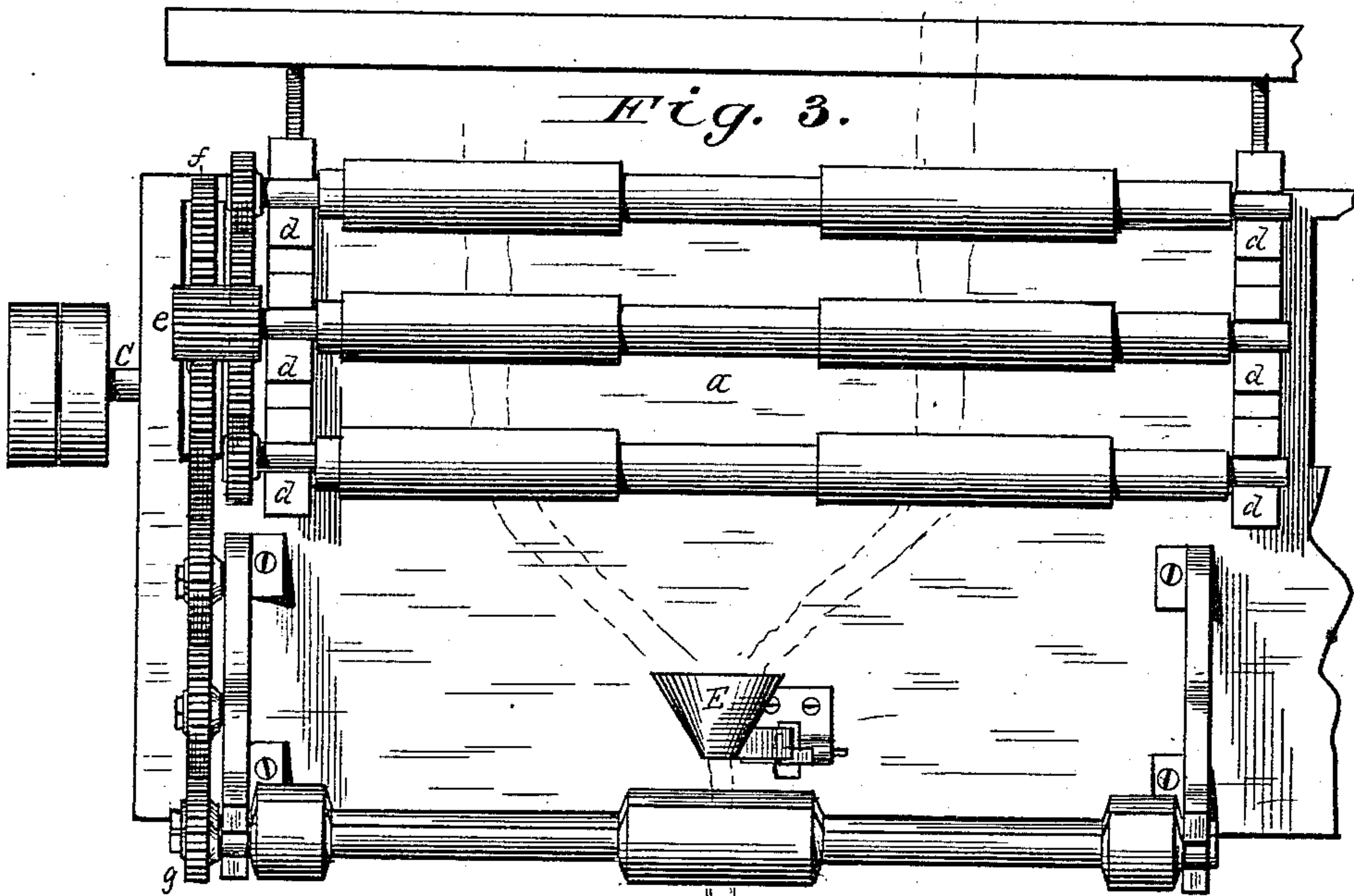
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# UNITED STATES PATENT OFFICE.

HENRY C. GRAYSON, OF CENTREVILLE, RHODE ISLAND.

## IMPROVEMENT IN DRAWING-FRAMES.

Specification forming part of Letters Patent No. **211,903**, dated February 4, 1879; application filed November 2, 1878.

*To all whom it may concern:*

Be it known that I, HENRY C. GRAYSON, of Centreville, in the county of Kent and State of Rhode Island, have invented certain new and useful Improvements in Drawing-Frames; and I do hereby declare that the following specification, taken in connection with the drawings furnished and forming a part thereof, is a clear, true, and complete description of my said improvements.

As heretofore constructed, drawing-frames have embodied from two to twelve (and sometimes more) sets of drawing-rolls, each set being provided with a trumpet, and each trumpet being so connected with stopping mechanism that the entire frame will be stopped in the event of the undue movement of any one trumpet either backward or forward, incident, respectively, to a lean, broken, or terminated sliver, and to a "bunch" therein.

Economy in space, as well as in first cost, renders it desirable to consolidate in one frame as many sets of rolls as may be required or may be practicable, and they are generally so consolidated, notwithstanding the fact that in proportion to the number of sets there is an increased loss in time and producing capacity incident to the frequent stopping of the entire frame when from any of the numerous well-known causes the trumpet of any one set of rolls operates the stop-motion. It is obvious that this loss in producing capacity involves either a deficiency in the stock prepared for spinning, causing loss in time, of spindles, and so on, or a greater plant in drawing-frames than would be actually necessary for supplying a given number of spindles if there was no loss in the producing capacity of the frames.

The object of my invention is to increase the producing capacity of drawing-frames embodying two or more sets of rolls; and this object is attained by a novel organization of the rolls, their driving mechanism, and their stopping mechanism, whereby any one or more sets of rolls in a frame may be stopped for cause without in any manner affecting the operation of other sets in the same frame, in connection with which the operative conditions are favorable for the production of drawn slivers.

The main feature of my invention relates to the novel organization of the drawing-rolls, without which the results attained would be impossible; and it consists of the combination, in a drawing-frame, of two or more sets of drawing-rolls constructed in independent sections, and provided with separate driving-gearing, whereby each set of rolls may be stopped independently of any other set, or operated at a speed greater or less than any other set.

Without reference to other portions of my invention this sectional feature in a drawing-frame has practical value in that by the well-known use of change-gears any one frame may be made to do a variety of drawing, or one set of rolls may require repairs, which can be proceeded with regardless of the continued operation of the other sets, and under many other circumstances a portion of the frame may be idle while the remainder is operated. A frame embodying this feature would necessarily have short top rolls at each set, as have heretofore been used; but, unlike all other drawing-frames, the fluted or bed rolls would be also of similar length instead of having them united to constitute a roller-shaft extending from end to end in the machine, as heretofore.

This novel organization of the rolls also involves the necessity of employing a separate pair of standards for each set of rolls and a separate set of gearing for communicating with a driving-shaft common to all the sets, and also any suitable or well-known means for disconnecting the driving-shaft from said gearing in each instance. Full benefits resulting from this portion of my invention are only available with the use of stopping mechanism capable of operating on one set of rolls only; but it will be obvious that substantial advantages, as stated, will accrue, even if, as heretofore, the entire frame be stopped through the action of a single trumpet, because immediately thereafter the disconnection by hand of the delinquent set of rolls from the main driving-shaft, as with a clutch, and the securing of their trumpet in a central position, will permit the prompt resumption of work with all the other set of rolls, which need not be again stopped when the idle rolls are next



ready for service, the connection with the driving-shaft of these latter being as readily executed as their disconnection.

Another feature of my invention consists in the combination, in a drawing-frame, of two or more separate sets of drawing-rolls separately geared to their driving-shaft, and a stopping mechanism to each set, which controls its gearing without interfering with the operation of any other set of rolls.

Any suitable stop-motion mechanism may be employed in this combination, as nothing more is required of it than is required of any other drawing-frame stop-motion, except that, instead of operating upon the belt-shipper and stopping the entire frame, I rely on it for stopping only the set of rolls with which it co-operates, and therefore it disconnects the gearing of its particular set of rolls from the driving-shaft, which is common to all the sets, instead of stopping the entire frame, as heretofore.

My invention further consists in the combination, with a set of drawing-rolls, of a main driving-shaft geared to said rolls by clutch-gearing, a revolving stop-wheel shaft provided with a cam for operating the clutch-gearing, and a trumpet and its lever for engaging with the stop-wheel, whereby the rolls may be stopped independently of the main shaft.

In order that the rotation of each can for receiving the sliver may be terminated with the stoppage of its particular set of rolls, my invention further consists in the combination, with a set of rolls which are capable of being stopped independently of the main shaft, of an auxiliary shaft, which revolves and stops simultaneously with the rolls for rotating the front can.

When combined with stop-motions which control a single set of rolls in a frame, the auxiliary shaft, in the combination last stated, is preferably made to perform also the function of a stop-wheel shaft; but when the stop-motions operate to stop the entire frame, as set forth in connection with the first-stated portion of my invention, I can utilize the front roll of a section of rolls and make it operate as and perform the function of the auxiliary shaft for revolving the can for that set of rolls, a band being used in either case. The can may, however, be revolved by being banded to any other revolving portion of the frame which has a movement corresponding with that of the rolls, and stops therewith, in which case said portion would constitute in its function and operation an auxiliary shaft, as stated in this combination. The value of this portion of my invention will be obvious, because if the stop-motion operates by reason of a weak or lean sliver the can will cease to revolve, and thereby prevent the sliver between the conducting-rolls and the can from being unduly twisted.

To more particularly describe my invention, I will refer to the drawings, of which there are two sheets.

Figure 1, Sheet 1, represents, in front elevation, a drawing-frame embodying one and portions of two other sets of drawing-rolls constructed in accordance with my invention. Fig. 2, Sheet 1, represents, in end view, the gearing of a set of rolls, and also, in section, the roller-beam and main shaft adjacent thereto. Fig. 3, Sheet 2, represents, in plan or top view, one set of rolls at the end of the frame. Fig. 4, Sheet 2, represents Fig. 3 in rear elevation. Fig. 5, Sheet 2, represents, in perspective, a portion of the main shaft and its clutch-gear, the auxiliary or stop-wheel shaft, its clutch and gear, and the trumpet with its lever, these parts being detached and in position with relation to each other as if mounted in the machine. Fig. 6, Sheet 2, is a sectional view of the clutch-gear on main shaft.

The frame of the machine contains the usual roller-beam *a*, legs *b*, and longitudinal central brace, *c*, below the beam. The three sets of rolls *A*, *B*, and *B'* are wholly independent of each other, each set being wholly mounted in its own standards *d*, secured to the top of the roller-beam. A main shaft, *C*, extends beneath all the sets of rolls from end to end of the frame, and is provided with driving and loose pulleys.

Each set of rolls is driven by its own gearing, as illustrated in Fig. 2. The central fluted or bed roll, receiving power through its gear *e*, transmits it by lazy-gears to the fluted rolls on either side. A large gear, *f*, mounted on a vertically-adjustable stud, connects the roll-gear *e* with the main shaft, and it also, by means of a chain of gearing, imparts motion to the gear *g* on the conducting or delivery rolls.

The main shaft *C*, beneath each large gear *f*, has a sliding gear, *h*, provided with an internally-grooved hub, which, when engaged with the spline *i* on the main shaft, causes it to revolve with said shaft, but to stand loose thereon when moved beyond the end of its spline. In a manner well known, the speed of the rolls in each section may be varied by the use of change-gears.

Each section or set of rolls involves the use of a separate stop-wheel shaft or its equivalent, by which the disconnection of the gearing from the main shaft is effected. I am well aware that all of the required effects may be attained by a hollow shaft or sleeve mounted on the main shaft, carrying the stop-wheel, and provided with cams and clutch mechanism in a manner obviously applied; but I have employed a solid shaft, *D*, mounted in hangers parallel with and in rear of the main shaft. This shaft *D* has the usual stop-wheel *k* secured thereon, and it has also at the end adjacent to the roll-gearing a sliding gear, *l*, the hub of which, at one end, is cam-shaped for co-operation with a corresponding cam-faced collar, *m*, which is secured to the stop-wheel shaft. The sliding gear *l* engages with the sliding gear *h* on the main shaft *C*, and these two sliding gears are connected to each other



by a yoke, *n*, so that their sliding movements on their respective shafts are simultaneous.

It will be seen, when the stop-wheel shaft is stopped by the trumpet-levers, that, the cam on collar *m* being stationary with its shaft, the continued revolution of the gear *l* will cause the latter to move longitudinally on its shaft, and carry with it, by reason of the yoke, the gear *h* on the main shaft to a point beyond its spline *i*, and from that moment that gear and the rolls driven by it will cease to revolve.

The trumpet *E* and its two-armed lever *o* is of a well-known character, and the stop-wheel *k* is engaged thereby, as heretofore.

Other forms of trumpet-levers and stop-wheels may be employed without departing from my invention, because no operative function is required in the trumpet, levers, and stop-wheel which is not required in the same parts as heretofore used for stopping the entire frame.

The stop-motion may also be so constructed as to operate promptly when a back can is exhausted, as with what are known as "back stop-motions," without in any manner affecting my invention.

The yoke *n*, which unites the two sliding gears *h* and *l*, is provided with a hand-lever, *p*, by which they may be returned to their operative positions after having been thrown out of gear by the stoppage of the stop-wheel shaft.

It will be seen that the stop-wheel shaft is revolved by the friction of coincident surfaces of the cam at *m*, and this, under ordinary circumstances, affords sufficient power for rotating the front can, into which the sliver is delivered from the frame.

It will be seen, however, that, if desirable, the frictional contact of the cam-surfaces may be increased to any required degree by the employment of a spring which will force them toward each other, and yet yield when the stop-wheel shaft ceases to revolve.

The can-pulley *r* is secured to the stop-wheel shaft at a point from which it may be conveniently banded for rotating the can, and the movement of the can therefore ceases with the rotation of the set of rolls from which it receives the sliver.

It will be seen that, if the can should continue to revolve after the stoppage of its rolls on a weak sliver, or when the back stop-motion has operated because of a terminal end or break from a back can, the sliver below the delivery-rolls would be unduly twisted, and result in lack of uniformity in the subsequent drawing operations.

The stop-wheel shaft is auxiliary to the main shaft, and any other revolving member in any section of the frame which revolves and stops with the rolls of that set or section will perform the same function as a can-driver, and be auxiliary to the main shaft in the sense herein intended.

In operation, it will be seen, if, for any of the well-known reasons too numerous to mention, any one of the sections of rolls is stopped, that all of the others will continue to operate, and that, after stoppage, said section may be put into operation while the others are at work.

The loss of time due to the necessary stoppage of each section of rolls is very considerable, varying, of course, in different mills, and whatever this loss may be it must be substantially increased in each frame, as heretofore constructed, in proportion to the number of sets of rolls in the frame; but by reason of my invention no loss of time or production is possible, except from the stoppage of individual sections.

It is obvious that the fluted rollers may be composed of fluted shells and solid shafts, the two being rotatively connected and disconnected by means of a splined clutch, as shown at *q*, Fig. 1, and that in such case said solid shafts could be extended from one end of the frame to the other and driven as heretofore; but the sectional feature would still exist, and the results before set forth be approximately attained without departing from the true spirit of my invention.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, in a drawing-frame, of two or more sets of drawing-rolls, constructed in independent sections, and provided with separate driving-gearing, substantially as described, whereby any one set of rolls may be stopped independently of any other set, or operated at a speed greater or less than the others, as set forth.

2. The combination, in a drawing-frame, of two or more sets of drawing-rolls, constructed in independent sections, and provided with separate driving-gearing, of a stopping mechanism to each section, which controls its driving-gearing independently of any other section, substantially as described.

3. The combination, with a set of drawing-rolls, of a main driving-shaft, clutch geared to the rolls, a revolving stop-wheel shaft for operating the clutch-gearing, and a trumpet with its lever, for engaging with the stop-wheel, substantially as described.

4. The combination, with a set of drawing-rolls, which are capable of stopping independently of their driving-shaft, of an auxiliary shaft, which revolves and stops simultaneously with the rolls, substantially as described, whereby a front can may be rotated from the auxiliary shaft only when the rolls are engaged in drawing, as set forth.

HENRY C. GRAYSON.

Witnesses:

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FRANK N. BABCOCK.