

P. H. STANDISH.
 BLANK CONVEYING APPARATUS.
 APPLICATION FILED JUNE 17, 1907.

Patented Apr. 27, 1909.
 5 SHEETS—SHEET 1.

919,487.

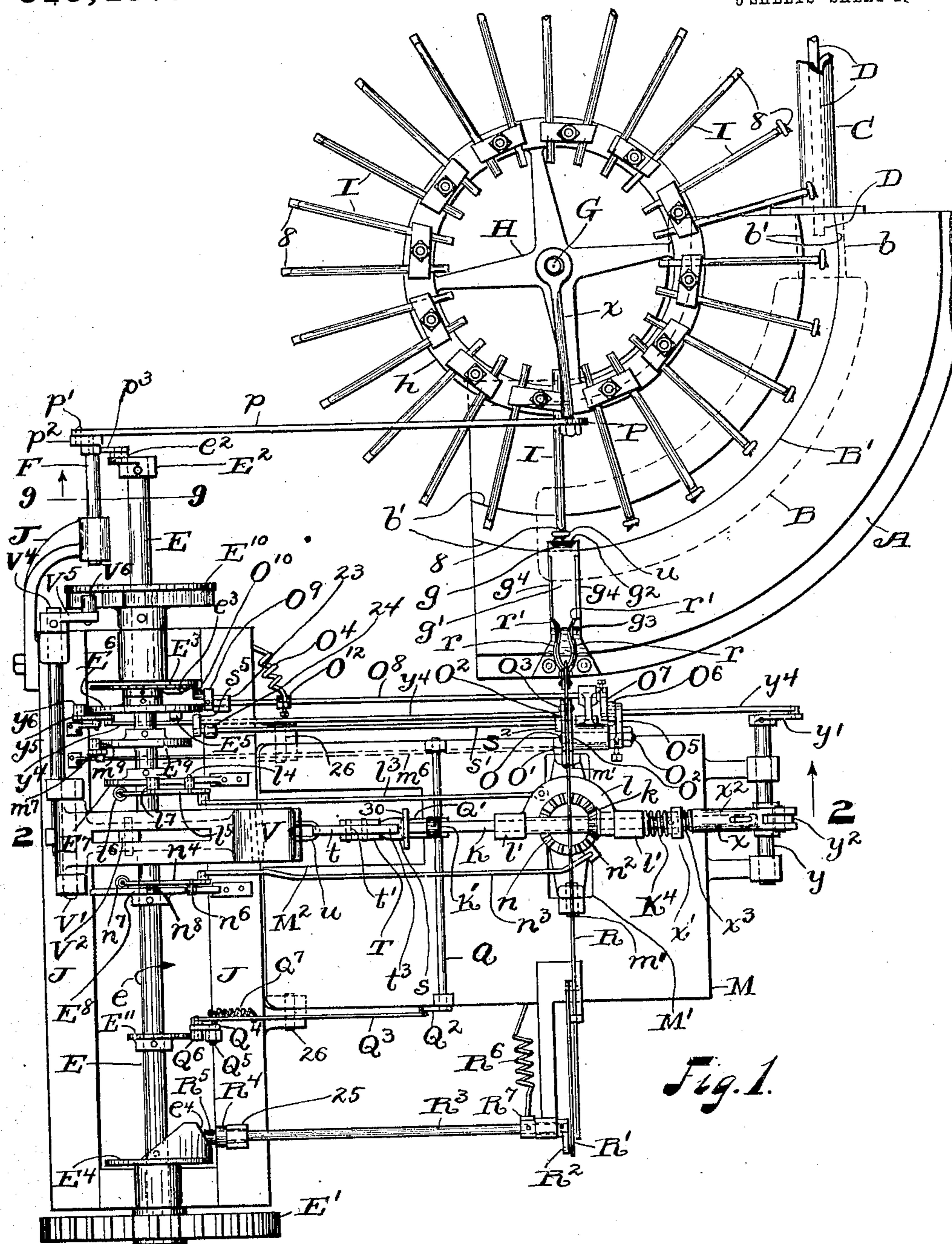


Fig. 1.

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Inventor:
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 His Attorneys.

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5 SHEETS—SHEET 2.



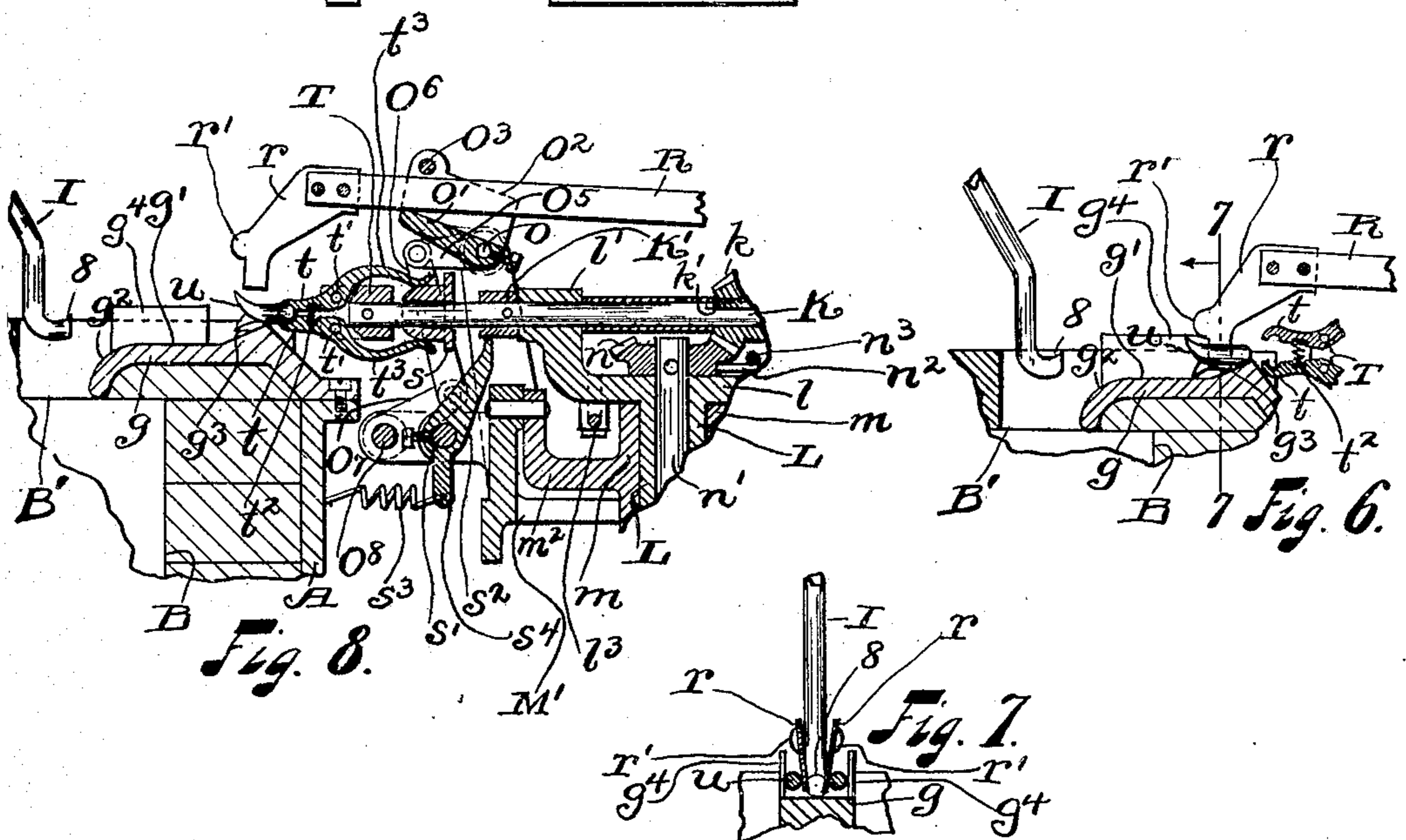
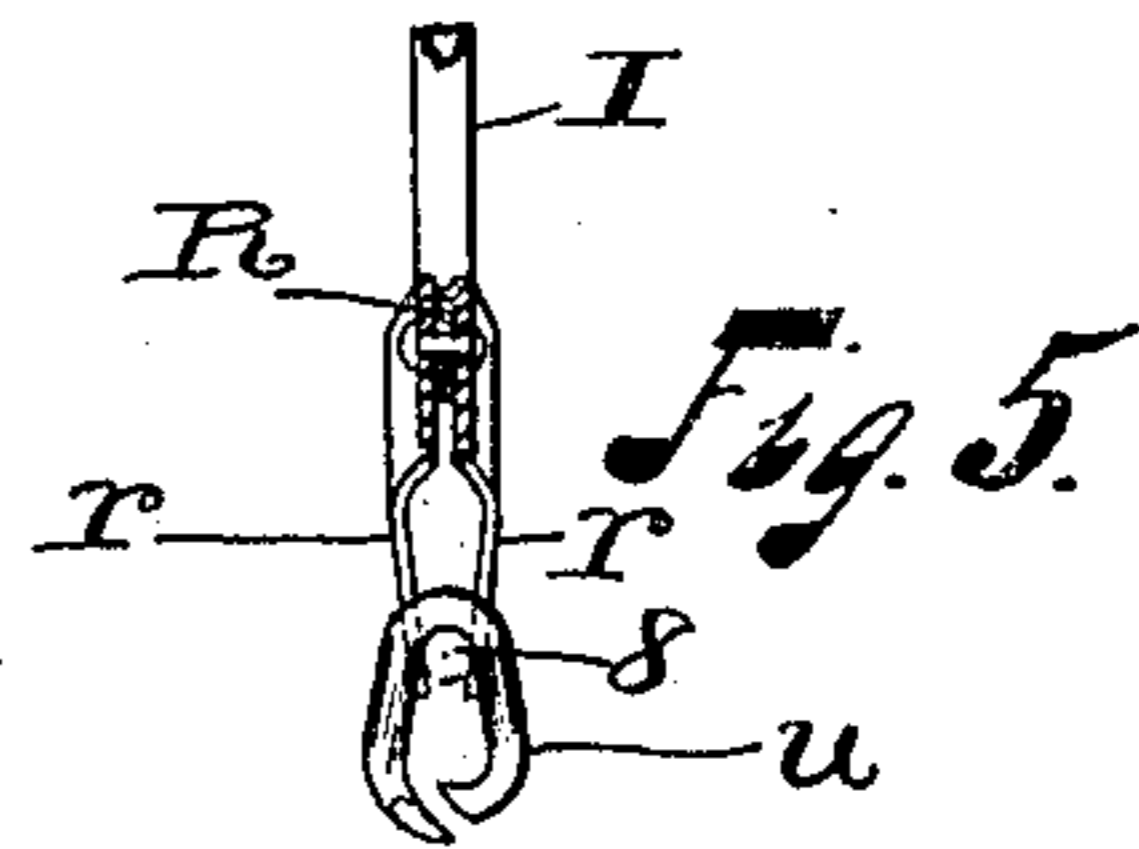
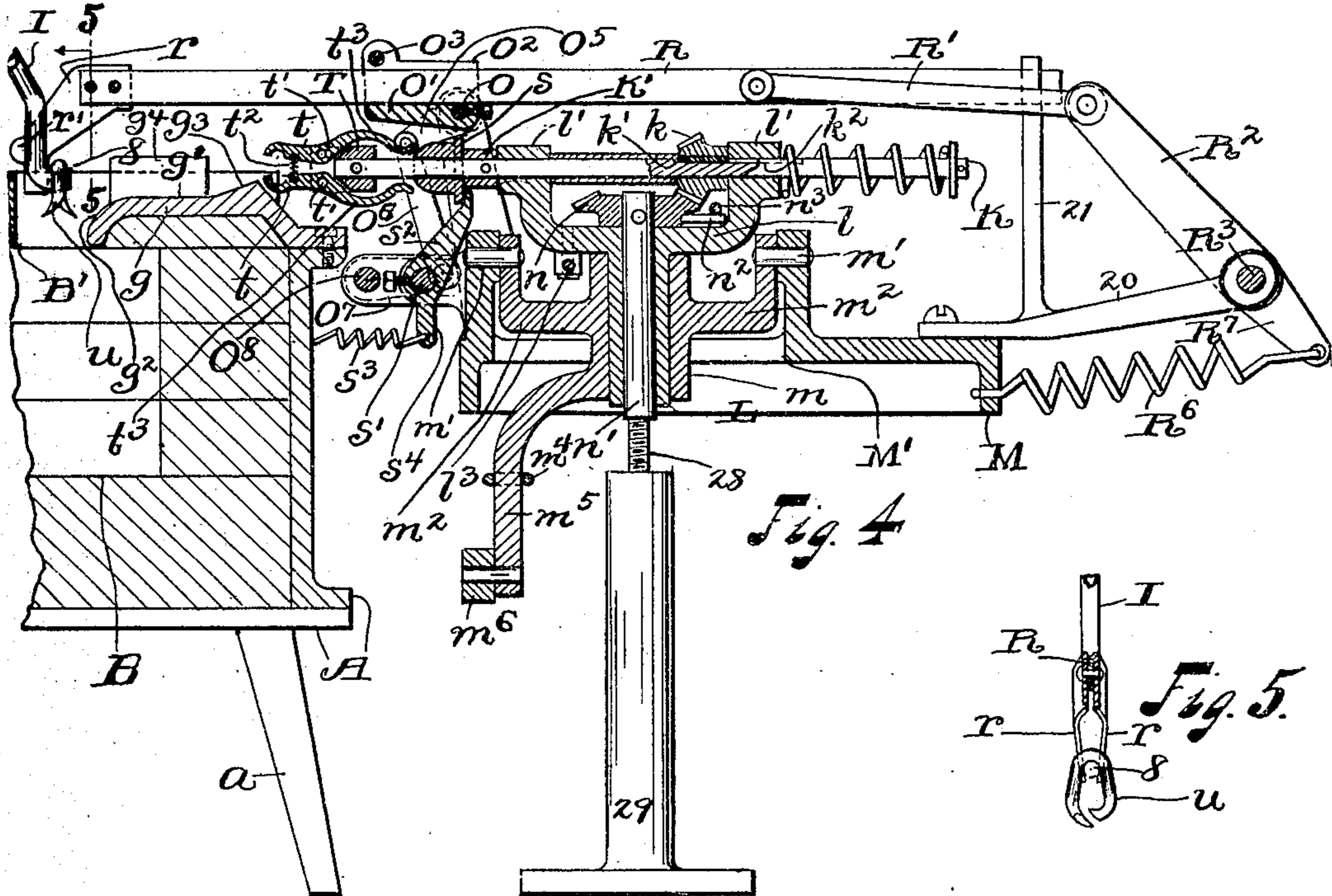
In witness whereof:
 Philander H. Standish
 By Samuel Norton
 His Attorneys.

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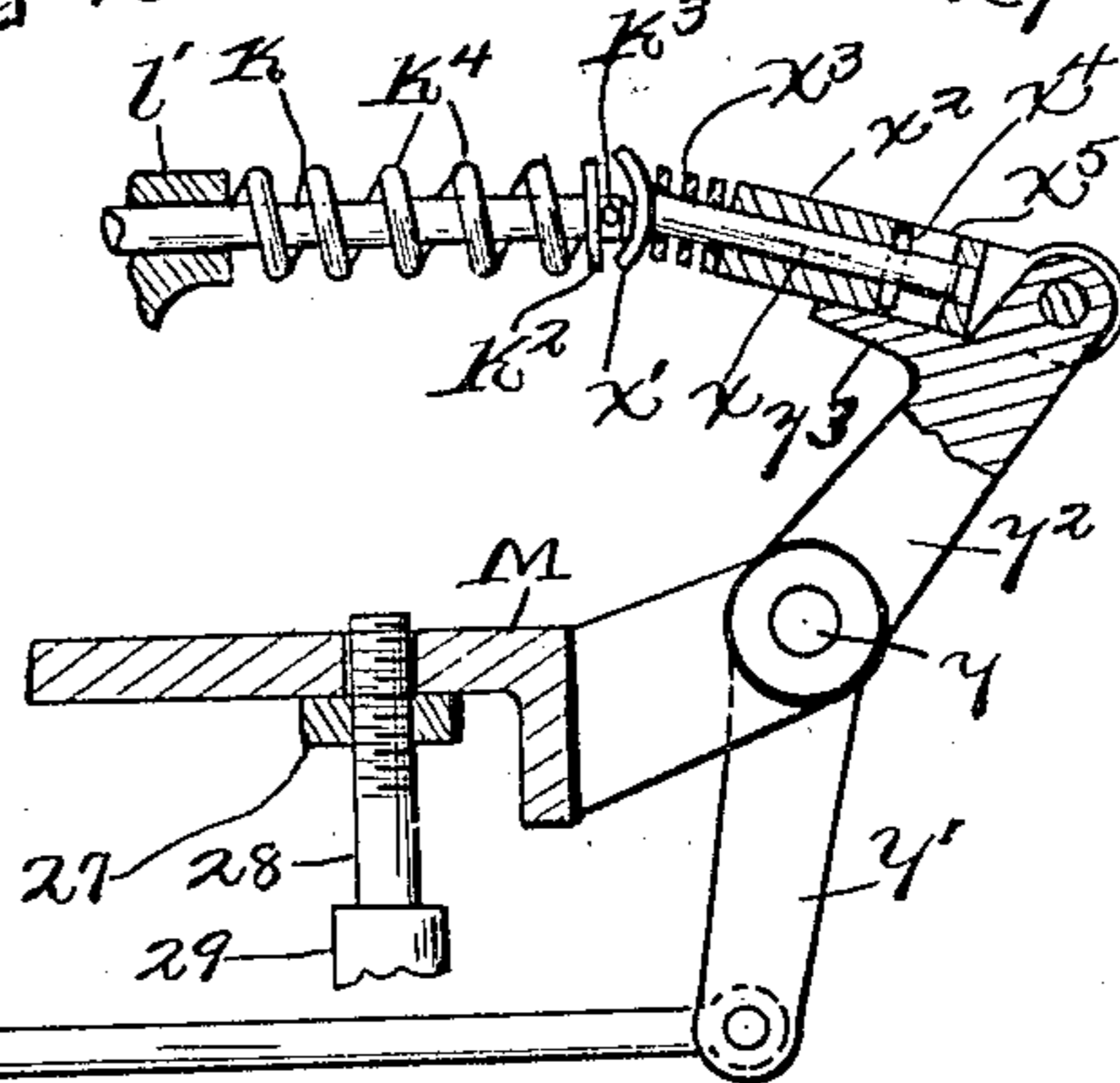
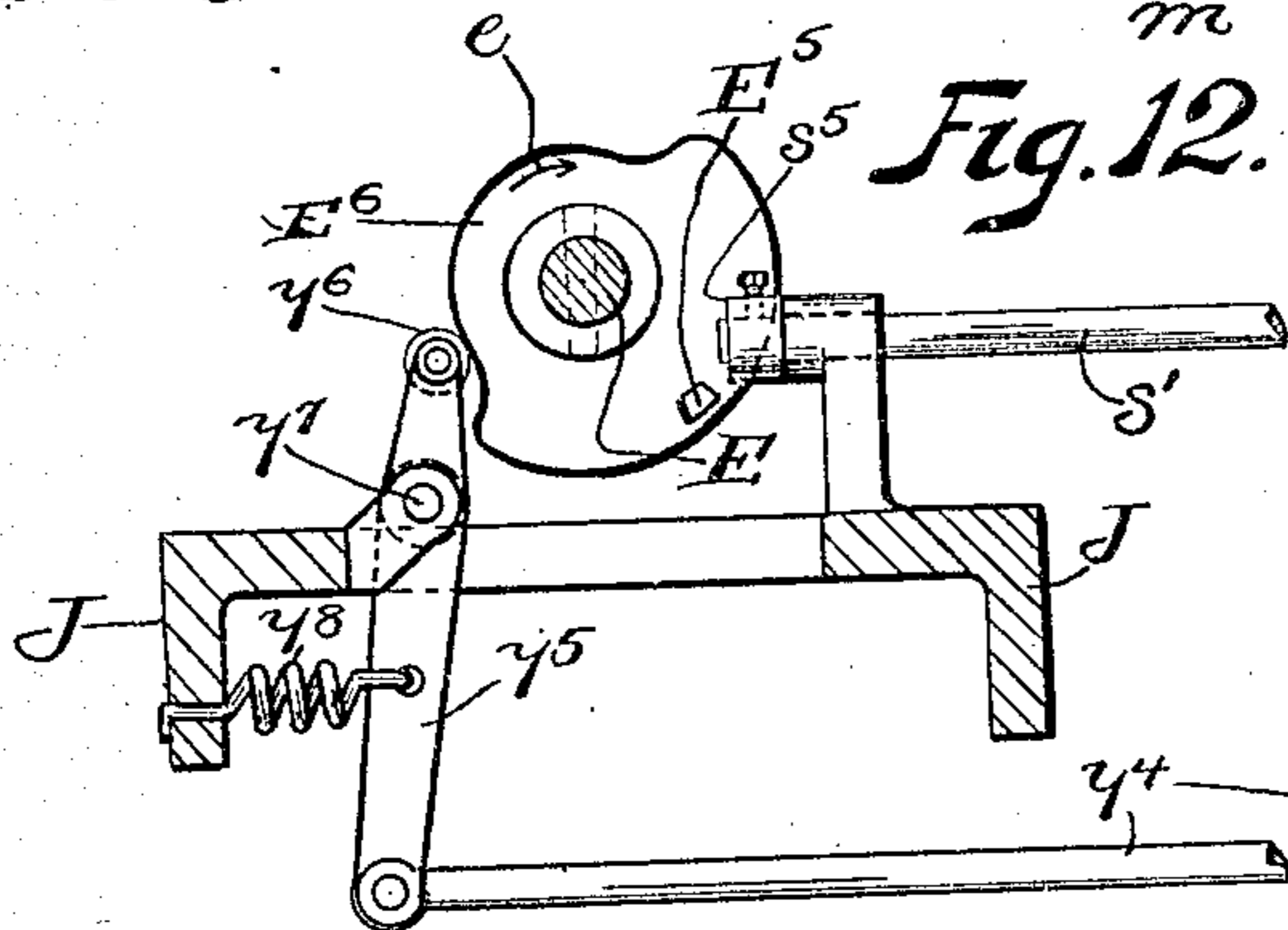
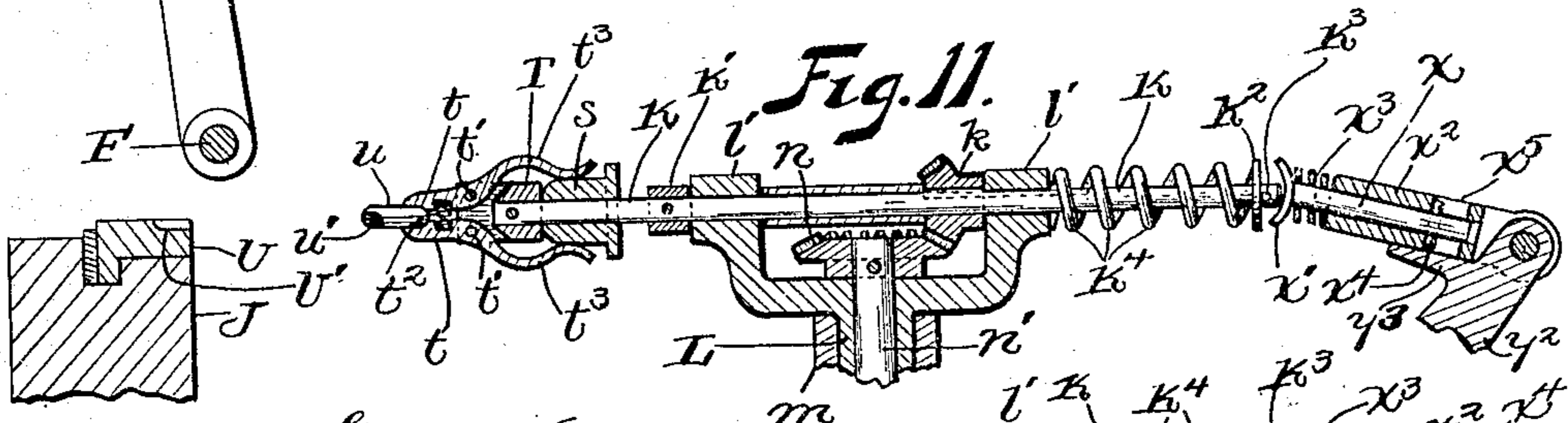
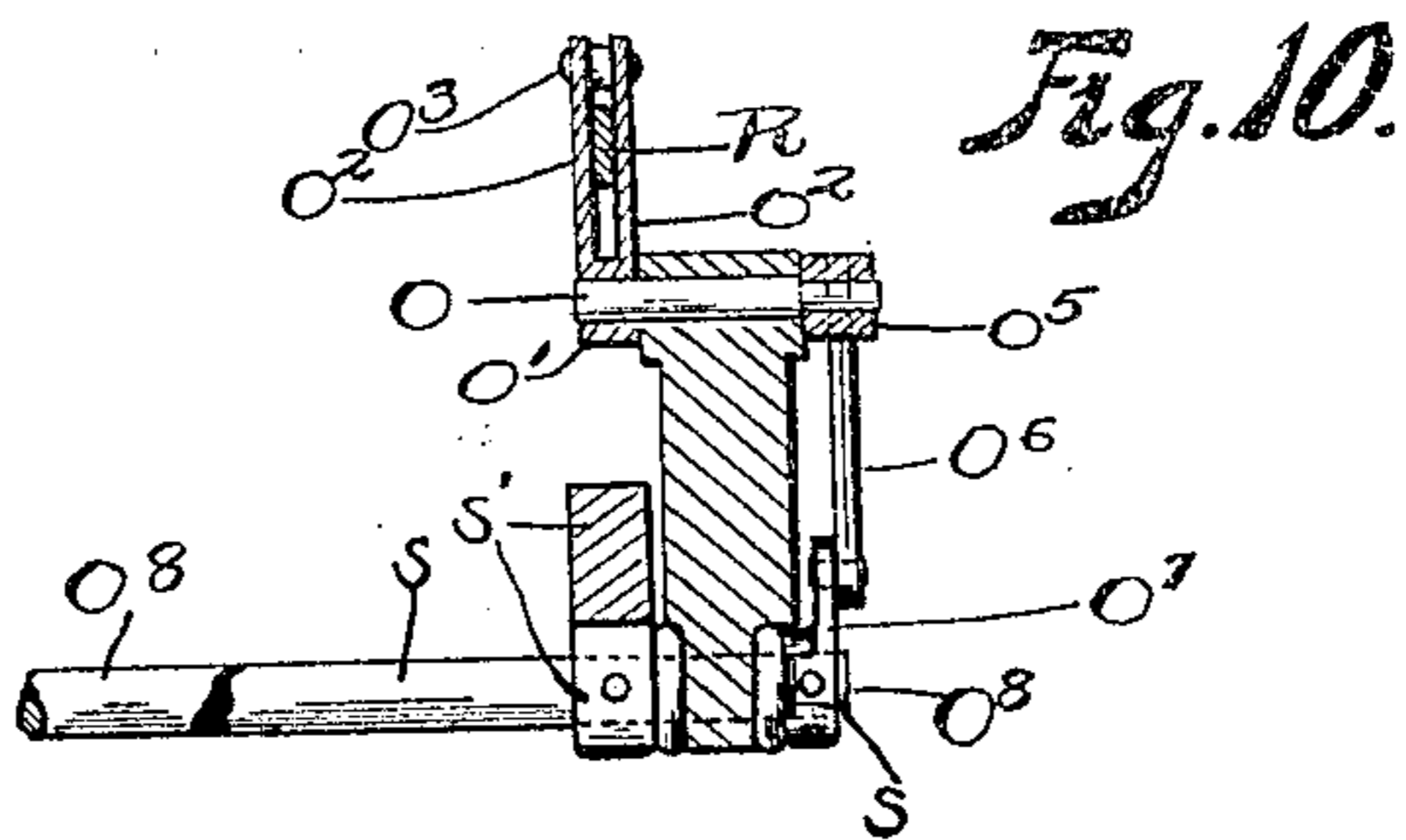
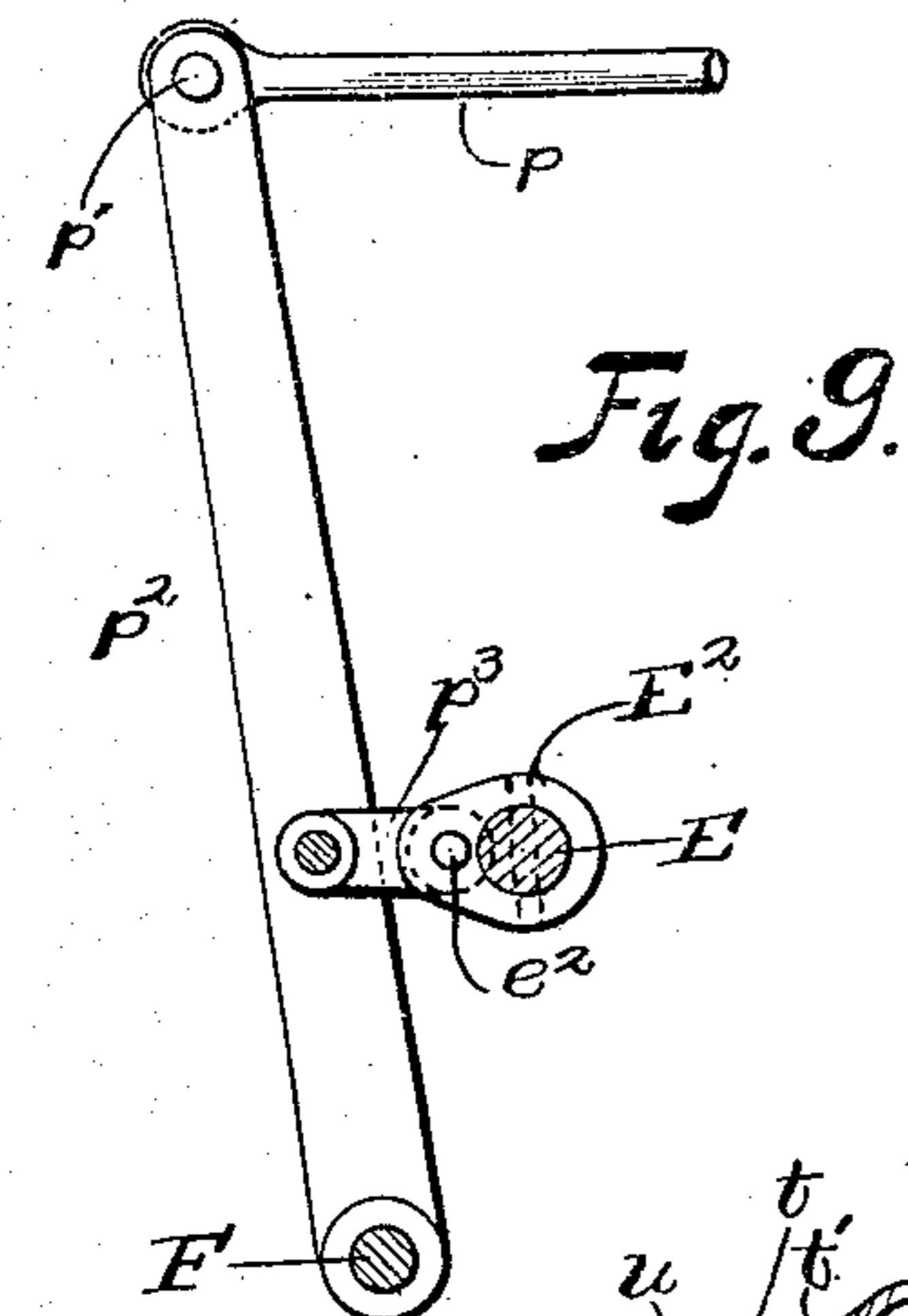
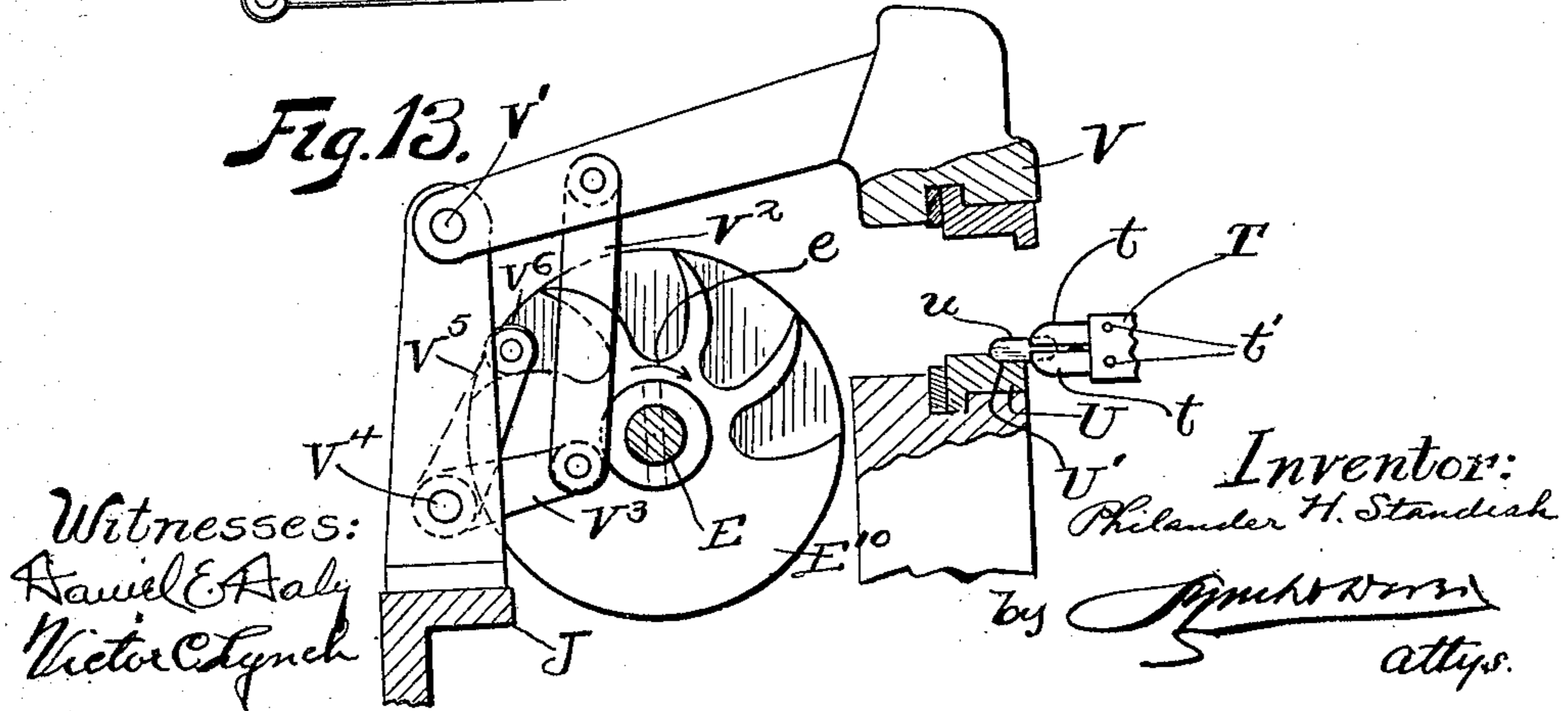


Fig. 13. v'



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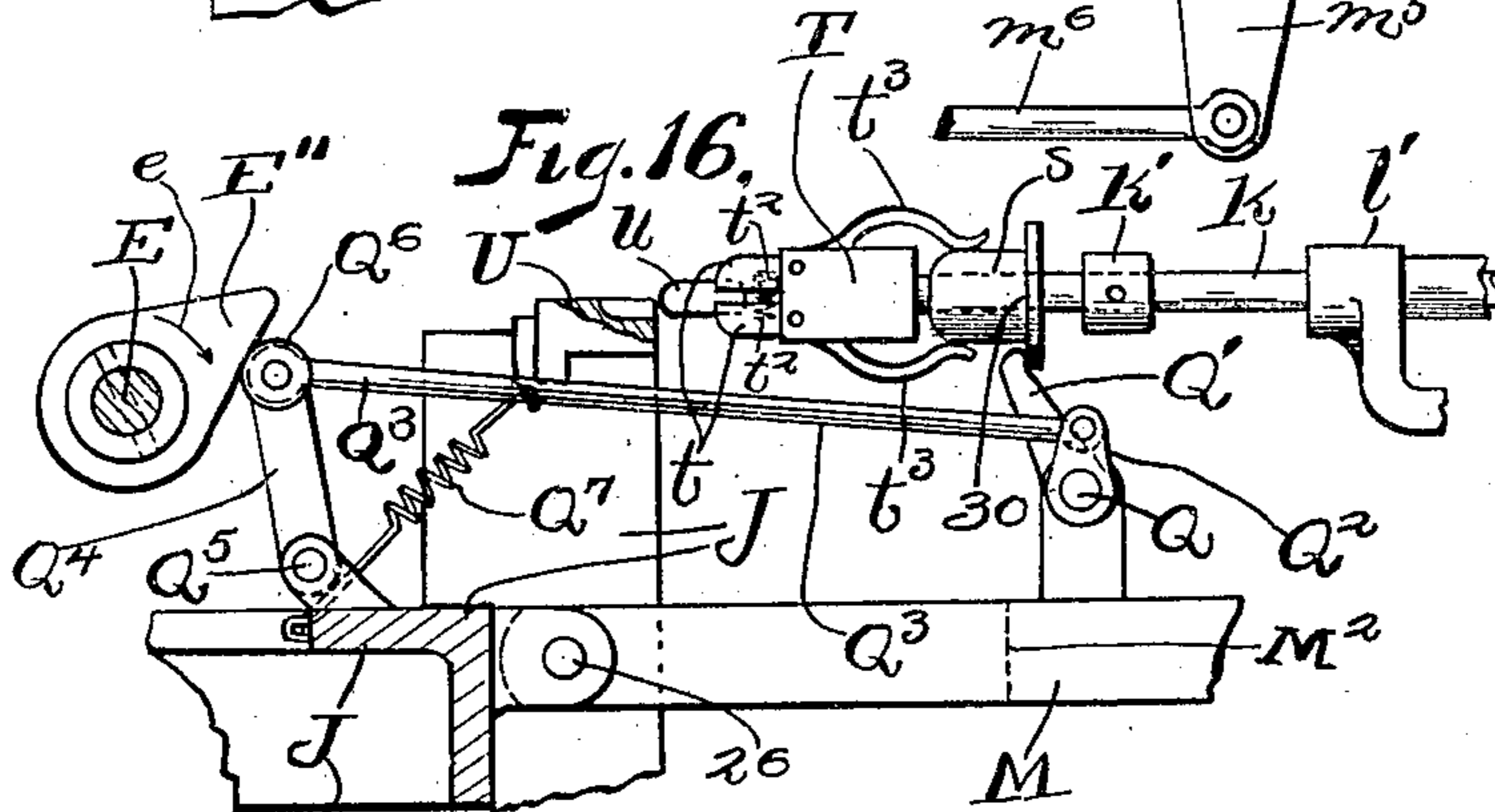
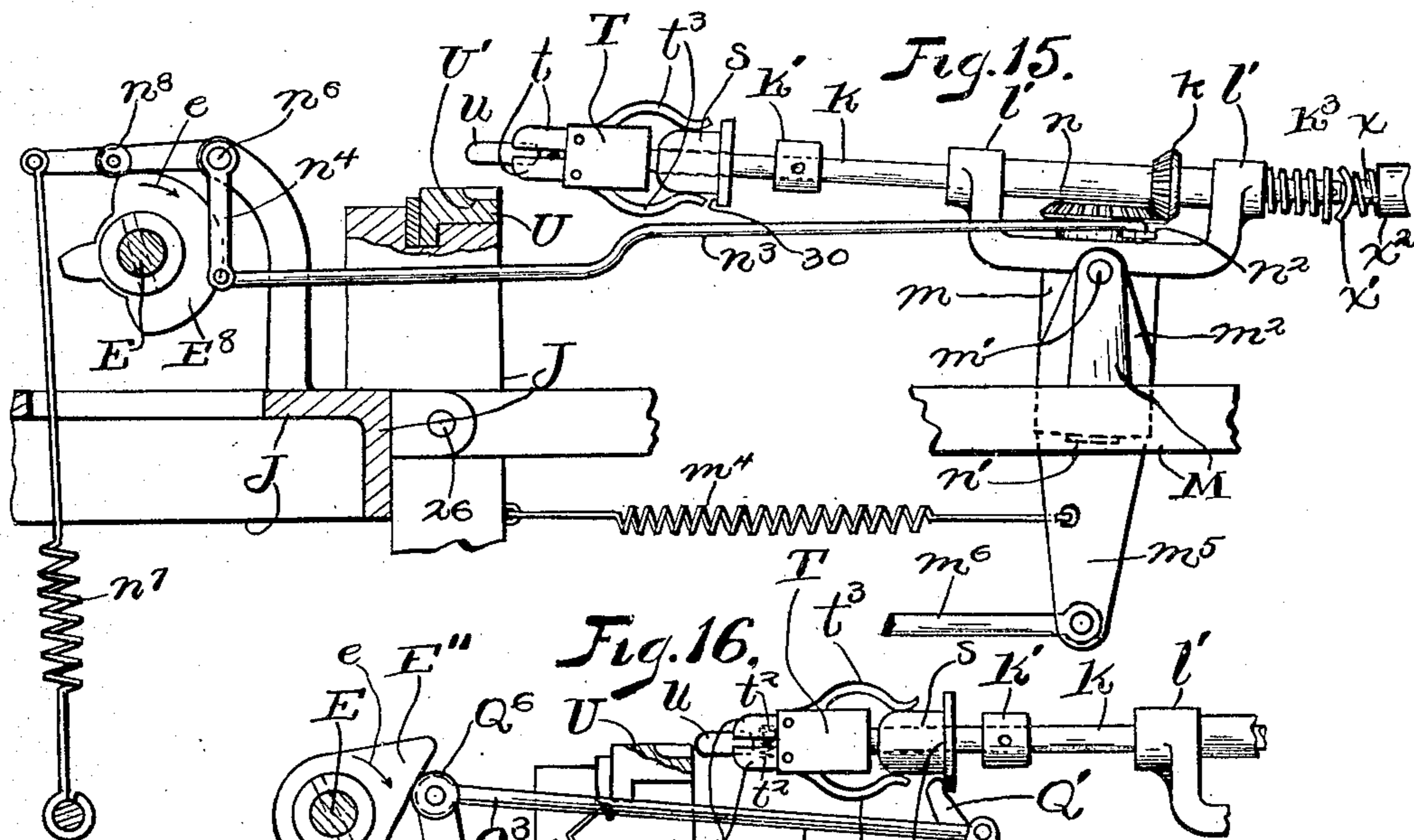
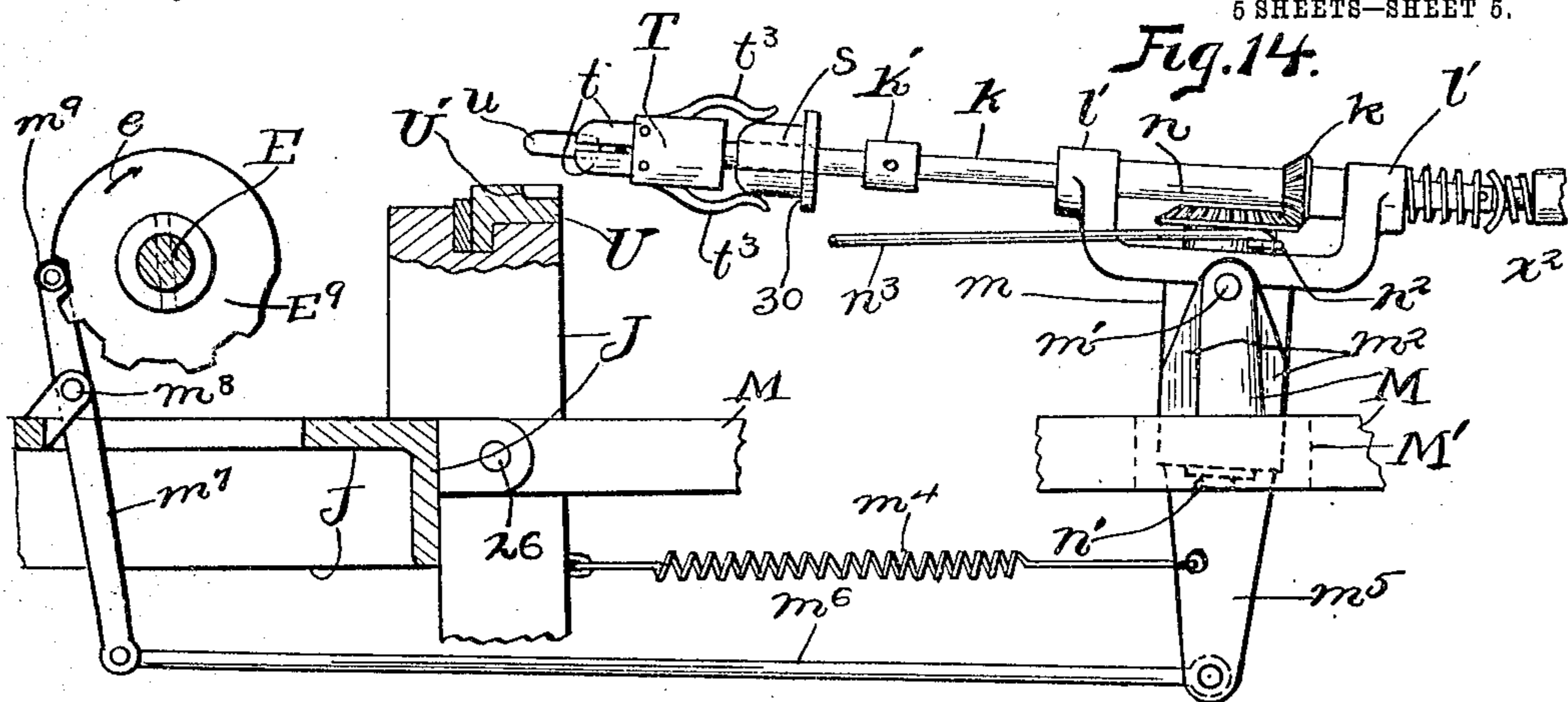
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5 SHEETS—SHEET 5.



Witnesses:
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UNITED STATES PATENT OFFICE.

PHILANDER H. STANDISH, OF CLEVELAND, OHIO.

BLANK-CONVEYING APPARATUS.

No. 919,487.

Specification of Letters Patent.

Patented April 27, 1909.

Application filed June 17, 1907. Serial No. 379,441.

To all whom it may concern:

Be it known that I, PHILANDER H. STANDISH, a citizen of the United States of America, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Blank-Conveying Apparatus; and I hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

This invention relates to improvements in apparatus for conveying blanks to means adapted to operate on the blanks, and the invention pertains more especially to apparatus for conveying heated blanks, which have open joints and are suitable for making chain-links, rings and the like, from a heating furnace to means employed in welding, forging or otherwise operating on the blanks to close and shape or finish the joints.

The primary object of this invention is to provide apparatus of the character indicated which is simple and inexpensive and otherwise advantageous in construction and convenient, accurate and reliable in operation, and to make chain-links, rings and other articles with greater facility and more cheaply than heretofore so as to materially reduce the cost of the product.

With this object in view, and to the end of realizing any other advantages hereinafter appearing, this invention consists in certain features of construction, and combinations of parts, hereinafter described, pointed out in the claims and illustrated in the accompanying drawings.

In the said drawings, Figure 1 is a top plan of apparatus embodying my invention. Fig. 2 is a vertical section on line 2—2, Fig. 1, looking in the direction indicated by the arrow, but to avoid confusion of lines in Fig. 2 the shafts indicated by the reference characters O^s and s' in other figures of the drawings are not shown in Fig. 2. Fig. 3 is a vertical section on line 3—3, Fig. 2, looking in the direction indicated by the arrow, but to avoid confusion of lines in Fig. 3 the shaft indicated by the reference-character γ in other figures of the drawings is omitted in Fig. 3. Fig. 4 is a vertical section partially corresponding with and drawn on a larger scale than Fig. 3, but in Fig. 4 the blank-conveying tongs is shown in position to receive a blank, and a blank-holder of the rotary blank-carrier for feeding blanks to the said

tongs is shown holding a blank in the position required to accommodate the delivery of the said blank to means employed in guiding the blank to the tongs. Fig. 5 is a vertical section on line 5—5, Fig. 4, looking in the direction indicated by the arrow. Fig. 6 is a vertical section in detail and illustrative of the removal of the blank from the rotary blank-feeder to the blank-conveying tongs. Fig. 7 is a vertical section on line 7—7, Fig. 6, looking in the direction indicated by the arrow. Fig. 8 is a vertical section largely corresponding with Fig. 4, but in Fig. 8 the blank is shown as having been fed to and grasped by the blank-conveying tongs. Fig. 9 is a vertical section on line 9—9, Fig. 1, looking in the direction indicated by the arrow. Fig. 10 is a section in detail on line 10—10, Fig. 3, looking in the direction indicated by the arrow. Fig. 11 is a vertical section in detail illustrating the tongs in the position required to enable the tongs-bearing shaft to be actuated endwise in the direction of the anvil, and shows also a portion of the mechanism employed in shifting the said shaft in the said direction. Fig. 12 is a vertical section in detail, showing the mechanism employed in actuating the tongs-bearing shaft endwise. Fig. 13 is an elevation in detail, partly in section, of the mechanism employed in operating the hammer. Fig. 14 is an elevation in detail partly in section, illustrating the mechanism for swinging the tongs upwardly from the anvil between successive blows of the hammer. Fig. 15 is an elevation in detail partly in section, showing more especially the mechanism employed in turning the tongs when the tongs have been swung upwardly from the anvil. Fig. 16 is an elevation in detail, partly in section, illustrating the mechanism for actuating the tongs-closing sleeve in the direction required to render the sleeve inoperative. Figs. 1, 2 and 3 are drawn on a smaller scale than the remaining figures, and portions are broken away in the drawings to reduce their size and to more clearly show the construction.

Referring to the drawings, A (see Figs. 1, 2, 3 and 4) indicates the casing of a furnace which is rendered stationary in any approved manner. The casing A has legs a .

B indicates the combustion or heating chamber of the furnace, which chamber is arranged centrally of the furnace as shown in Figs. 1 and 3.

C represents an air-pipe or flue that dis-

charges into the chamber B through an aperture *b* only shown in dotted lines Fig. 1 and formed in one of the end walls of the said chamber.

5 D (see Fig. 1) represents a pipe arranged to conduct gas, oil, or other fluid used as fuel, to the chamber B. The pipe D is arranged centrally of the air-flue C and discharges within and centrally of the aperture *b* and
10 such a distance from the discharging end of the said aperture that the gas or substitute and the air will commingle before being discharged into the chamber B.

G (see Figs. 1 and 3) represents a shaft
15 which is arranged vertically and externally and at one side of and a suitable distance from the furnace centrally between the ends of the furnace. The shaft G is supported in any approved manner and forms a portion
20 and is arranged centrally of the rotary carrier or feeder employed in feeding the blanks or articles to be heated into and within the heating chamber B of the furnace, and the said chamber is arranged concentrically of
25 the said shaft and consequently concentrically of the said carrier or feeder, and the combustible mixture which constitutes the fuel to be discharged and burned within the said chamber is introduced into the chamber
30 through the aperture *b* as already indicated.

The heating chamber B (see Figs. 1 and 3) extends to the top surface of the furnace but the upper portion B' of the said chamber is narrower than the central and lower portions
35 of the chamber so as to concentrate the heat at the point where the blanks or articles to be heated are suspended and to prevent the heat from blowing or shooting upwardly out of the furnace. It will be observed therefore
0 that the blanks or articles to be heated are suspended and heated during the operation of the rotary blank-feeder within the upper and narrower portion B' of the chamber B, and preferably the said upper and narrower
5 portion of the said chamber is just wide enough to freely accommodate the suspension therein of the blanks to be heated. The rotary blank feeder also comprises a wheel H which is operatively mounted on the shaft G
0 a suitable distance above the furnace. The wheel H has a circumferentially extending annular rim *h* and is provided with blank-holders I by which the blanks to be heated are suspended within the upper portion B' of
5 the heating chamber B. The blank-holders I are attached to the rim H in any approved manner. The blank-holders I are equidistantly spaced circumferentially of the wheel H and arranged radially of the said wheel.
0 It will be observed therefore that the blank-holders I are supported from and arranged radially relative to the shaft G and spaced equidistantly circumferentially of the said shaft. Each blank-holder I extends later-
5 ally and outwardly and downwardly from

the wheel-rim *h* and terminates at its outer and lower end in a hook 8 adapted to receive a blank to be fed into and within the upper portion B' of the heating chamber B.

The arrangement of the heating chamber B and the rotary blank-feeder which, as already indicated, comprises the shaft G, wheel H and holders I is such that a blank hung upon the outer and hook-forming end of a holder I externally of the furnace, is during
75 the rotation of the feeder conveyed into and within and longitudinally of the upper portion B' of the said chamber so as to be properly heated in its passage through the said chamber. In Figs. 1, 3, 4 and 5 a chain-
80 link-blank *u* which is next to be removed from the rotary blank-feeder is shown depending from a blank-holder I into the said upper portion B' of the said chamber at the point where the heated blanks are removed
85 from the furnace. The rotary blank-feeder is intermittently actuated as will hereinafter appear, and the end walls of the upper portion B' of the heating chamber are recessed in the top thereof, as at *b'*, Fig. 1, to accom-
90 modate the passage or travel of the blank-holders I into and out of the said chamber. Each blank-holder I consists preferably of a suitably bent round rod, and the inner and upper end-portion of the said blank-holder
95 operates as the tooth of a ratchet-wheel, being rounded at least on top to facilitate the operative engagement therewith by a suitably applied and suitably operated pawl P which is shown integral or rigid with one end
100 of a rod *p* which (see Figs. 1, 2 and 9) is suitably pivoted at its other end, as at *p'*, to a lever *p*² which is loosely mounted or journaled upon an axle F which is supported in any approved manner from a member of sta-
105 tionary frame-work J. The axle F is arranged at one side of and a suitable distance from a cam-shaft E which is suitably supported from the said frame-work and operatively provided (see Fig. 1) with a gear or
110 driving wheel E' to which power is suitably applied. The shaft E and axle F are parallel, and the lever *p*² is arranged adjacent one end of the shaft E and operatively connected by a rod or link *p*³ with the wrist *e*² of a crank
115 E² with which the said end of the shaft E is operatively provided. The shaft E is during the operation of the apparatus rotated in the direction indicated by the arrow *e*.

An arm *x* (see Figs. 1 and 3) is shown turn-
120 ably embracing the shaft G and rests upon the hub of the wheel H. The arm *x* extends laterally from the shaft G to the pawl P which is loosely mounted on the said arm. The connection of the arm *x* with the shaft G
125 is loose enough to freely accommodate the operation of the pawl P. The arrangement of the parts is such that motion is transmitted during each complete rotation of the shaft E to the rotary blank-feeder from the
130

shaft E through the medium of the crank E², link p³, lever p² and the rod p and its pawl P, and the said blank-feeder is turned during the said rotation of the shaft E far enough to
 5 bring the blank-holder I from which a blank is next to be removed into its blank-delivering position, and in Figs. 1, 3 and 4 the said blank-holder is in the said position holding a blank u at the point where the blank is re-
 10 moved from the said blank-holder onto and along a guide g to the blank-conveying tongs comprising two coöperating blank-grasping jaws t.

T indicates the body-portion of the tongs, which body-portion is mounted on and fixed to one end of a laterally extending oscillatory shaft K which (see Figs. 1, 2 and 4) has bearing in two boxes l' spaced longitudinally of the shaft a suitable distance from the tongs
 20 and centrally between the tongs-bearing end and opposite end of the shaft. The boxes l' are integral or rigid with a turn-table l which is provided with a depending hub L which has lateral bearing in a correspondingly ar-
 25 ranged upright box m which is supported as will hereinafter appear. The turn-table l is mounted on the upper end of the box m. The jaws t of the tongs are pivoted, as at t', to the body-portion T horizontally and
 30 transversely of the shaft K and are consequently capable of swinging toward and from each other to close and open the tongs respectively. The tongs are arranged with their jaws open and one above the other in
 35 their blank-receiving position, as shown in Fig. 4, and a suitably applied spring t² interposed between the jaws and between the axes and the outer or blank-grasping ends of the jaws acts to retain the jaws swung apart
 40 and consequently open.

The guide g preferably consists of a cast-iron plate which (see Figs. 1, 3 and 4) is mounted on the furnace and rendered stationary in any approved manner and ar-
 45 ranged radially relative to the rotary blank-feeder hereinbefore described. The plate or guide g has an upwardly facing blank-guiding surface g' which is arranged substantially horizontally centrally between the ends
 50 of the said surface and at the blank-receiving end of the guide slopes, as at g², upwardly and in the direction of the opposite end of the guide and at the last-mentioned end slopes upwardly, as at g³, in the same direc-
 55 tion and extends into close proximity to the tongs in the blank-receiving position of the tongs, as shown in Fig. 4. The shaft K and the tongs borne thereby are also arranged radially relative to the rotary blank-feeder
 60 in the blank-receiving position of the tongs, as shown in Fig. 4.

By the construction hereinbefore described it will be observed that the tongs have a range of movement laterally in a horizontal
 65 plane; that the shaft K and consequently

the tongs are actuated laterally in the one direction or the other according as the turn-table l is turned in the one or the other direction; that the tongs are in their blank-receiving position when they are at one ex-
 70 tremity of their said lateral movement; that the tongs at the other extremity of the said lateral movement are in position in front of or adjacent to means employed in welding, shaping or otherwise operating on the blank
 75 and consisting, in the apparatus illustrated, of an anvil U and a hammer V arranged a suitable distance from the furnace and rotary blank-feeder.

When a link-blank u having unjoined ex-
 80 tremities has been brought into position for delivery from the engaging blank-holder I onto the guide g the blank is removed from the said blank-holder onto the aforesaid sur-
 85 face g' of the guide and along the said surface to the tongs, and the blank is so removed from the hook 8 of the engaging blank-holder I onto the guide that the unjoined extren-
 90 ities of the blank delivered onto the guide are presented toward the blank-receiving end of the guide so that the said extremities of the blank when the blank has been received by the tongs will project forwardly of and be ar-
 95 ranged externally of the tongs. It will be observed therefore that a blank received by the tongs, as shown in Fig. 8, projects from the tongs forwardly in a horizontal plane toward the rotary blank-feeder, and that the upper inclined portion g³ of the blank-guiding surface is instrumental in bringing the
 100 blank into parallelism with the tongs, and the guide g extends into the upper portion B' of the heating chamber B, as shown in Figs. 3 and 4, into such proximity to and enough lower than the blank to be removed from the
 105 engaging blank-holder onto the guide that dropping of the blank into the furnace during the removal of the blank from the blank-holder is avoided.

The means for removing the next blank to
 110 be removed from the rotary blank-feeder to and along the guide g to the tongs preferably comprises a suitably supported and suitably operated endwise shiftable rod R which (see
 115 Figs. 1, 3, 4, 6, 8 and 10) has a limited range of movement vertically and is arranged above and movable longitudinally of the guide g and provided at its forward end (see also
 120 Figs. 5 and 7) with two laterally spaced and laterally springy members r arranged to re-
 125 move the blank from the blank-holder onto and along the guide to the tongs during the actuation of the rod. The rod R has bearing on a shaft-arm O' and within the upright arm 21 of a suitably supported bracket 20,
 130 and the said shaft-arm and the said bracket-arm are spaced longitudinally of the rod, and O represents the oscillatory shaft which is operatively provided with the said shaft-arm and arranged horizontally below and trans-

versely of the rod R but above the lateral travel of the tongs.

The shaft-arm O' is provided with two upwardly projecting flanges O² arranged at opposite sides respectively of the rod R and preventing displacement of the rod laterally from the shaft-arm, and the said flanges are connected above the rod by a pin O³ which prevents displacement of the rod upwardly from the said shaft-arm. The flanges O² and the connecting pin O³ constitute means therefore for holding the rod R to the shaft-arm without interfering with the endwise movement of the rod, and the shaft O is oscillated during the rearwardly endwise movement of the rod to raise the shaft-arm from the blank immediately upon the delivery of the blank to the tongs and against the action of a suitably applied spring O⁴ hereinafter referred to and shown in Fig. 1.

The laterally springy members *r* of the rod R are arranged at opposite sides respectively of and suitably fixed to the rod. The members *r* project forwardly and downwardly from the rod and preferably converge somewhat toward their lower ends and approach each other near enough at said ends to render them capable of entering the link-blank *u* next to be removed from the rotary blank-feeder when the said blank has been removed with the guide *g*. The blank-engageable members *r* are adapted to straddle the blank-holder I from which a blank *u* is next to be removed, and each member *r* is provided near its lower end with a forwardly projecting portion *r'*. The portions *r'* of the members *r* diverge forwardly to facilitate the straddling of the said blank-holder by the said members *r*, and the arrangement of the parts is such that the portions *r'* of the members *r* during the forward actuation of the rod R move at opposite sides respectively of the blank-holder I from which a blank is next to be removed and cause the said members *r* to be spread apart if necessary the required distance to insure the straddling of the said blank-holder by the said members *r*. The extent of the forward movement of the rod R is such that the blank-engageable members *r* during the said movement of the said rod are moved somewhat rearwardly of the blank and during the said forward movement of the rod the shaft O is oscillated in the direction required to lower its arm O' and thereby cause the rod to be lowered by the action of the spring O⁴, and the blank-engageable members *r* when they have been lowered by the said spring are arranged in their blank-removing position at the rear of the blank, as shown in Figs. 4 and 5, so that during the next rearward movement of the rod the blank is removed from the blank-holder along the guide *g* toward the tongs, as shown in Figs. 6 and 7, and delivered to the tongs, as shown in Fig. 8. The shaft O is opera-

tively provided with another laterally projecting arm O⁵ which (see Figs. 1, 3, 4, 8 and 10) is operatively connected by a link O⁶ with an arm O⁷ operatively mounted on a shaft O⁸ which is arranged horizontally and parallel with but below the shaft O. The shaft O⁸ is operatively provided in suitable proximity to the cam-shaft E (see Fig. 1) with an arm O⁹ provided with a projecting member O¹⁰ arranged to be engaged by the working surface *e*³ of a cam-wheel E³ operatively mounted on the said cam-shaft, and the arrangement of the parts is such that immediately upon the delivery of the blank to the tongs from the guide *g* the working surface *e*³ of the said cam-wheel shall have come into engagement with the projecting member O¹⁰ of the shaft-arm O⁹ and not only oscillate the shafts O⁸ and O in the direction required to raise the shaft-arm O' and consequently the rod far enough to lift the blank-engageable members *r* from the blank, but to hold the arm O' and consequently the rod R in their upper position until the proper time during the next succeeding forward movement of the rod. I would here remark that the shaft O⁸ is also operatively provided with an upwardly projecting arm O¹² as shown in Fig. 1, and the spring O⁴ is attached at one end to the said arm O⁹ and at its other end to any stationary object, such, for instance, as a member of the stationary frame-work J.

It will be observed that the lower ends of the blank-engageable members *r* of the rod R enter the link-blank *u* during the removal of the said blank from the engaging blank-holder and thereby prevent lateral displacement of the link during the said removal, but to positively avoid any lateral displacement whatsoever of the blank during its passage from the engaging blank-holder to and along the guide *g* to the tongs, the said guide (see Figs. 1, 3, 4, 6, 7 and 8) is provided with two laterally spaced upwardly projecting flanges *g*⁴ arranged at and extending a suitable distance along opposite sides respectively of the travel of the blank to the tongs.

The forward actuation of the rod R is effected through the medium of a link R' which (see Figs. 1, 3 and 4) operatively connects the said rod with an upwardly projecting arm R² operatively mounted on one end of a shaft R³ which is arranged horizontally and parallel with the shafts O and O⁸, and the shaft R³ is operatively provided at its opposite end (see Fig. 1) with an upwardly projecting arm R⁴ which has a projecting member R⁵ arranged to be engaged by the working surface *e*⁴ of a cam-wheel E⁴ operatively mounted upon the cam-shaft E, and the parts are so arranged and timed that immediately upon the actuation of the blank next to be removed from the blank-feeder into position for removal the rod R shall have been actuated forwardly against the

action of a suitably applied spring R^6 and brought its blank-removing members r into their blank-removing position. The spring R^6 is attached at one end to an arm R^7 operatively mounted on and depending from the shaft R^3 and at its other end to any suitable support, such, for instance, as a table M which bears the box m and consequently the turn-table l and is provided with the bracket 20.

Means for closing the jaws t of the tongs immediately upon the reception by and between the said jaws of a blank are provided and (see Figs. 2, 4 and 8) comprise a sleeve s which is loosely mounted on and shiftable endwise of the shaft K between the turn-table l and the tongs. Each jaw t is provided with a rearwardly projecting arm t^3 and the outer ends of the jaw-arms t^3 diverge toward their outer or free extremities, and the sleeve s is rounded at its forward end to facilitate the passage of the sleeve forwardly between the jaw-arms. A collar K' suitably fixed on the shaft K and smaller in external diameter than the rear end of the sleeve s is arranged to limit the rearward movement of the sleeve. A shaft s' is arranged horizontally and parallel with the shaft O^8 and between the said shaft and the turn-table l . The shaft s' is operatively provided with an upwardly projecting arm s^2 arranged to overlap and engage the rear end of the sleeve s during the oscillation of the shaft in the required direction and actuate the latter forwardly against the action of a suitably applied spring s^3 which is shown attached at one end to a member s^4 depending from and integral with the said arm s^2 and at its opposite end to any stationary object, such, for instance, as the furnace-casing A . The shaft s' extends into suitable proximity to the cam-shaft E and is operatively provided (see Fig. 1) with a laterally projecting arm s^5 arranged to be engaged at its upper side by a revoluble member E^5 operatively connected with the cam-shaft E . The revoluble member E^5 is formed preferably by a lug which is formed integral with and projects from a cam E^6 which is operatively mounted on the shaft E and hereinafter referred to. The parts are so arranged and timed that the revoluble member E^5 shall have come into engagement with the upper side of the shaft-arm s^5 and thereupon oscillate the shaft s' against the action of the spring s^3 in the direction required to cause the shaft-arm s^2 to come into engagement with the rear end of the sleeve s and actuate the latter forwardly far enough to pass between and spread apart the jaw-arms t^3 and thereby close the jaws t against the action of the spring t^2 immediately upon the reception of a blank by the tongs.

The shafts O^8 and s' as well as the shaft

R^3 are supported at one end from the table M and at their other end (see Fig. 1) have loose bearing in boxes 23, 24 and 25 respectively formed on the stationary frame-work J . The furnace and the blank-conveying apparatus are of course relatively positioned vertically, but to readily accommodate a fine adjustment of the tongs vertically relative to the guide g , and more especially a fine adjustment vertically of the blank-removing members r relative to the said guide and the rotary blank-feeder, the table M which, as already indicated, is instrumental in bearing the tongs-bearing turn-table l and the rod R and connected blank-removing members r , is pivoted at one end, as at 26, to the stationary frame-work J horizontally and parallel with the cam-shaft E (see Figs. 1, 2, 12 and 14) and at its opposite end rests upon a nut 27 which (see Figs. 2 and 12) is mounted on a vertically arranged stud 28 which is rigid with and projects upwardly from a suitably applied standard 29. Obviously by a slight manipulation of the nut N a fine adjustment vertically of the table M is attainable. Any boxes or bearings provided for the shafts O^8 , s' and R^3 and borne by the stationary frame-work J should be loose enough to accommodate the said adjustment of the said table M .

As already indicated, the shaft K and consequently the tongs are arranged in a horizontal plane in the blank-receiving position of the tongs, as shown in Figs. 4 and 8. The shaft K and consequently the tongs are, immediately upon the reception and grasping of a blank by the tongs, swung or actuated laterally in a horizontal plane to bring the tongs into position for delivery of the blank to the anvil U . The actuation of the tongs-bearing shaft K laterally in a horizontal plane is effected, as already indicated, by turning the turn-table l which is turned in the one direction or the other according as the tongs is to be brought into its blank-receiving position or into position for delivery of the blank to the anvil U .

The means for actuating the turn-table l and consequently swinging the tongs-bearing shaft laterally in either direction (see Figs. 1 and 2) preferably comprise a cam E^7 operatively mounted on the shaft E and having its working peripheral surface engaged by a roller l^7 borne by one arm of a bell-crank-lever l^5 which is fulcrumed, as at l^4 horizontally and parallel with the shaft E , to a stationary object, such, for instance, as a member of the frame-work J , and has its other arm operatively attached by a connecting rod l^3 with the turn-table l . A suitably applied spring l^6 , which is shown attached at one end to the lever l^5 and at its other end to the stationary frame-work J , acts to retain the roller-bearing arm of the lever l^4 in engagement with the cam E^7 , and

the parts are so arranged and timed, and the trend of the working peripheral surface of the cam E^7 is such that the turn-table l is actuated in the direction required to swing the tongs-bearing shaft laterally in the direction required to actuate the blank-holding tongs from their blank-receiving position into position for delivery of the blank to the anvil U and hold them long enough in the last-mentioned position to accommodate the forward movement of the tongs-bearing shaft, as will hereinafter appear, to bring the blank into a recess U' formed in the top of the adjacent portion of the anvil and to accommodate also the operation upon the blank thus brought into the said recess by the coöperating anvil and hammer and to furthermore accommodate the withdrawal of the blank from the anvil upon the completion of the work upon the blank by the hammer and anvil.

The tongs when they have been actuated into position for delivery of the blank held thereby to the anvil are in front of or adjacent the anvil-recess U' , as shown in Fig. 11, and in position to render the tongs capable, upon being actuated endwise and forwardly, to bring the blank into the said recess, but of course preparatory to the actuation of the tongs forwardly to bring the blank into the said recess, the heated extremities of the blank, if the said extremities are spread apart as shown in Figs. 3, 4 and 8, are butted or lapped together, as at u' , as shown in Fig. 11, to form a closed joint, and the said butting or squeezing together of the said extremities of the blank preparatory to the actuation of a blank into the said recess is accomplished in any well known manner. Mechanical means for squeezing or butting the extremities of an open ring or link together are so well known in the art that description and illustration thereof in this specification are not considered necessary. If, however, blanks to be operated on have their ends not spread apart and are already in shape to be welded or otherwise operated upon no operation upon the heated extremities of the blanks is necessary. Fig. 2 illustrates a closed link-blank having been brought into position within the recess U' of the anvil in which position the blank is arranged half above and half below the top surface of the anvil, and the closed extremities of the blank are properly welded together or united by the coöperation of the anvil U and hammer V .

The means for effecting the forward movement of tongs-bearing shaft to actuate the tongs forwardly as required to bring the blank into position within the anvil-recess U' comprise the following:—The shaft K (see Figs. 11 and 12) extends from the tongs, which are arranged at one side of the turn-table l as already indicated, through the boxes l' and l'' of the turn-table and a suitable distance beyond the opposite side of the turn-

table and is provided at the last-mentioned side and a suitable distance from the turn-table with a washer or collar K^2 which is prevented from moving outwardly away from the turn-table and toward the rear end of the shaft by a pin K^3 with which the said shaft is provided. A spiral spring K^4 is mounted and confined upon the shaft K between the collar or washer K^2 and the outer end of the adjacent box l' and acts to retain the shaft and consequently the tongs in their rearward position. The shaft K is arranged to be actuated forwardly against the action of the spring K^4 by the inwardly curved face of a head x' formed upon the forward end of a push-bar x which is shiftable endwise forwardly and rearwardly relative to the rear end of the shaft K and has bearing in a sleeve x^2 loosely mounted on and shiftable endwise of the said bar. A spiral spring x^3 is mounted and confined upon the bar x between the head x' and the sleeve x^2 . The bar x is provided with a pin x^4 which engages a slot x^5 formed in and extending a suitable distance longitudinally of the sleeve x^2 , and engaging the forward end wall of the said slot in the rearward position of the sleeve. The spring x^3 acts to push the bar x forwardly and the engagement of the pin x^4 with the forward end wall of the slot x^5 limits the forward movement of the bar independently of the embracing sleeve x^2 . A shaft y arranged horizontally and parallel with the cam-shaft E is located below the sleeve and suitably supported from the table M . The shaft y is operatively provided at one end with a depending arm y' which is operatively connected by a connecting rod y^4 with an upright tilting lever y^5 arranged to tilt in a vertical plane and fulcrumed, as at y^7 , horizontally and parallelly with the cam-shaft E to the stationary frame-work J . The lever y^5 is provided at its upper end and a suitable distance above its fulcrum with a roller y^6 which engages the working peripheral surface of the cam E^6 already hereinbefore referred to. The shaft y is also operatively provided with an upwardly projecting arm y^2 which is operatively attached at its upper end to the sleeve x^2 , which arm is provided with a projecting lug y^3 which extends under the sleeve x^2 and forms a seat or bottom-bearing for the sleeve in the rearward or outer position of the sleeve, as shown in Figs. 11 and 12. A suitably applied spring y^8 acts to retain the said sleeve in its said position and also acts to retain the roller y^6 of the lever y^5 in engagement with the cam E^6 , which spring is shown attached at one end to the lever a suitable distance below the fulcrum of the lever, and at its opposite end to the stationary frame-work J . The arrangement of the parts is such and the peripheral working surface of the cam E^6 has such trend that as soon as the blank borne by the tongs has been brought into position and

put into shape if necessary for delivery to the anvil U the cam E^6 actuates the lever y^5 against the action of the spring y^8 and in the direction required to oscillate the shaft y in the direction required to effect the forward movement of the sleeve x^2 and push-bar x and thereby result in the actuation of the tongs-bearing shaft forwardly against the action of the spring K^4 and far enough to bring the blank borne by the tongs into position within the anvil-recess U' preparatory to the operation of the hammer V upon the blank, and the trend of the aforesaid surface of the cam-wheel E^6 is furthermore such that the tongs-bearing shaft is held in its forward position until the work upon the blank by the hammer V and anvil U has been completed, whereupon the tongs-bearing shaft is rendered free to be returned into its rear position by the spring K^4 .

The upper and lower ends of the push-bar-head x' diverge forwardly to insure a proper engagement of the push-bar x with the shaft K during the forward actuation of the bar, and it will be observed that the extension of the pin x^4 into the slot x^5 in the sleeve prevents turning of the said bar, and the spring x^3 affords relief to prevent breakage or injury to any member of the apparatus by any abnormality or imperfect entrance or other obstruction to the passage of the blank into the anvil-recess U' . In other words, the bar x and spring x^3 form somewhat yieldable means for actuating the shaft K and consequently the tongs forwardly when the tongs are in position for the insertion of the blank into the said recess U' . As soon as the blank has been brought into position within the anvil-recess U' the hammer V is actuated to deliver four successive blows upon the blank to weld or unite the extremities of the blank together. The hammer V (see Figs. 1, 2 and 13) is arranged to swing in a vertical plane above the anvil U, being pivoted, as at V' horizontally and parallel with the cam-shaft E to any stationary object, such, for instance, as a member of the frame-work J, and the hammer is operatively connected by a link V^2 with an arm V^3 operatively mounted on a shaft V^4 which is arranged parallel with the cam-shaft E and a suitable distance below the hammer and supported from the said frame-work. The shaft V^4 is also operatively provided with an arm V^5 which is provided with a roller V^6 engaged by a cam E^{10} operatively mounted on the shaft E, which cam has the shape required to cause the hammer to deliver four successive blows during each rotation of the cam-shaft. The hammer V is arranged to deliver its blows by gravity, and the arrangement of the parts and the trend of the working surfaces of the cam E^{10} are such that the hammer V is raised preparatory to the insertion of the blank into the anvil-recess U' , and that im-

mediately upon the delivery of the blank to the anvil the shaft V^4 is oscillated in opposite directions alternately until the hammer has delivered four blows upon the blank.

To properly weld a link or the like the hammer-blows should be alternately delivered upon opposite sides of the blank, and hence means for giving the tongs and blank to be welded a half turn in the interval of time between successive hammer-blows are provided and (see Figs. 1, 2, 3, 4 and 15) preferably comprise a pinion k which is operatively mounted upon the shaft K between the boxes l' and l'' by the well known means of groove-and-feather, as at k' , as shown in Fig. 4, and the groove of the last-mentioned means extends far enough longitudinally of the shaft, as at k^2 , in the direction of the rear end of the shaft to accommodate the forwardly endwise movement of the shaft. The pinion k meshes with a bevel-gear n arranged under the shaft K and between the shaft and the turn-table l and rests upon the latter. The gear n is twice as large diametrically and consequently has twice as many teeth as the pinion k . The gear n is arranged with its axis coincident with the axis of the turn-table l and is preferably fixed to an axle n' arranged centrally of the turn-table and extending vertically through the hub L of the turn-table, which hub is tubular to afford lateral bearing to the said axle. The gear n is provided at one side with a laterally projecting arm n^2 which is operatively connected by a connecting rod n^3 , with one arm of a bell-crank-lever n^4 which is fulcrumed, as at n^6 , horizontally and parallel with the cam-shaft E to any stationary object, such, for instance, as a member of the frame-work J, and has its other arm provided with a roller n^8 which engages the peripheral working surface of a cam E^8 operatively mounted on the shaft E, and the said lever is held with its roller in engagement with the said surface by a suitably applied spring n^7 which is shown attached at one end to the said roller-bearing lever-arm and at its other end to any stationary object, such, for instance as a member of the frame-work J.

The tongs - bearing shaft K and consequently the tongs must be swung or moved upwardly to bring the blank or work out of the anvil-recess U' in order to permit the turning of the blank as hereinbefore described, and the means employed for swinging or moving the tongs upwardly from the anvil preparatory to each half turn given to the tongs between successive blows of the hammer V (see Figs. 1 and 14) comprise a cam E^9 operatively mounted on the cam-shaft E and having a peripheral working surface engaged by the roller m^9 borne by the upper end of an upright lever m^7 fulcrumed at any suitable point between the ends, as at

m^8 , horizontally and parallelly with the said shaft (see also Fig. 2) to any stationary object, such, for instance, as a member of the frame-work J, and operatively connected at its lower end by a connecting rod m^6 (see also Fig. 4) with an arm m^5 depending from and rigid with the box m . The box m is pivotally supported from the table M, having two laterally and upwardly projecting arms m^2 arranged at opposite sides respectively of the box and pivoted, as at m' , horizontally and parallelly with the cam-shaft E, to the frame M. A suitably applied spring m^4 acts to retain the roller-bearing lever m^7 in engagement with the cam E^9 and consequently acts to retain the tongs-bearing shaft in its downwardly swung or horizontal position. The spring m^4 is shown attached at one end to the arm m^5 and at its other end to the stationary framework J. The table M is slotted or cut away, as at M' , to accommodate the swinging of the box m . The arrangement of the parts and the trend of the working surfaces of the cams E^8 and E^9 are such that as soon as the hammer V between successive blow-delivering movements of the hammer has swung upwardly far enough to permit the raising of the blank-bearing tongs above the anvil far enough to accommodate turning of the blank, the cam E^9 actuates the lever m^7 against the action of the spring m^4 and in the direction required to swing the box m in a vertical plane and in the direction required to swing the tongs-bearing shaft K and consequently the tongs upwardly, and as soon as the tongs-bearing shaft has thus been swung upwardly far enough to accommodate turning of the blank the said shaft and consequently the tongs are turned half way around by the actuation of the mechanism operatively connecting the said shaft with the cam E^8 . The shape of the cam E^8 is furthermore such that the tongs-bearing shaft and consequently the tongs are turned in opposite directions alternately upon successive upward movements of the blank upwardly from the anvil so that the hammer-blows are delivered upon opposite sides of the blank alternately. I would here remark that the trend of the working surface of the cam E^9 is also preferably such that the tongs and consequently the blank are somewhat raised during the actuation of the tongs toward the anvil to facilitate the entrance of the blank into the anvil-recess U'. The blank is retained between the anvil and hammer until the work upon the blank is completed as already indicated, whereupon the blank is withdrawn from between the hammer and anvil by the rearward or outward movement of the tongs-bearing shaft as hereinbefore described. As soon as the tongs during its withdrawal from the anvil has moved far enough to accommodate the discharge or removal of the finished product from the tongs downwardly through an open-

ing M^2 formed in the table M the sleeve s is withdrawn from between the jaw-arms t^3 to permit the opening of the tongs by the spring t^2 and accommodate the removal of the finished product from the tongs. The withdrawal of the sleeve s from between the jaw-arms t^3 is effected by means which preferably comprise an arm Q' operatively mounted (see Figs. 1, 2 and 16) on a shaft Q which is supported from the table M and arranged horizontally and parallel with the cam-shaft E about midway between the box m and the stationary frame-work J and about midway between the lateral sweep of the tongs and the table M. The shaft Q is operatively provided at one end with an upwardly projecting arm Q^2 operatively connected by a link Q^3 with a lever Q^4 which is fulcrumed, as at Q^5 , horizontally and parallelly with the shafts Q and E, to the stationary frame-work J and bears a roller Q^6 which engages the peripheral working surface of a cam E^{11} operatively mounted on the cam-shaft E. The roller-bearing lever Q^4 is continually held in engagement with the said surface of the cam E^{11} by a suitably applied spring Q^7 which is shown attached at one end to the link Q^3 and at its other end to the frame-work J. The parts are so arranged and the cam E^{11} has such shape that immediately upon the withdrawal of the tongs-bearing shaft rearwardly from the anvil far enough upon the completion of the work upon the blank borne by the tongs, the arm Q' of the shaft Q comes into engagement with a forwardly facing annular shoulder 30 formed on the sleeve s and thereupon actuates the said sleeve rearwardly against the action of the spring Q^7 far enough to permit the tongs to open.

The trend of the cam E^8 which, as already indicated, participates in the rotation of the gear n is furthermore such that the gear is held stationary during the actuation of the turn-table I so that during the movement of the tongs-bearing shaft laterally to bring the tongs from their blank-receiving position into position adjacent the anvil or from the last-mentioned position into their blank-receiving position the pinion k and consequently the tongs-bearing shaft and tongs are given a quarter turn. The quarter turn given to the tongs during the actuation of the tongs from their blank-receiving position into their position adjacent the anvil is unimportant, but as the jaws t of the tongs at either end of the lateral range of movement of the tongs are arranged the one above the other the quarter turn given to the tongs during their movement into their blank-receiving position is important to accommodate the application of a cooling fluid to both jaws of the tongs from above during the last-mentioned movement of the tongs, and the turn-table-actuating cam E^7 has preferably such shape that the tongs will rest or dwell

somewhat midway of their lateral range of movement during the return of the tongs into their blank-receiving position.

What I claim is:—

5 1. Blank-conveying apparatus comprising a suitably supported blank-feeder having a blank-holder arranged to receive and carry a blank; means for operating the blank-feeder; suitably supported movable tongs instru-
10 mental in conveying the blank removed from the said blank-holder, said tongs in their blank-receiving position being forwardly of but in suitable proximity to the blank-holder; a suitably supported guide instrumen-
15 tal in guiding a blank removed from the said blank-holder to the tongs, and means for effecting the passage of the blank from the blank-holder into engagement with and along the guide to the tongs.

20 2. Blank-conveying apparatus comprising a suitably operated blank-feeder having a blank-holder terminating at one end in a hook for carrying a link-blank having un-
25 joined extremities and adapted to be hung on the hook; suitably supported movable tongs instrumental in conveying the blanks removed from the aforesaid blank-holder, said tongs in their blank-receiving position
30 being arranged in suitable proximity to the blank-holder; a suitably supported guide instrumental in guiding a blank removed from the blank-holder to the tongs, and means for so removing the blank from the
35 hook of the blank-holder onto the guide that the blank delivered onto the guide is presented with its extremities toward the blank-receiving end of the guide.

3. In blank-conveying apparatus, the combination, with a suitably supported mov-
40 able blank-holder arranged to receive and carry a blank; suitably supported and suitably actuated movable tongs adapted to receive and thereupon convey a blank removed from the said blank-holder, said tongs in
45 their blank-receiving position being arranged a suitable distance from the travel of the blank-holder, and a suitably supported guide instrumental in guiding the blank from the blank-holder to the tongs, of a suitably sup-
50 ported and suitably operated endwise shiftable rod having a limited range of movement vertically, which rod is arranged above and movable longitudinally of the aforesaid guide and provided at one end with means arranged
55 to remove the blank from the blank-holder onto and along the guide to the tongs during the actuation of the rod, and means for operating the rod.

4. In blank-conveying apparatus, the combination, with a suitably supported mov-
60 able blank-holder arranged to receive and carry a blank; suitably supported and suitably actuated movable tongs adapted to receive and thereupon convey a blank re-
65 moved from the blank-holder, said tongs in

their blank-receiving position being arranged a suitable distance from the travel of the blank-holder, and a suitably supported guide instrumental in guiding the blank from the blank-holder to the tongs, of a suitably supported endwise shiftable rod having a limited range of movement vertically, which rod is arranged above and movable longitudinally of the aforesaid guide and provided with means arranged to remove the blank
75 from the blank-holder onto and along the guide to the tongs during the actuation of the rod; means for shifting the rod endwise in one direction; means for shifting the rod endwise in the opposite direction; means
80 acting to retain the rod in its lower position, and means for raising the rod from its lower into its upper position.

5. In blank-conveying apparatus, the combination, with a suitably supported mov-
85 able blank-holder arranged to receive and carry a blank; suitably supported and suitably actuated movable tongs adapted to receive and thereupon convey a blank removed from the blank-holder, said tongs in
90 their blank-receiving position being arranged a suitable distance from the travel of the blank-holder, and a suitably supported guide instrumental in guiding the blank from the blank-holder to the tongs, of a suitably sup-
95 ported endwise shiftable rod having a limited range of movement vertically, which rod is arranged above and movable longitudinally of the aforesaid guide and provided with means arranged to remove the blank from
100 the blank-holder onto and along the guide to the tongs during the actuation of the rod; means for shifting the rod endwise in one direction; means for shifting the rod endwise in the opposite direction; means acting to
105 retain the rod in its lower position; a suitably supported shaft arranged below and transversely of the rod and operatively provided with an arm affording bearing to and instrumental in supporting the rod, and means for
110 oscillating the shaft in the direction required to raise the rod against the action of the means acting as aforesaid to retain the rod in its lower position.

6. In blank-conveying apparatus, the combination, with a suitably supported mov-
115 able blank-holder arranged to receive and carry a blank; suitably supported and suitably actuated movable tongs adapted to receive and thereupon convey a blank removed
120 from the blank-holder, said tongs in their blank-receiving position being arranged a suitable distance from the travel of the blank-holder, and a suitably supported guide instrumental in guiding the blank from the
125 blank-holder to the tongs, of a suitably supported endwise shiftable rod having a limited range of movement vertically, which rod is arranged above and movable longitudinally of the aforesaid guide and provided with
130

means arranged to remove the blank from the blank-holder onto and along the guide to the tongs during the actuation of the rod; means for shifting the rod endwise in one direction; means for shifting the rod endwise in the opposite direction; means acting to retain the rod in its lower position; a suitably supported shaft arranged below and transversely of the rod and operatively provided with an arm affording bearing to and instrumental in supporting the rod, which arm is provided with means for preventing lateral displacement of the rod, and means for oscillating the shaft in the direction required to raise the rod against the action of the means acting as aforesaid to retain the rod in its lower position.

7. In blank-conveying apparatus, the combination, with a suitably supported movable blank-holder arranged to receive and carry a blank; suitably supported and suitably actuated movable tongs adapted to receive and thereupon convey a blank removed from the blank-holder, said tongs in their blank-receiving position being arranged a suitable distance from the travel of the blank-holder, and a suitably supported guide instrumental in guiding the blank from the blank-holder to the tongs, of a suitably supported endwise shiftable rod having a limited range of movement vertically, which rod is arranged above and movable longitudinally of the aforesaid guide and provided with means arranged to remove the blank from the blank-holder onto and along the guide to the tongs during the actuation of the rod; means for actuating the rod endwise; a suitably applied spring acting to retain the rod in its lower position; a suitably supported shaft arranged below and transversely of the rod and operatively provided with an arm affording bearing to and instrumental in supporting the rod, which arm is provided with means for preventing displacement of the rod upwardly from the arm, and means for oscillating the shaft in the direction required to raise the rod against the action of the aforesaid spring.

8. In blank-conveying apparatus, the combination, with a suitably supported movable blank-holder arranged to receive and carry a blank; suitably supported and suitably actuated movable tongs adapted to receive and thereupon convey a blank removed from the blank-holder, and a suitably supported guide instrumental in guiding the blank from the blank-holder to the tongs, of a suitably supported endwise shiftable rod having a limited range of movement vertically, which rod is arranged above and movable longitudinally of the aforesaid guide and provided with means arranged to remove the blank from the blank-holder onto and along the guide to the tongs during the actuation of the rod; means for actuating

the rod endwise; means acting to retain the rod in its lower position; a suitably supported shaft arranged below and transversely of the rod and operatively provided with an arm affording bearing to and instrumental in supporting the rod, which arm is provided with means for preventing displacement of the rod upwardly from the arm; another suitably supported and suitably actuated shaft arranged below and parallel with the first-mentioned shaft, and means for transmitting motion to the upper shaft from the lower shaft.

9. In blank-conveying apparatus, the combination, with a suitably supported movable blank-holder arranged to receive and carry a blank; suitably supported and suitably actuated movable tongs adapted to receive and thereupon convey a blank removed from the blank-holder, and a suitably supported guide instrumental in guiding the blank from the blank-holder to the tongs, of a suitably supported movable rod movable longitudinally of the guide and provided with means arranged to remove the blank from the blank-holder onto and along the guide to the tongs during the actuation of the rod, and means for operating the rod.

10. In blank-feeding apparatus, the combination, with a suitably supported movable blank holder arranged to receive and carry a blank; suitably supported and suitably actuated movable tongs adapted to receive and thereupon convey a blank removed from the blank-holder, said tongs in their blank-receiving position being arranged a suitable distance from the travel of the blank-holder, and a suitably supported guide instrumental in guiding the blank from the blank-holder to the tongs, of a suitably supported endwise shiftable rod having a limited range of movement vertically, which rod is arranged and movable longitudinally of the aforesaid guide and provided with means arranged to remove the blank from the blank-holder onto and along the guide to the tongs during the actuation of the rod; means for effecting the endwise movement of the rod, and means for effecting a movement of the rod up and down.

11. In blank-feeding apparatus, the combination, with a suitably supported movable blank-holder arranged to receive and carry a blank; suitably supported and suitably actuated movable tongs adapted to receive and thereupon convey a blank removed from the blank-holder, said tongs in their blank-receiving position being arranged a suitable distance from the travel of the blank-holder, and a suitably supported guide instrumental in guiding the blank from the blank-holder to the tongs, of a suitably supported endwise shiftable rod having a limited range of movement vertically, which rod is arranged and movable longitudinally of the aforesaid guide

and provided with means arranged to remove the blank from the blank-holder onto and along the guide to the tongs during the actuation of the rod; means for effecting a movement of the rod up and down; a suitably supported shaft arranged below and transversely of the rear end of the rod and operatively provided with an upwardly projecting arm; a link operatively connecting the rod with the said arm; means for oscillating the shaft in the direction required to actuate the rod forwardly toward the blank-holder, and means acting to retain the rod in its rearward position.

12. In blank-conveying apparatus, the combination, with a suitably operated and suitably supported blank-feeder comprising suitably spaced blank-holders terminating at one end respectively in a hook arranged to receive and carry a blank adapted to be hung on the hook, and suitably supported and suitably actuated movable tongs adapted to receive and thereupon convey a blank removed from the blank-feeder, said tongs in their blank-receiving position being arranged a suitable distance from the blank-holder from which a blank is next to be removed, of a suitably supported guide instrumental in guiding a blank from the last-mentioned blank-holder to the tongs, and two suitably supported and suitably actuated laterally spaced and laterally springy members adapted to straddle the last-mentioned blank-holder and movable during their actuation into their blank-removing position at the rear of the blank and also having such range of movement that during their actuation the last-mentioned blank is removed from the said blank-holder onto the guide and actuated along the guide to the tongs.

13. In blank-conveying apparatus, the combination, with a suitably operated and suitably supported blank-feeder comprising suitably spaced blank-holders terminating at one end respectively in a hook arranged to receive and carry a blank adapted to be hung on the hook, and suitably supported and suitably actuated movable tongs adapted to receive and thereupon convey a blank removed from the blank-feeder, said tongs in their blank-receiving position being arranged a suitable distance from the blank-holder from which a blank is next to be removed, of a suitably supported guide instrumental in guiding a blank from the last-mentioned blank-holder to the tongs; a suitably supported shiftable rod arranged above and movable longitudinally of the guide, said rod being provided at one end with two laterally spaced and laterally springy members arranged to straddle the last-mentioned blank-holder and movable during the actuation of the rod into their blank-removing position at the rear of the blank and also having such

range of movement that during the actuation of the rod the last-mentioned blank is removed from the said blank-holder onto the guide and actuated along the guide to the tongs, and means for operating the rod.

14. In blank-conveying apparatus, the combination, with a suitably operated and suitably supported blank-feeder comprising equidistantly spaced blank-holders terminating at one end respectively in a hook arranged to receive and carry a blank adapted to be hung on the hook, and suitably supported and suitably actuated movable tongs adapted to receive and thereupon convey a blank removed from the blank-feeder, said tongs in their blank-receiving position being arranged a suitable distance from the blank-holder from which a blank is next to be removed, of a suitably supported guide instrumental in guiding a blank from the last-mentioned blank-holder to the tongs, and two suitably supported and suitably actuated laterally spaced and laterally springy members adapted to straddle the last-mentioned blank-holder and movable during their actuation into their blank-removing position at the rear of the blank and also having such range of movement that during their actuation the last-mentioned blank is removed from the said blank-holder onto the guide and actuated along the guide to the tongs, said blank-removing members being provided with forwardly projecting and forwardly diverging portions to facilitate the straddling of the said blank-holder by the said blank-removing members.

15. In blank-conveying apparatus, the combination, with a suitably operated and suitably supported blank-carrier comprising suitably spaced blank-holders terminating at one end respectively in a hook arranged to receive and carry a link-blank adapted to be hung on the hook, and suitably supported and suitably actuated movable tongs adapted to receive and thereupon convey a blank removed from the blank-feeder, said tongs in their blank-receiving position being arranged a suitable distance from the blank-holder from which a blank is next to be removed, of a suitably supported guide instrumental in guiding a blank from the last-mentioned blank-holder to the tongs, and two suitably supported and suitably actuated laterally spaced and laterally springy members adapted to straddle the last-mentioned blank-holder and movable during their actuation into their blank-removing position at the rear of the blank and also having such range of movement that during their actuation the last-mentioned blank is removed from the said blank-holder onto the guide and actuated along the guide to the tongs, said blank-removing members converging toward their lower ends and having forwardly diverging

portions to facilitate the straddling of the said blank-holder by the said blank-removing members.

16. In blank-conveying apparatus, the combination, with a suitably supported blank-holder arranged to receive and carry a blank; suitably supported and suitably actuated movable tongs instrumental in conveying a blank removed from the blank-holder, and a suitably supported guide instrumental in guiding a blank from the blank-holder to the tongs, of a suitably supported and suitably actuated rod having a limited range of movement vertically, which rod is movable longitudinally of the aforesaid guide, said rod being provided with two laterally spaced and laterally springy members arranged to straddle the blank-holder and movable during the actuation of the rod into their blank-removing position at the rear of the blank and also having such range of movement that during the actuation of the rod the blank is removed from the blank-holder onto the guide and actuated along the guide to the tongs, said blank-removing members having forwardly projecting and forwardly diverging portions to facilitate the straddling of the said blank-holder by the said blank-removing members; means for shifting the rod toward the blank-holder; means for shifting the rod in the opposite direction; means acting to retain the rod in its lower position, and means for raising the rod, all arranged and operating substantially as and for the purpose set forth.

17. Blank-conveying apparatus comprising a laterally extending tongs-bearing shaft; a suitably supported turn-table supporting the said shaft; means for operating the turn-table; a bevel-gear supported from the turn-table and arranged with its axis coincident with the axis of the turn-table; means whereby the gear is held stationary during the operation of the turn-table, and a bevel-pinion operatively mounted on the tongs-bearing shaft and meshing with the gear.

18. Blank-conveying apparatus comprising a laterally extending tongs-bearing shaft; a turn-table supporting and arranged below the tongs-bearing shaft; means for operating the turn-table; an upright axle arranged centrally of the turn-table; a bevel-gear on the axle above the turn-table; means whereby the gear is held stationary during the operation of the turn-table, and a bevel-pinion operatively mounted on the tongs-bearing shaft and meshing with the gear.

19. Blank-conveying apparatus comprising a laterally extending tongs-bearing shaft; a turn-table supporting the tongs-bearing shaft and having a depending hub; means for operating the turn-table; an upright box affording lateral bearing to the hub of and supporting the turn-table; an up-

right axle having lateral bearing in the said hub; a bevel-gear fixed to the axle and supported from the turn-table, said axle and gear being arranged with their axes coincident with the axis of the turn-table; means whereby the gear is held stationary during the operation of the turn-table, and a bevel-pinion operatively mounted on the tongs-bearing shaft and meshing with the gear.

20. In blank-conveying apparatus, the combination, with a suitably supported shaft having lateral movement and provided at one end with tongs which comprise two jaws movable relative to each other to open or close the tongs and provided each with an arm extending from the respective jaw toward the opposite end of the shaft, means acting to retain the jaws in their open position, and a sleeve slidably mounted on the shaft and arranged to move between the arms of the jaws and adapted during its forward movement to actuate the jaws outwardly and thereby close the tongs, of means located at one extremity of the lateral movement of the aforesaid shaft and arranged to actuate the sleeve in one direction, and means located at the other extremity of the said movement and arranged to actuate the sleeve in the opposite direction.

21. In blank-conveying apparatus, the combination, with a suitably supported shaft having lateral movement and provided at one end with tongs which comprise two jaws movable relative to each other to open or close the tongs and provided each with an arm extending from the respective jaw toward the opposite end of the shaft, means acting to retain the jaws in their open position, and a sleeve slidably mounted on the shaft and arranged to move between the arms of the jaws and adapted during its forward movement to actuate the jaws outwardly and thereby close the tongs, of means located at one extremity of the lateral movement of the shaft and arranged to move the sleeve in one direction, and a suitably supported and suitably actuated oscillatory shaft arranged under the said range of movement and having an arm located at the other extremity of the said movement and arranged to actuate the sleeve in the other direction.

22. In blank-conveying apparatus, the combination, with an endwise shiftable shaft provided at one end with blank-conveying tongs, which shaft has lateral movement, and means acting to retain the shaft in position holding the tongs in their rearward position, of means arranged to engage the other end of the shaft when the latter is in position at one end of its range of lateral movement and actuate the shaft forwardly.

23. Blank-conveying apparatus comprising endwise shiftable laterally movable oscillatory blank-conveying tongs which have

suitably operated blank-grasping jaws and are in position for the delivery of a blank conveyed thereby or to receive a blank according as the tongs are in position at the one or the other extremity of their range of lateral movement, said tongs being supported to render them capable of being swung in a vertical plane as well as to permit lateral, endwise and oscillatory movement of the tongs; means acting to retain the blank-grasping jaws open, and means for closing the jaws upon the reception of a blank by the tongs.

24. In blank-conveying apparatus, the combination, with an endwise shiftable shaft provided at one end with blank-conveying tongs, a suitably supported turn-table bearing the shaft; means for operating the turn-table, and means acting to retain the shaft in position holding the tongs in their rearward position, of an endwise shiftable member provided with a head arranged to engage the other end of the shaft and actuate the latter forwardly when the tongs have been brought into position to deliver a blank borne thereby, a sleeve on the said shaft-shifting member, a yieldable member interposed between the head and the sleeve, and means for actuating the sleeve endwise.

25. The combination, with means adapted to operate on the blank, of blank-conveying apparatus comprising a blank-feeder arranged a suitable distance from the first-mentioned means; a turnable endwise shiftable shaft provided at one end with tongs instrumental in conveying the blank to the first-mentioned means, said tongs in their blank-receiving position being arranged in suitable proximity to the blank-feeder; a suitably supported guide instrumental in guiding the blank from the blank-holder to the tongs; means for removing a blank from the blank-holder onto and along the guide to the tongs; a suitably supported turn-table bearing the endwise shiftable shaft; means for turning the turn-table, and a suitably applied spring acting to retain the shaft in position holding the tongs in their rearward position, of suitably operated and suitably applied yieldable means arranged to actuate

the tongs-bearing shaft endwise against the action of the spring.

26. The combination, with means adapted to operate on a blank, of blank-conveying apparatus comprising the following:—an endwise shiftable shaft supported as required to render it capable of movement laterally and also capable of being swung in a vertical plane, which shaft is provided with blank-conveying tongs which are in position to present a blank to the first-mentioned means or to receive a blank according as the shaft has been actuated into position at the one or the other extremity of its lateral movement; means acting to retain the blank-grasping jaws of the tongs open; means for closing the jaws upon the reception of a blank by the tongs; suitably operated means for turning the shaft in opposite directions alternately, and means for actuating the tongs-bearing shaft endwise.

27. The combination, with means adapted to operate on a blank, of blank-conveying apparatus comprising the following:—a suitably operated turn-table; an endwise shiftable shaft borne by the turn-table and provided with blank-conveying tongs which are in position to present a blank to the first-mentioned means or to receive a blank according as the turn-table has been actuated in the one or the other direction; means acting to retain the blank-grasping jaws of the tongs open; means for closing the jaws upon the reception of a blank by the tongs; a suitably actuated turn-table supporting member pivotally supported as required to render it capable of being swung in a vertical plane; suitably operated means for turning the shaft in opposite directions alternately, and means for actuating the tongs-bearing shaft endwise.

In testimony whereof, I sign the foregoing specification, in the presence of two witnesses.

PHILANDER H. STANDISH.

Witnesses:

C. H. DORER,

VICTOR C. LYNCH.