

(No Model.)

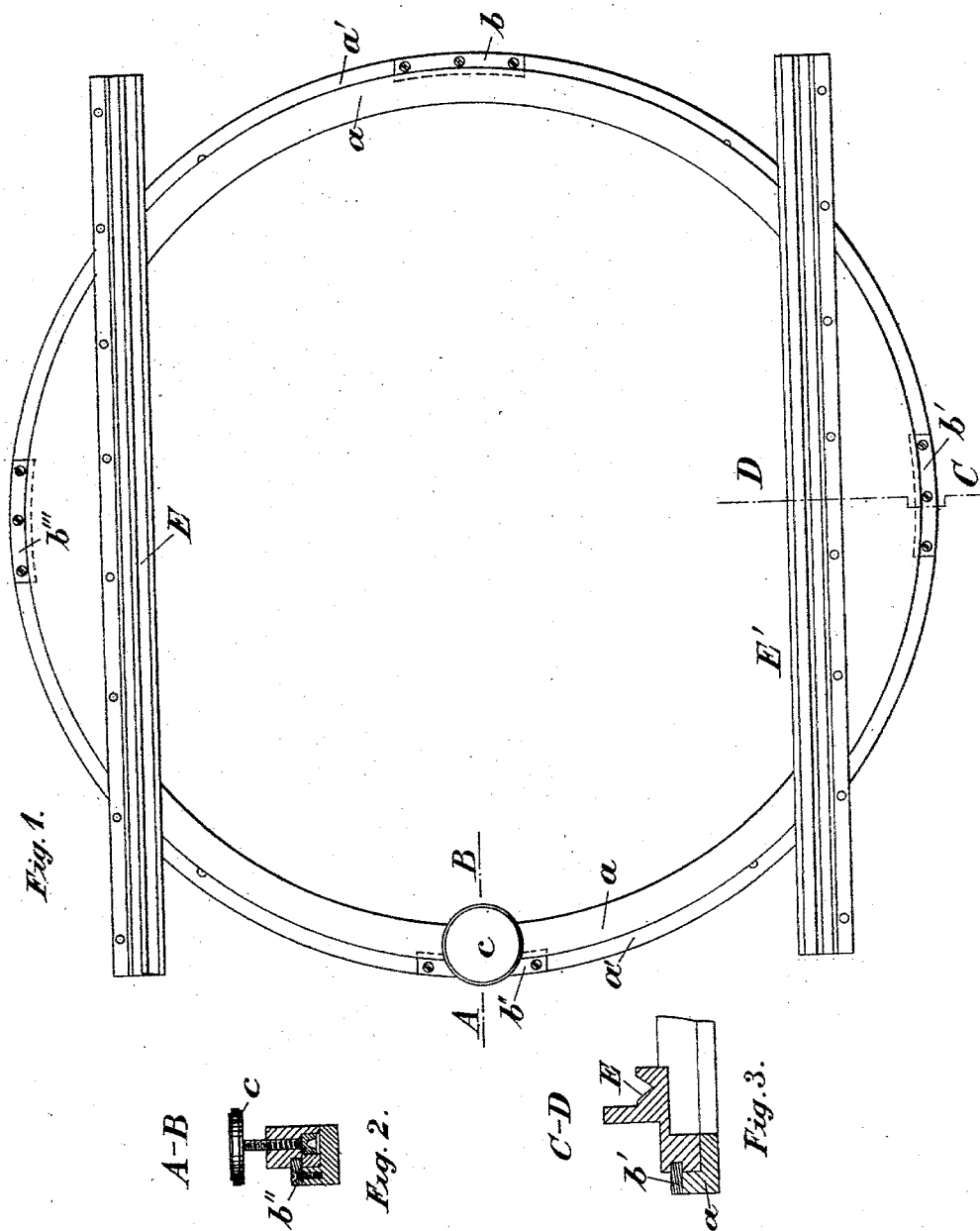
10 Sheets—Sheet 1.

A. TESSARO.

APPARATUS FOR PRINTING OR RULING ON PAPER OR METAL.

No. 569,845.

Patented Oct. 20, 1896.



Witnesses:
J. H. Wilman
Peter A. Ross

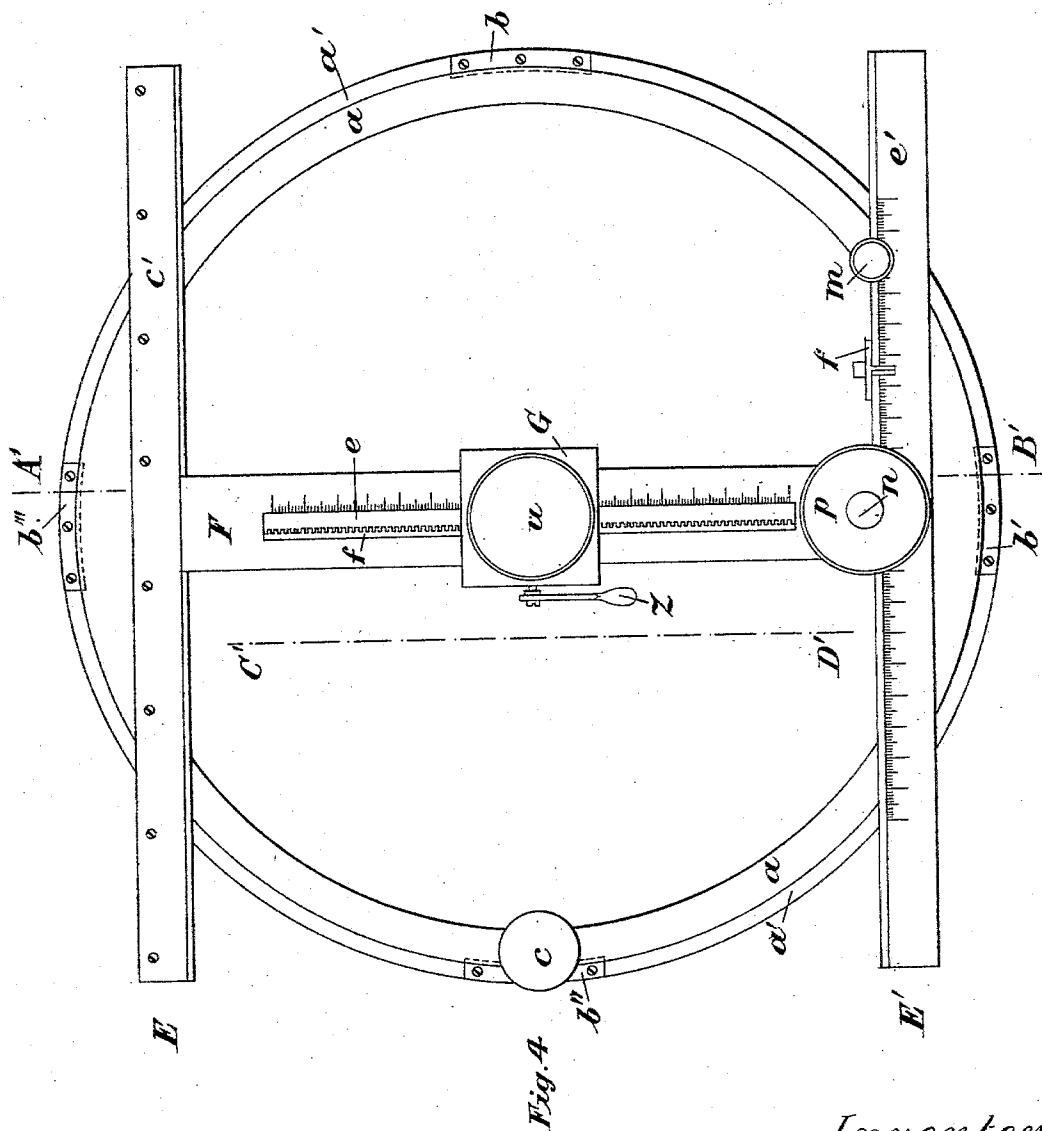
Inventor:
Angelo Tessaro
by Henry Connors
his attorney

A. TESSARO.

APPARATUS FOR PRINTING OR RULING ON PAPER OR METAL.

No. 569,845.

Patented Oct. 20, 1896.



Witnesses:
F. W. Wiman
Peter A. Ross.

Inventor:
Angelo Tessaro
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his Attorney.

(No Model.)

10 Sheets—Sheet 3.

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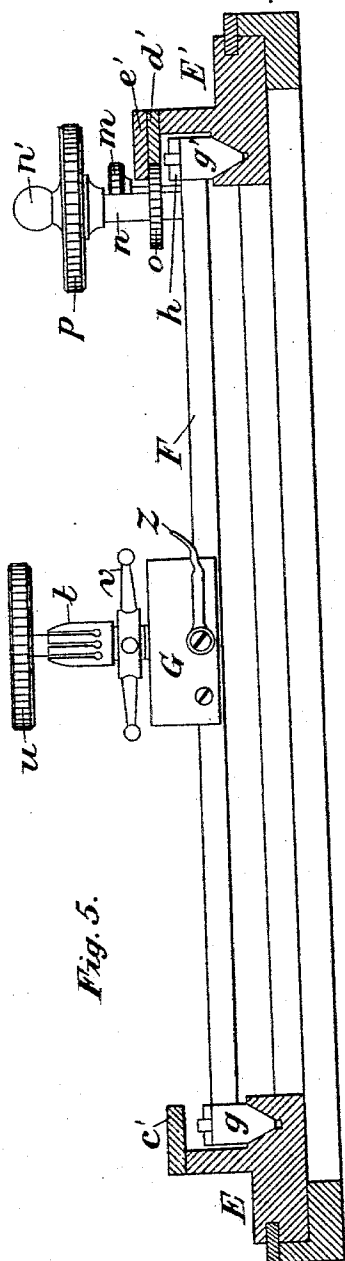


Fig. 5.

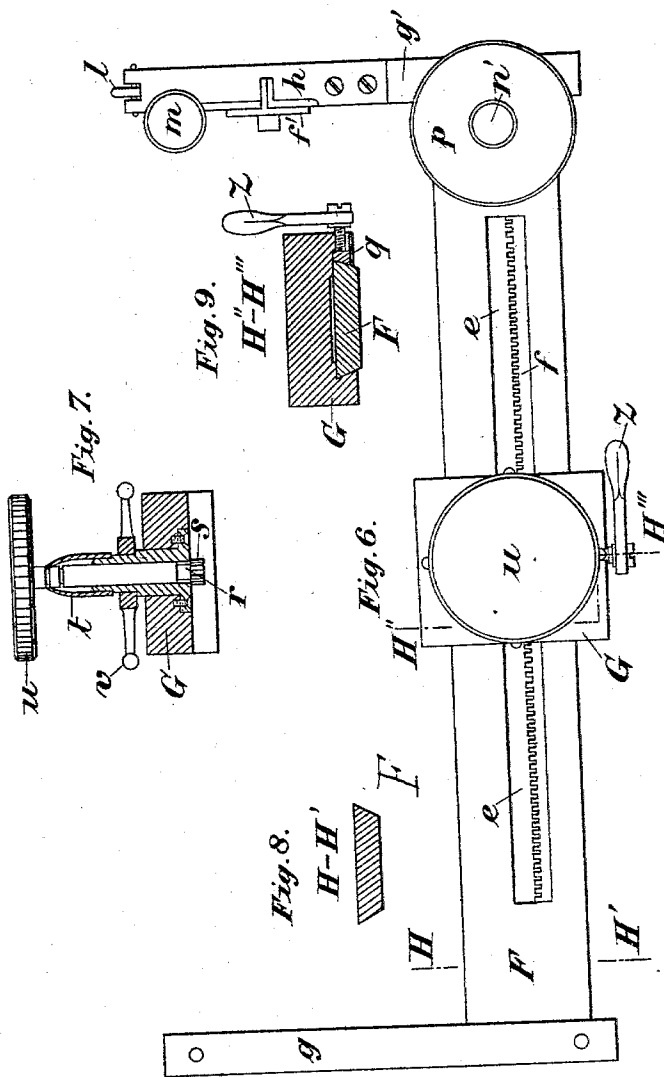


Fig. 7.

Fig. 9.

Fig. 6.

Fig. 8.

Witnesses:
L. H. Whiman
Peter A. Rose

Inventor:
Angelo Tessaro
by *Henry Combs*
his Attorney

(No Model.)

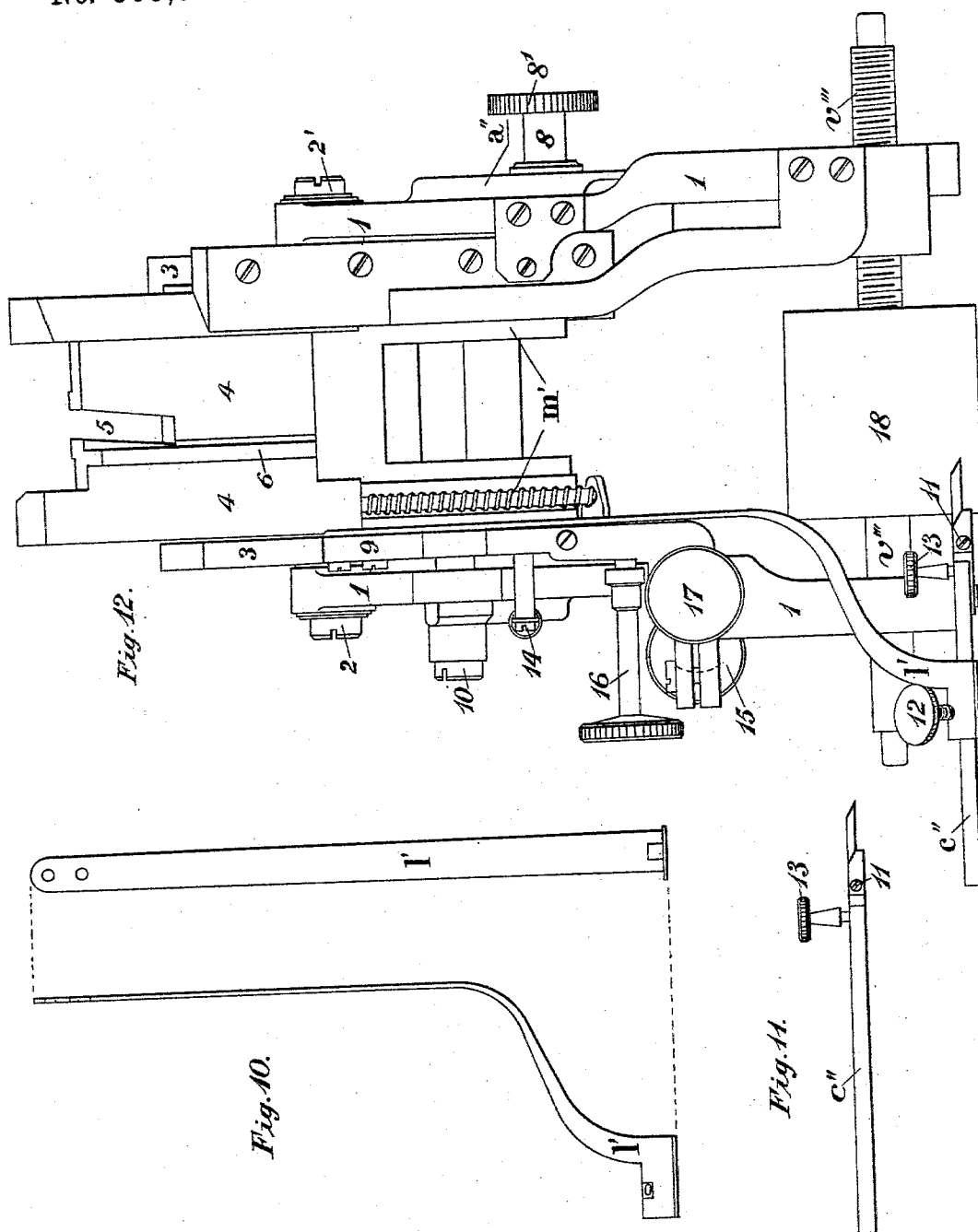
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Witnesses:
J. H. H. H. H.
Peter A. Ross

Inventor:
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(No Model.)

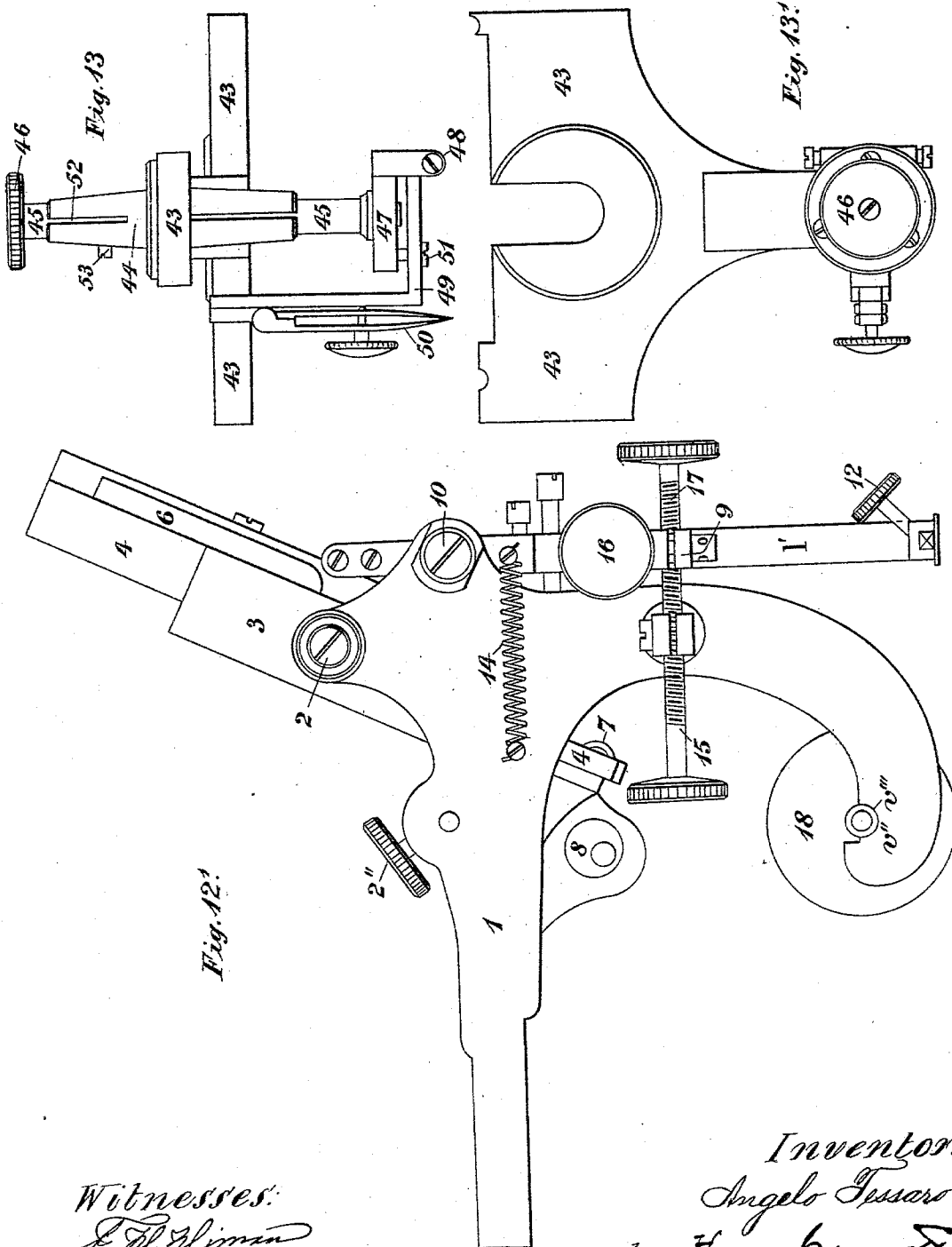
10 Sheets—Sheet 5.

A. TESSARO.

APPARATUS FOR PRINTING OR RULING ON PAPER OR METAL.

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Patented Oct. 20, 1896.



Witnesses:

J. W. Whinn
Peter A. Ross

Inventor:

Angelo Tessaro

by Henry G. Bond
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(No Model.)

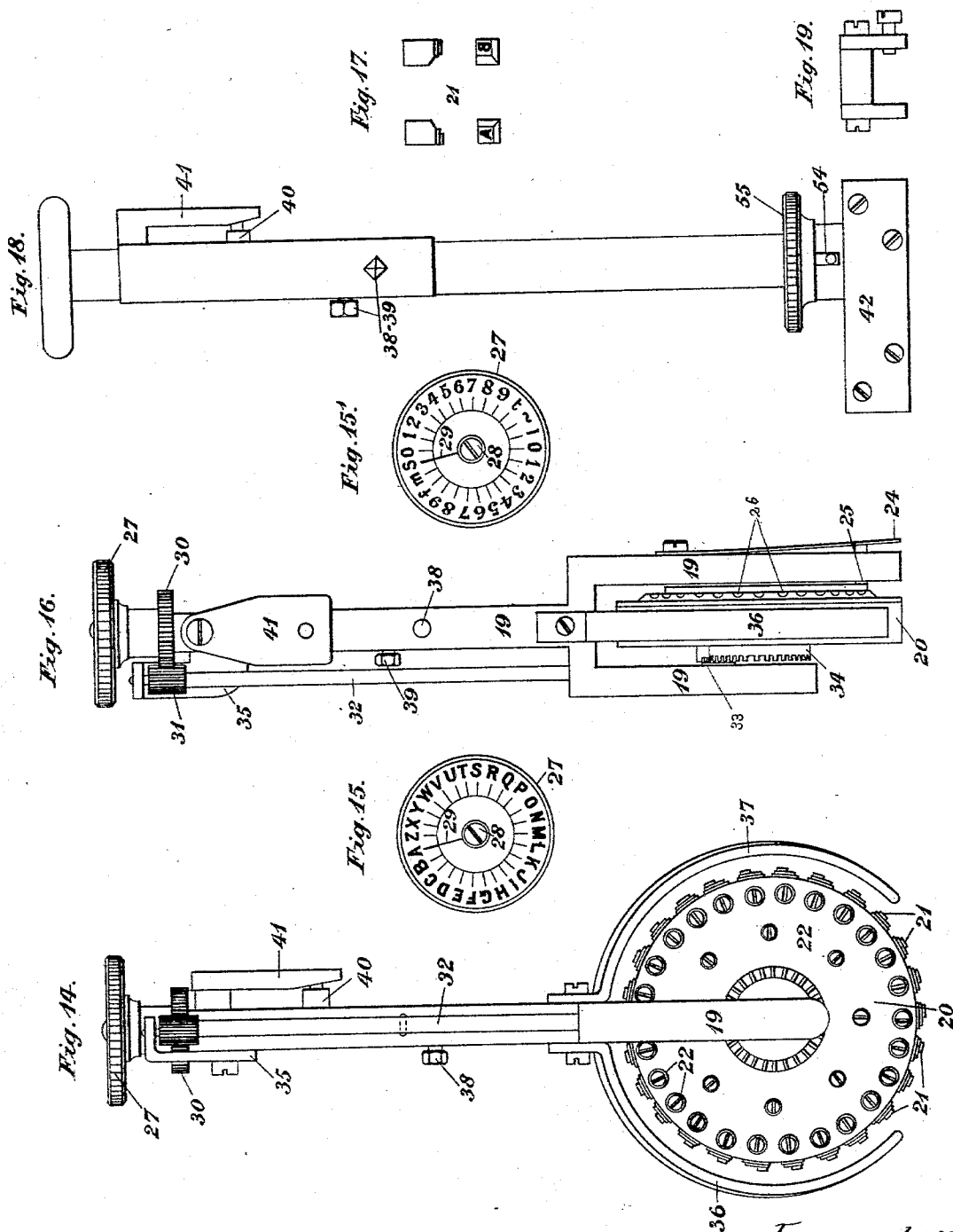
10 Sheets—Sheet 6.

A. TESSARO.

APPARATUS FOR PRINTING OR RULING ON PAPER OR METAL.

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Patented Oct. 20, 1896.



Witnesses:

J. H. Kliman
Peter A. Ross

Inventor:
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(No Model.)

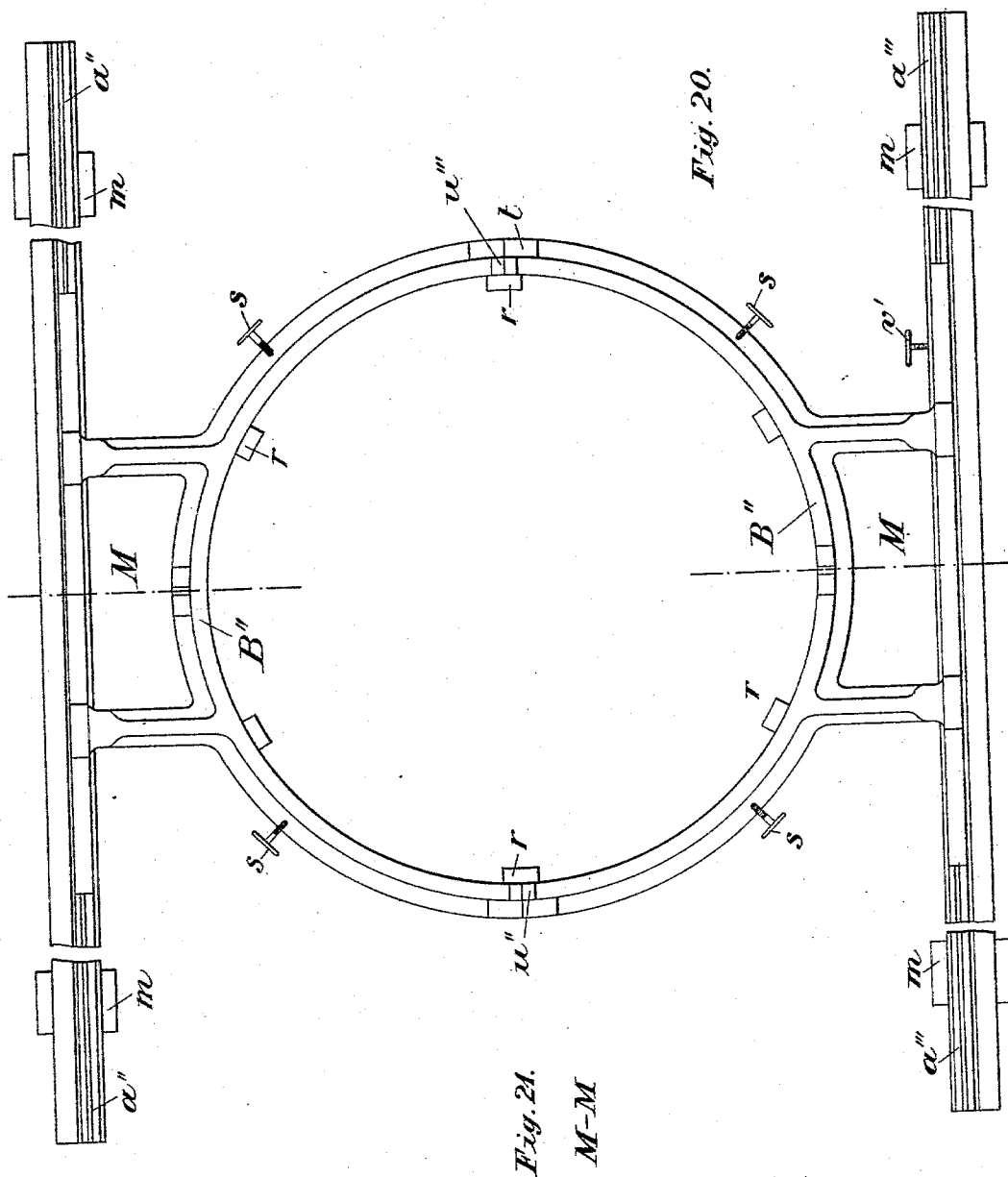
10 Sheets—Sheet 7.

A. TESSARO.

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No. 569,845.

Patented Oct. 20, 1896.



Witnesses:
J. H. H. H. H.
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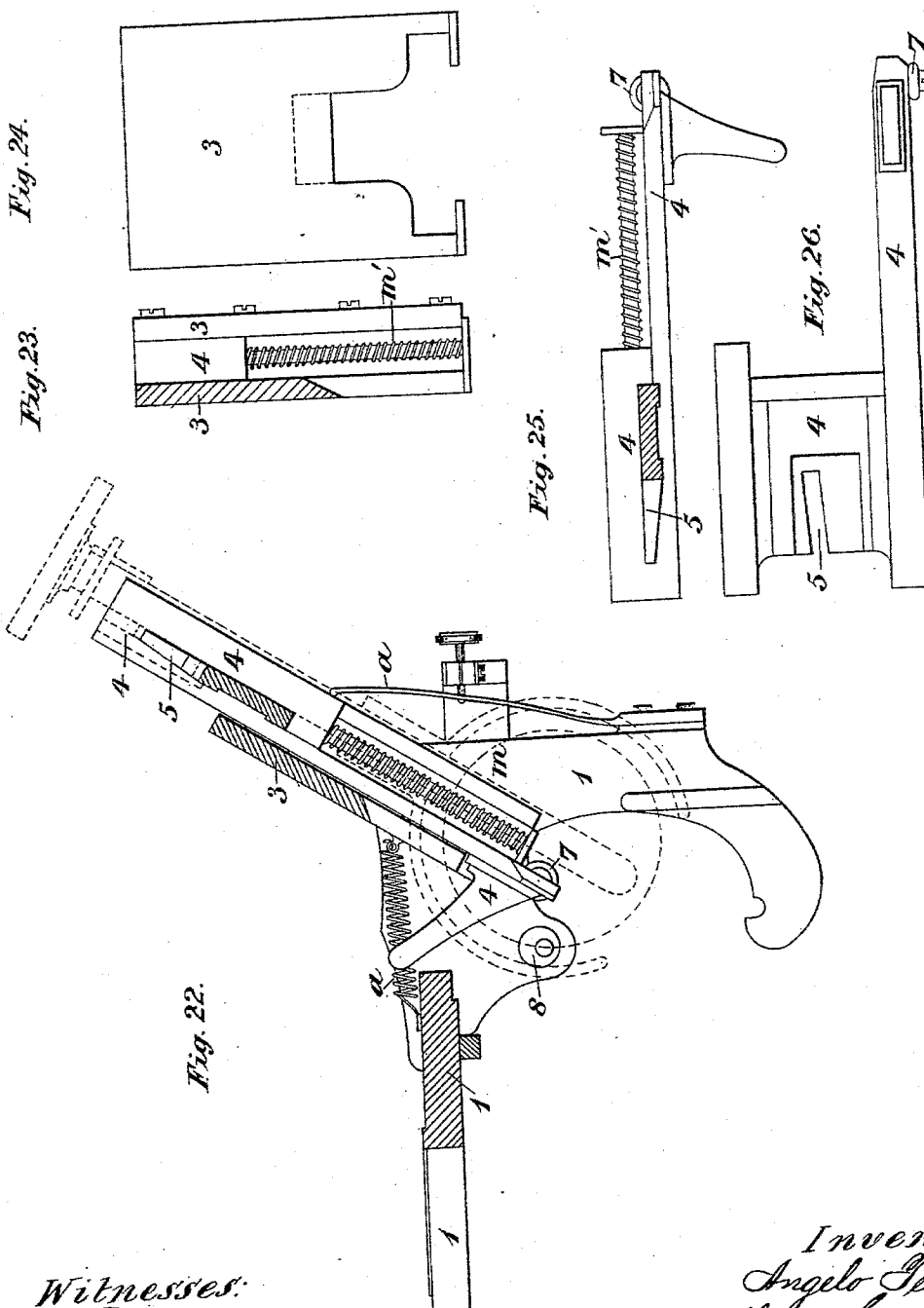
(No Model.)

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Patented Oct. 20, 1896.



Witnesses:
J. W. Whinn
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(No Model.)

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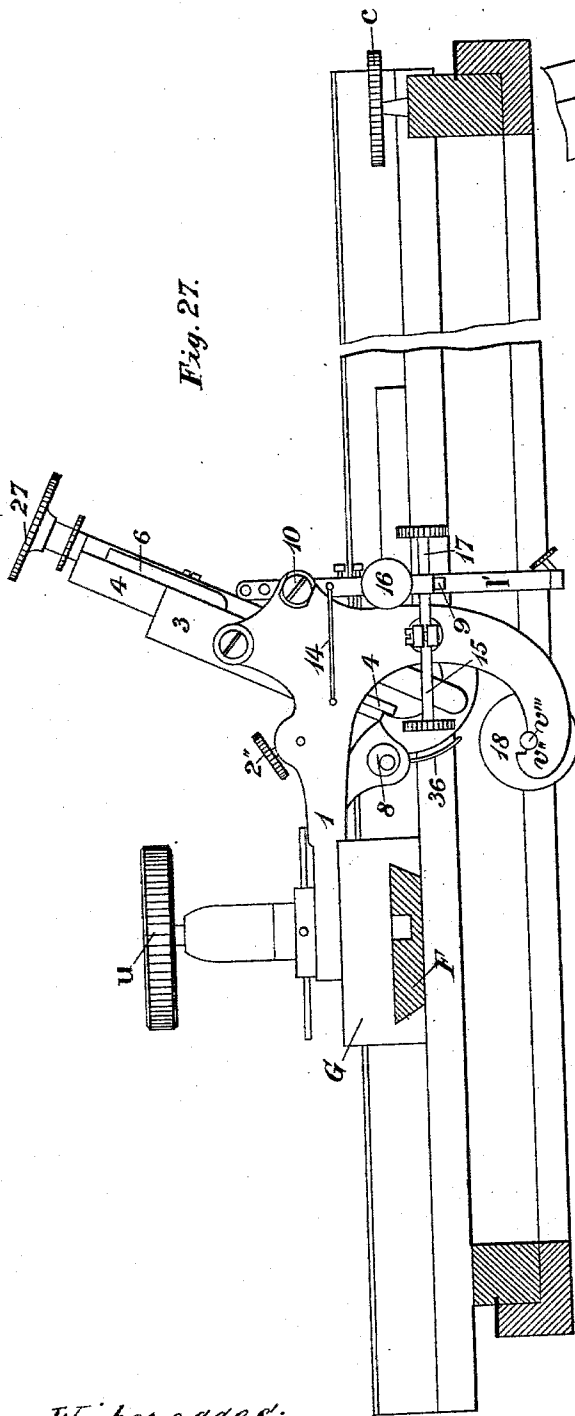


Fig. 27.

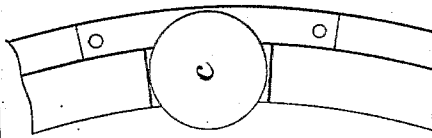


Fig. 29.

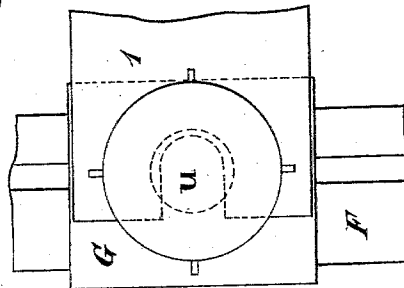


Fig. 28.

Witnesses:
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Inventor:
Angelo Tessaro
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Attorney

(No Model.)

10 Sheets—Sheet 10.

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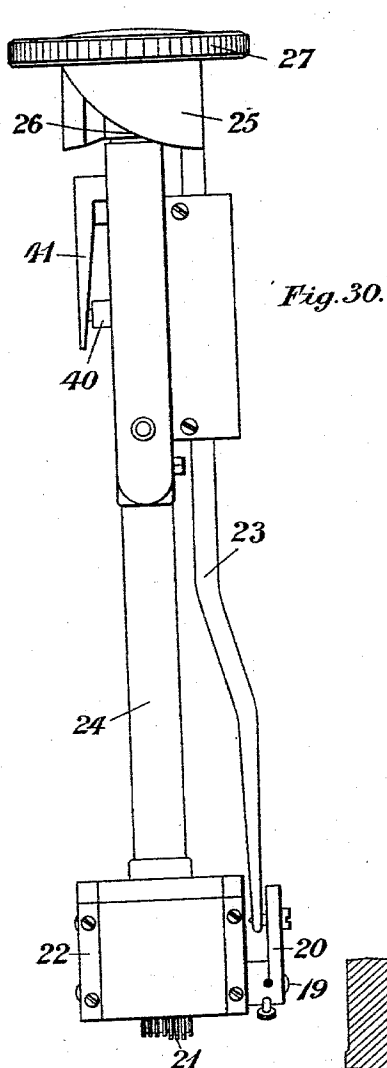


Fig. 30.

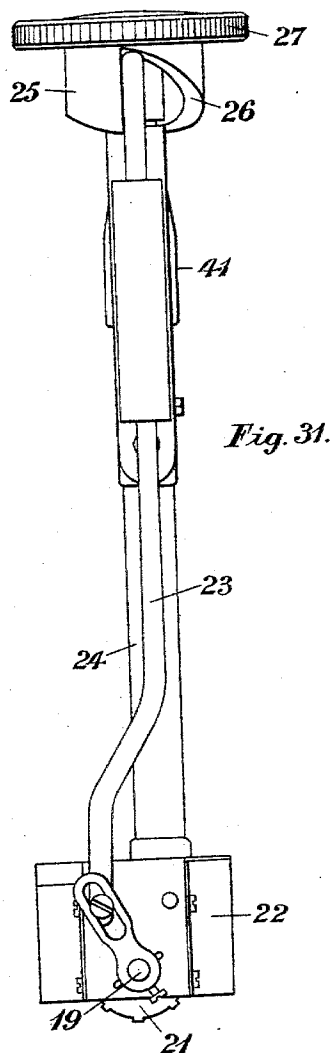


Fig. 31.

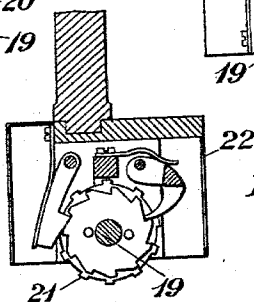


Fig. 32.

Witnesses:

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Peter A. Ross

Inventor:
Angelo Tessaro
by Henry Bonnett
his Attorney

UNITED STATES PATENT OFFICE.

ANGELO TESSARO, OF PADUA, ITALY.

APPARATUS FOR PRINTING OR RULING ON PAPER OR METAL.

SPECIFICATION forming part of Letters Patent No. 569,845, dated October 20, 1896.

Application filed January 23, 1895. Serial No. 535,979. (No model.) Patented in Italy March 11, 1892, LXI, 311; in England May 5, 1893, No. 9,046; in Belgium May 15, 1893, No. 104,481; in Spain June 17, 1893, No. 14,500; in France August 3, 1893, No. 229,766; in Luxemburg August 9, 1893, No. 1,872; in Sweden August 11, 1893, No. 5,808; in Austria-Hungary December 30, 1893, No. 42,530 and No. 66,647; in Norway January 26, 1894, No. 3,370; in Switzerland January 31, 1894, No. 7,366, and in Germany May 2, 1894, No. 76,035.

To all whom it may concern:

Be it known that I, ANGELO TESSARO, a subject of the King of Italy, residing at Padua, in the Kingdom of Italy, have invented a new and useful Improved Apparatus for Printing and Ruling on Paper or Metal, (in respect whereof I have obtained Letters Patent in Great Britain, dated May 5, 1893, No. 9,046; in Italy, dated March 11, 1892, No. 311, Vol. LXI; in France, dated August 3, 1893, No. 229,766; in Belgium, dated May 15, 1893, No. 104,481; in Austria-Hungary, dated December 30, 1893, No. 42,530 and No. 66,647; in Luxemburg, dated August 9, 1893, No. 1,872; in Spain, dated June 17, 1893, No. 14,500; in Switzerland, dated January 31, 1894, No. 7,366; in Norway, dated January 26, 1894, No. 3,370; in Germany, dated May 2, 1894, No. 76,035, and in Sweden, No. 5,808, dated August 11, 1893,) of which the following is a specification.

This invention relates to apparatus adapted for writing or printing in characters or type of any shape or description and in straight lines, either parallel or at any angle of inclination to the edges of the paper, or in curves. It also enables lines of any desired thickness, parallel or not, to be drawn, say, on maps, plans, or tracings, printed cards or tables, and the like. It may further be employed for printing circulars, announcements, notices, or books on metal or paper, which may or may not have been subjected to a preparatory chemical treatment, the operation being substantially the same whether finished, written, or printed matter is produced at once or whether the written or printed matter is intended to be first transferred to and subsequently reprinted from stone, zinc, or other plates.

In the United States Patent No. 484,262, granted to me October 11, 1892, is described an apparatus for writing music, constructed on general principles similar to the present apparatus and having some features in common therewith; but the present machine is adapted to a wider range of work than the former.

Apparatus constructed according to this

invention is illustrated in the accompanying drawings.

Figure 1 is a plan of the frame, guides, and ring. Fig. 2 a section on the line A B. Fig. 3 is a section on the line C D. Fig. 4 is a plan corresponding with Fig. 1, but showing the bar and accessory parts. Fig. 5 is a view, partly in side elevation, as seen from the plane of the line C' D'; Fig. 4, and partly in section on the line A' B', Fig. 4. Fig. 6 is a plan of the movable bar and its accessory parts. Fig. 7 is a cross-section of the carriage and adjuncts. Fig. 8 is a cross-section on the line H H', Fig. 6. Fig. 9 is a similar view on the line H'' H''', Fig. 6. Fig. 10 shows, in side and in end elevation, respectively, the spring pertaining to the indicating device. Fig. 11 is a side elevation of the sliding index-rod. Fig. 12 is a rear view of the writing or drawing device proper. Fig. 12' is a corresponding side elevation. Figs. 13 to 19 are views of the ruling and printing attachments. Fig. 13 is a front view, and Fig. 13* is a plan view, of the line drawing or ruling device. Figs. 14 to 16 show printing devices, Fig. 14 being a side or face view, Figs. 15 and 15' being plan views of the head 27, the former being marked with letters and the latter with numerals, &c., and Fig. 16 being an edge view or elevation of the device seen in Fig. 14. Fig. 17 represents several of the types detached in side and end elevation. Fig. 18 shows a printing device furnished with means for attaching it to the drawing device and with a type-holder 42, and Fig. 19 is an end view of said type-holder detached. Fig. 20 is a plan of the transferring device. Fig. 21 is a section on the line M M, Fig. 20. Fig. 22 is a longitudinal section of the writing or drawing device proper seen in Figs. 10 to 12, the device seen in Figs. 14 to 16 being represented in place in Fig. 22 by dotted lines. Figs. 23 to 26 illustrate some details of said writing device, Fig. 23 being a longitudinal section of the guide 3, of which Fig. 24 is a front view, and Fig. 25 being a similar section of the carrier 4, of which Fig. 26 is a front view. Fig. 27 is a

cross-section of the entire apparatus when ready for use, the carriage G being secured on the bar F and having secured on it the drawing or writing device proper seen in Figs. 10 to 12, which latter carries the printing device seen in Figs. 14 to 16. Figs. 28 and 29 are plan views of parts of the apparatus seen in Fig. 27. Figs. 30 and 31 are respectively a front view and side view of a numbering device which may be employed with the apparatus in lieu of the printing device shown in Figs. 11 to 16. The object is numbering exclusively. Fig. 32 is a sectional view of the box at the lower end of the printing device.

The improved apparatus comprises a circular frame *a*, mounted to turn in a ring *a'*. This frame carries two straight parallel guides E and E'. The frame *a* and the ring *a'* are connected by means of projecting plates *b*, *b'*, *b''*, and *b'''*, which engage in a groove in the frame and are secured by screws to the ring. A thumb-screw *c* acts as a handle for turning the frame in the ring about the common axis of the frame and ring, the thumb-screw when turned about its own axis serving to lock the frame and ring together in the required relative positions. The ring always remains stationary. The guide E' is fitted with a rack *d'*, Fig. 5, and a flat plate *e'*, bearing a graduated scale, Figs. 4 and 5. The guide E is furnished with a plate *c'*, Fig. 5. A bar F is arranged to slide in the grooves of the guides E and E'. This bar is preferably made of steel and of the cross-section indicated in Fig. 8. On its upper surface there is a longitudinal groove *e*, Figs. 4 and 6, within which is secured a rack *f*. The bar F carries at each end a cross-piece *g* or *g'*, Fig. 6. The lower parts of these cross-pieces are wedge-shaped and fit in the grooves in the guides E and E', in which they slide. A flat spring *h*, Figs. 5 and 6, is secured by screws to the cross-piece *g'*, the free end of the spring carrying a roller *l*. The pressure exerted by the spring can, when required, be increased or regulated by the screw *m*, which engages with the spring. To regulate the tension, the screw *m* screws through a lateral projection on the spring and bears on a similar projection on the cross-piece. This is a common tension device. The degree to which the roller *l* is pressed against the lower surface of the rack *d'* determines the freedom with which the bar F slides along the guides E and E', the maximum pressure firmly locking the bar in position and securing it against displacement. The bar F also carries, near one end, a pin *n*, terminating in a milled head *p*, and having a pinion *o*, which is in engagement with the rack *d'*.

A carriage G is mounted on and can be slid along the bar F. This carriage is in the form of a rectangular plate having a dovetail groove beneath for the reception of the bar F, and can be rigidly connected to the bar by

a block *g*, Fig. 9, acted upon by a set-screw *z*, provided with an arm or lever. The carriage is traversed by a spindle *r*, Fig. 7, carrying at its lower end a pinion *s*, which engages with the rack *f* of the bar F. The spindle *r*, which is embraced by a clip *t*, terminates in a milled plate or disk *u*. By rotating the disk *u* a minute movement along the bar F can be imparted to the carriage G. The fingers or segments of the clip *t* engage one or the other of two circumferential grooves in the spindle *r* and stop the latter against endwise movement.

When the bar F is placed between the guides E and E' of the frame, the pinion *o* being in gear with the rack *d'*, a minute movement of the bar along the guides E and E' can be obtained by turning the plate or disk *p*, this movement being at right angles to the movement of the carriage G, produced by turning the plate or disk *u*.

By means of the four-armed nut *v* the writing or drawing device proper (represented in Figs. 10 to 12') is secured on the carriage G. The said device comprises a steel frame 1, provided with journals 2 and 2' and supporting a guide 3, within which a carrier 4 is adapted to slide. This carrier at its upper end has a beveled notch or recess 5 and a rib 6, while at its lower end it has another rib provided with a roller 7. A spring *a'*, Fig. 12, secured to the lower portion of the frame, retains the guide and carrier in the inclined position in which they are shown in Fig. 12'. The eccentric 8, which is operated by turning the milled disk 8', is adapted to limit the downward motion of the guide 3 toward the inking-roller 18, while the set-screw 2" serves to adjust the angle of inclination. Two spiral springs abutting against the bottom of the guide 3 retain the carrier in the position in which it is shown in the drawings. One of these springs *m'* is visible in Fig. 12. When the carrier 4 has been depressed within its guide, these springs, as soon as it is relieved from pressure, raise it back to its normal position. The indicating device comprises a piece 9, pivoted on a screw 10 to the frame and carrying a spring *l'*, secured thereto by screws. In the lower part of this spring is mounted a horizontal sliding rod *c''*, terminating in an index-point attached by means of a screw 11. This screw enables the point to be readily removed and exchanged for a different one when necessary. The sliding rod *c''* is fixed in the end of the spring *l'* by the thumb-screw 12. The point or index can be lowered or raised as required by the thumb-screw 13. A spiral spring 14 keeps the indicating device in its normal position. By means of the screws 16 and 17 the device can be adjusted horizontally in two directions at right angles to each other. The screw 15 serves as a stop for the screw 17. The lower part of the frame 1 has an open bearing *v''*, containing a mutilated screw-thread corre-

sponding with the thread on the shaft *v'''* of the inking-roller 18, which is made of india-rubber.

Figs. 14 to 19 show printing devices adapted for attachment to the carrier 4.

In Figs. 14 to 16 the device comprises a fork 19, made of steel and having a spindle on which is mounted a drum or barrel 20, divided into as many compartments as there are characters to be printed, twenty-six compartments being shown by way of example in the drawings. Each compartment contains one character or type 21. Several detached types are represented in Fig. 17. The types are fixed by screws 22. A spring 24 forces a pin or stud 25 into one of the notches or recesses 26, formed on the opposite face of the barrel to that containing the screws 22. There is one recess to each compartment in the barrel, and the recesses are arranged at the same distances apart as the compartments. The head or disk 27 has also the same number of divisions, (in the present instance twenty-six,) against which are marked letters or figures corresponding with the type in the compartments. Fig. 15 is a plan of a head marked with letters, Fig. 15' being a corresponding view of a head marked with numerals and other signs. The head is adapted to turn on a pivot at the upper end of the fork 19. The index 29 is secured to the pivot by a screw 28. The lower part of the head is provided with a wheel 30, engaging with a pinion 31 on a rod or spindle 32, at the lower end of which is another pinion 33, engaging with a crown-wheel 34 on the barrel 20. The upper end of the rod 32 turns in a bearing-bracket 35. By turning the head or dial 27 the barrel 20 is also turned through the gearing. It will therefore be seen that as the type contained in the barrel corresponds with the letters or figures on the disk or dial 27 the particular letter or figure to which the index on the dial happens to point will be in the printing position on the lower surface of the drum. Two guards 36 and 37, secured to the fork 19, serve to protect the type from injury. 38 and 39 are adjusting-screws. The stud 40 slides along the inclined groove 5, Fig. 12, of the carrier 4 in such a manner that one side of the fork 19 is pressed against the rib 6 of the carrier while the arm 41, Figs. 14 and 16, draws the device into contact with the surface of the carrier.

The rod or spindle shown in Fig. 18 is provided with means for enabling it to be attached to the carrier of the drawing device and also with screws 38 and 39 for effecting adjustment. This spindle is fitted at its base with a holder 42, into which type of any suitable size can be inserted. The holder is represented in end elevation in Fig. 19.

The dimensions of the holder may be varied and different holders may be attached to the same spindle. Each holder is preferably secured by simply pushing the spindle into a hole therein, a stud 54 engaging in a groove

to insure the correct relative position. To enable the holders to be readily freed and removed, a thumb-nut 55 is provided.

When numbering is the only object in view, the devices represented in Figs. 30 to 32 may be substituted for the printing devices illustrated in Figs. 14 and 16, said numbering device being mounted on the carrier by means of the arms 41 and stud 40, as before explained with reference to the printing device, both devices being furnished alike in this respect.

The numbering device comprises (a) a milled head 27, provided with a sleeve 25, having a helicoidal lower edge 26; (b) a bar 24, carrying a rod 23, whose upper end is kept by a spring in contact with said surface or edge 26, by which a to-and-fro movement may be imparted to the rod by turning the head 27, this movement serving to rock a shaft 19 through a slotted crank 20, to which the rod 23 is coupled; (c) the numbering device proper, which is contained in a box 22, (broken away in Fig. 32 to show the interior,) said device consisting of numbering-wheels 21, loosely mounted on the shaft 19 and controlled by pawls. This numbering device does not differ materially from those now known, and its construction is not claimed as new.

The line drawing or ruling device, Figs. 13 and 13', is directly secured to the carriage G by means of the four-armed nut *v*. It comprises a base or platform 43, provided with a sleeve 44, within which slides a spindle 45, terminating at its upper end in a knob or head 46, while its lower end is fixed to a supporting-bracket 47, to which is secured an L-shaped bracket 49, adapted to carry the drawing-pen 50. The bracket 49 is pivoted on the screw 48 and supported by the screw 51, which passes through a slot in the lower part of the bracket 49 and enters the supporting-bracket 47. The sleeve 44 has two vertical slots in planes passing through the axis of the spindle 45 at right angles to each other. Within either of these slots the stud 53, projecting from the spindle 45, is adapted to slide. By means of the stud and slots the drawing-pen can be brought into either of two different positions, these two positions being at right angles to one another.

For the purpose of transferring the apparatus to any desired point of the map or plan to be printed upon the special device shown in Figs. 20 and 21 is provided. This device, which can be fitted to any well-planed drawing-board, consists of two guides *a''* and *a'''*, of steel, supported by plates *m*, secured to the table. A circular frame B'' is adapted to slide in the grooves *e''* and *e'''*. This frame is raised about five millimeters above the surface of the table, so as to permit the free passage under it—both in a longitudinal and a transverse direction—of a sheet of paper mounted on a plate or board. The apparatus first described is placed against lugs *r*, projecting within the crown of the frame, and

is secured in position by set-screws *s*. To enable the apparatus to be properly inserted, plates *u''*, marked with lines *u'''*, are provided. The screw *v'* serves to hold the frame *B''* in the desired position in relation to the guides between which it slides.

By pushing the knob 27 of the writing device the type-barrel is lowered sufficiently far for one of the type 21 to meet the surface of the inked roller 18. The writing device is thereupon caused to assume a vertical position. The knob 27 is then again pressed until the inked type, which for the time being is the lowest type contained in the drum or barrel, meets the surface to be printed upon. The impression which that surface receives will be that of the character or sign to which the index-hand 29 points on the knob 27. By means of the screws 12, 13, 16, and 17 the end of the rod *c''*, Fig. 12, of the indicator device 9 is adjusted until it takes up a position corresponding with the spacing required. After turning one of the milled plates or disks to the extent determined by the index-point a fresh impression can be made and the printing may thus be proceeded with as long as necessary, care being taken to keep the inking-roller supplied with ink.

It will be readily understood that any writing in straight or curved lines may in this manner be readily reproduced, it being merely needful for each succeeding letter, figure, or sign to move the index 29 on the disk or dial 27 up to the division corresponding to the desired character or mark. Any lines required can be drawn by means of the ruling device, which would take the place of the writing or printing device on the carriage *G*.

It will be understood that the apparatus described in my former patent, No. 484,262, is limited in its operation as compared with that of this application, which is adapted for drawing maps, plans, cards, and the like. I do not, however, claim broadly herein the bar *F* in the grooved guides *E* and *E'*, the writing or drawing device proper of Figs. 10 to 12, and the ruling and printing devices of Figs. 13 to 16, as these do not differ materially from those illustrated in my former patent.

All of the devices herein shown and described form part of a single apparatus, although the several auxiliary devices for printing, drawing, &c., are employed alternately according to requirements.

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

1. In an apparatus for the purposes specified, the combination with a suitable non-rotating bed, having in it a circular, ring-like guide, a frame fitting into said guide and having retaining-keepers, said frame adapted to be rotated in said guide, straight, parallel guides fixed on said rotatable frame, a transverse bar mounted at its ends in said parallel guides and having retaining-keepers, a car-

riage mounted on said transverse bar for carrying the writing, drawing, numbering and printing devices, and means for securing said transverse bar and said carriage in place when set, substantially as set forth.

2. An apparatus for the purposes specified comprising the non-rotatable ring *a'*, the circular frame *a*, mounted to turn in said ring, said ring having plates which engage a circumferential groove in said frame, the straight, parallel guides on said frame, the transverse bar *F*, mounted at its ends in said guides, the carriage *G*, mounted on said bar and adapted to be moved longitudinally thereon, means on said carriage for locking it to said bar, means carried by said bar for locking it to said guides, a device substantially as described for drawing or marking mounted on said carriage, and a securing mechanism for securing the said device removably to said carriage, all combined and arranged substantially as set forth.

3. An apparatus for the purpose specified comprising a transferring device substantially as described adapted to be mounted on a drawing board or table, and comprising two straight, parallel, fixed guides, a frame *B''*, mounted in said guides, and a ring *a'*, adapted to be secured to said frame, in combination with a circular frame *a*, mounted in the ring *a'*, keepers for retaining the frame *a* in said ring, straight parallel guides on said frame *a*, a transverse bar *F*, mounted in the last-named guides, a carriage *G*, mounted on the bar *F*, means for securing the bar *F* and carriage *G* in position when adjusted, and means for securing to said carriage a device for drawing or marking, all combined and arranged to operate substantially as set forth.

4. In an apparatus for the purpose specified, the combination with the longitudinally-grooved bar *F*, having in it the rack *f*, of the carriage *G*, grooved to fit on the bar, the upright spindle *r*, in the carriage *G*, provided at its lower end with a pinion to gear with the rack *f*, and the clamping-nut *v* on the upright portion of the carriage, substantially as set forth.

5. The combination with an open, circular, ring-like base to support the drawing, writing and printing devices, of the supporting-frame mounted and guided in said ring-like base and provided with two straight, parallel guides, a transverse bar mounted in said parallel guides, a carriage *G*, mounted on said bar and provided with means for securing the drawing, writing or printing devices thereto, and means for securing the said bar and carriage in place when set.

In witness whereof I have hereunto set my hand in presence of two witnesses.

ANGELO TESSARO.

Witnesses:

GIOVANNI VENUTI,
WILLIAM CHRIST.