

No. 690,815.

Patented Jan. 7, 1902.

F. ALBERINI, C. ANCHISE & L. G. CANCELLIERI.

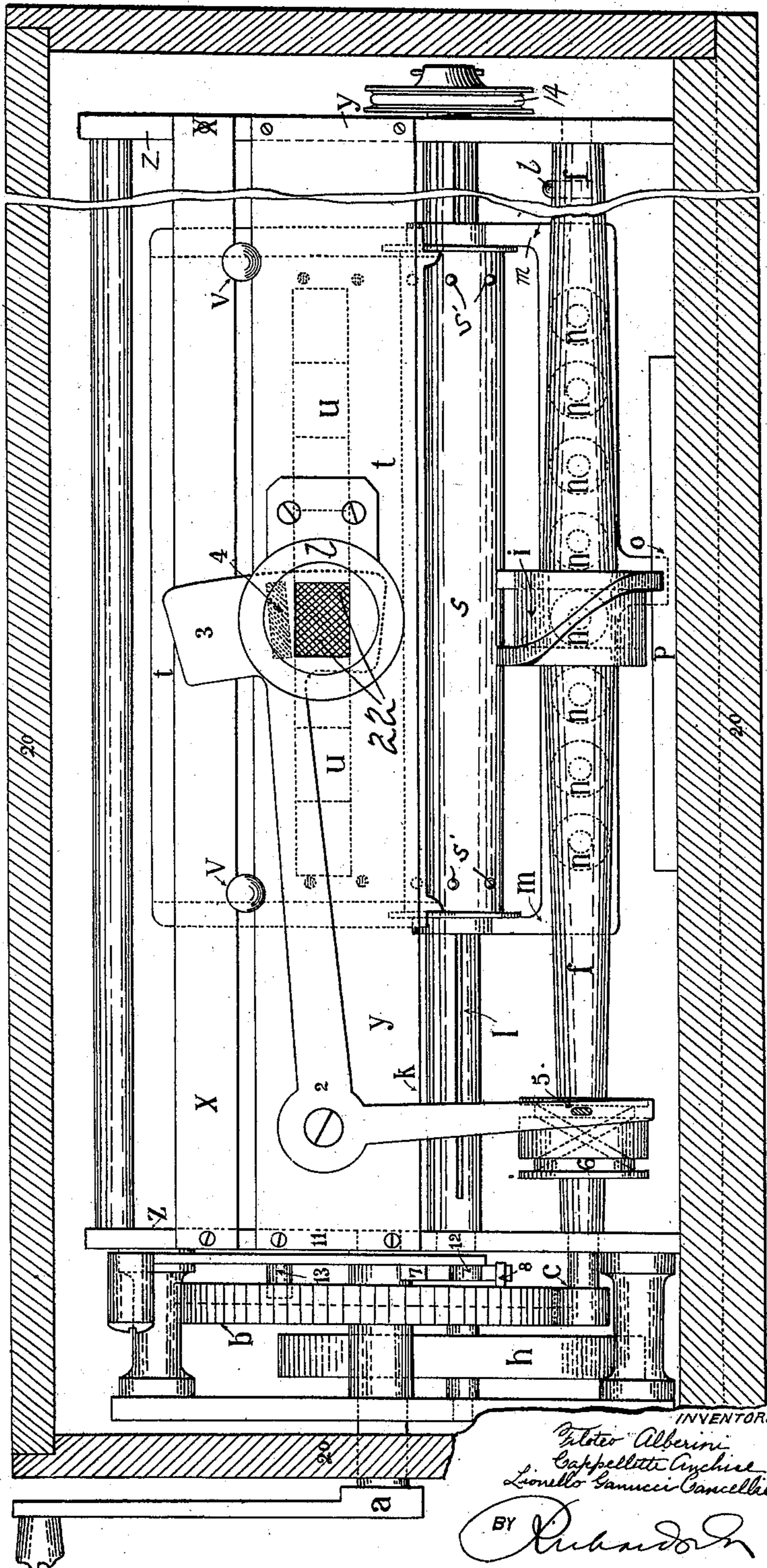
CINEMATOGRAPHIC APPARATUS.

(Application filed Oct. 18, 1899.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.



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Fig. 3.

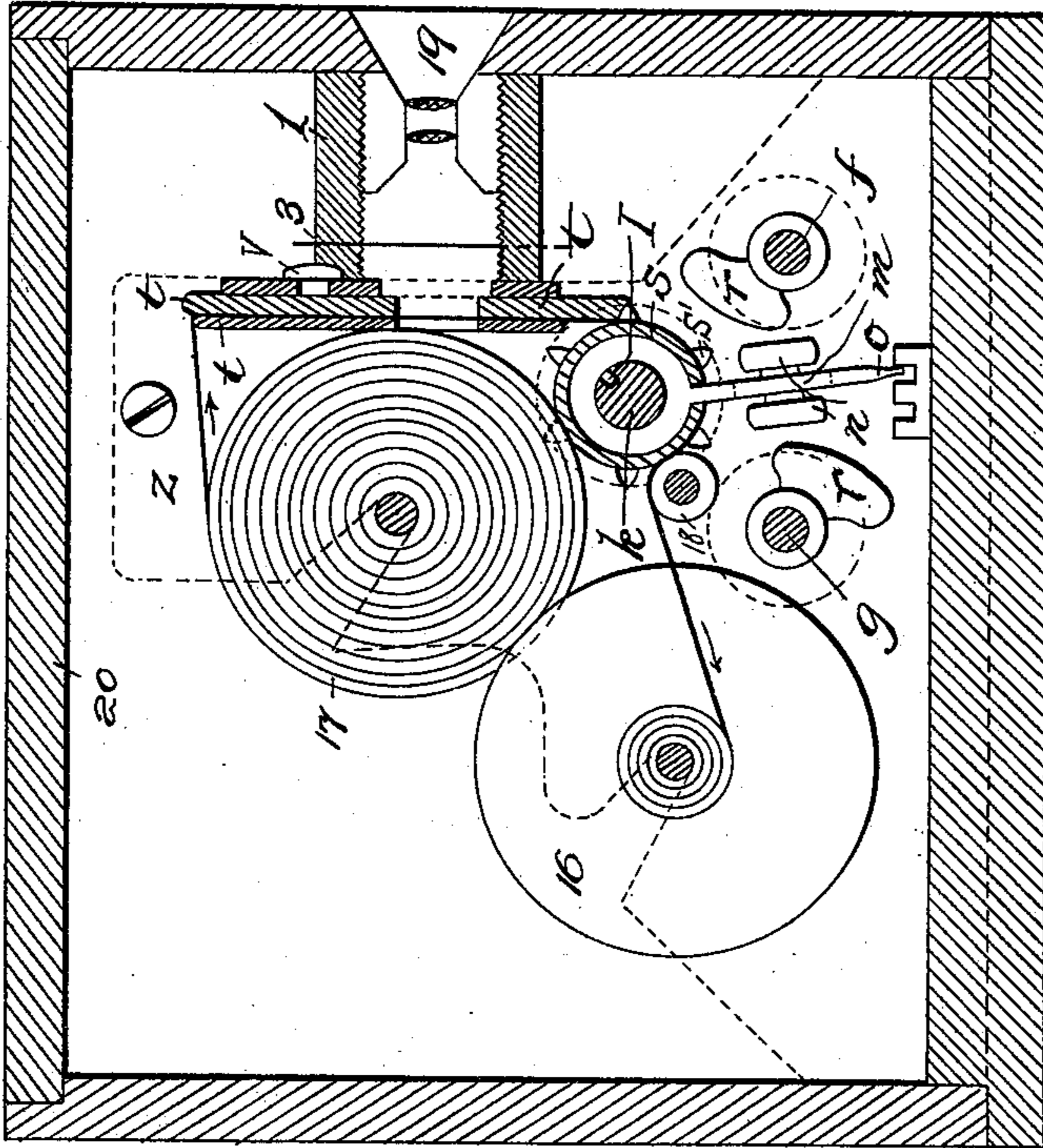
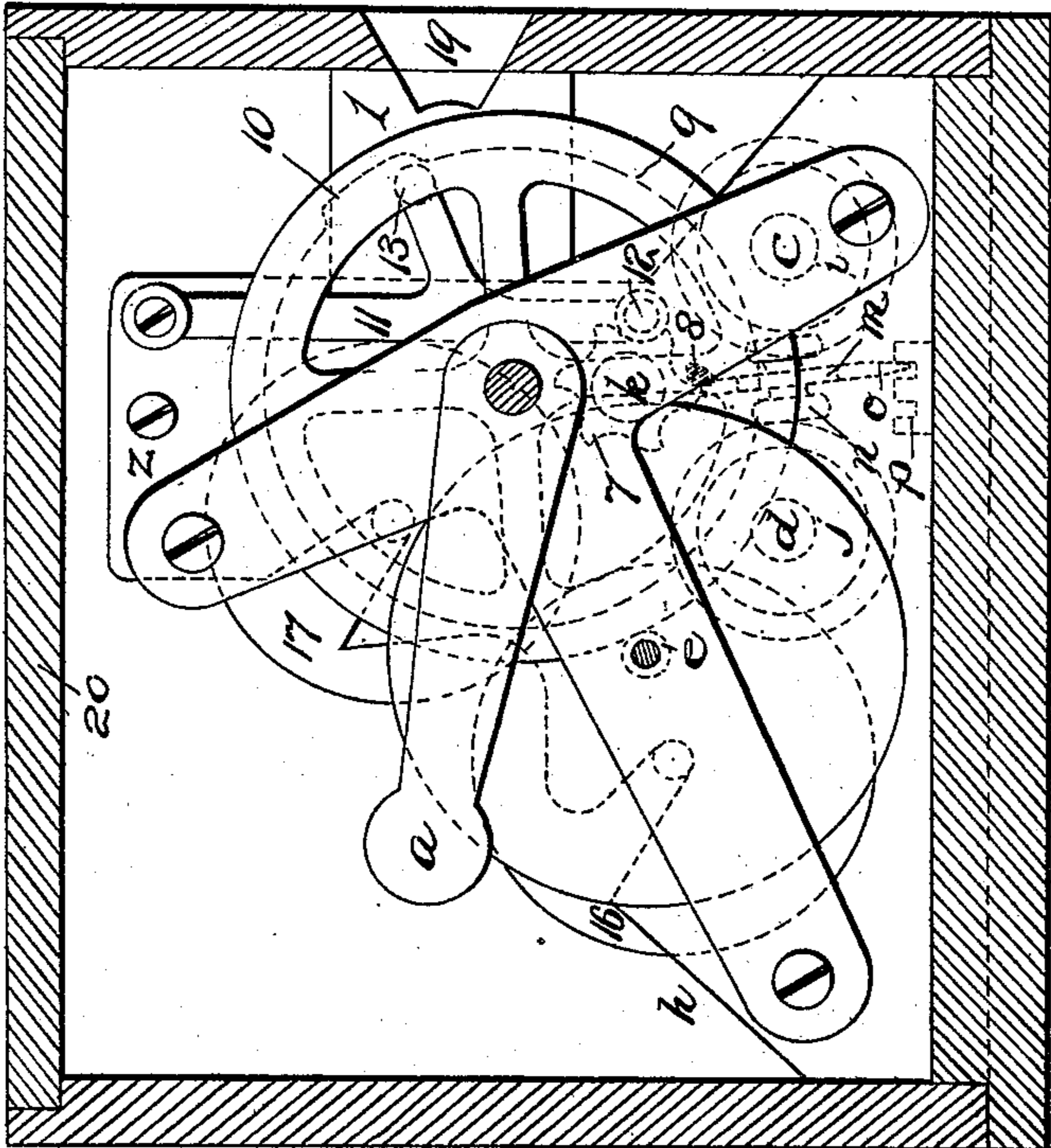


Fig. 2.



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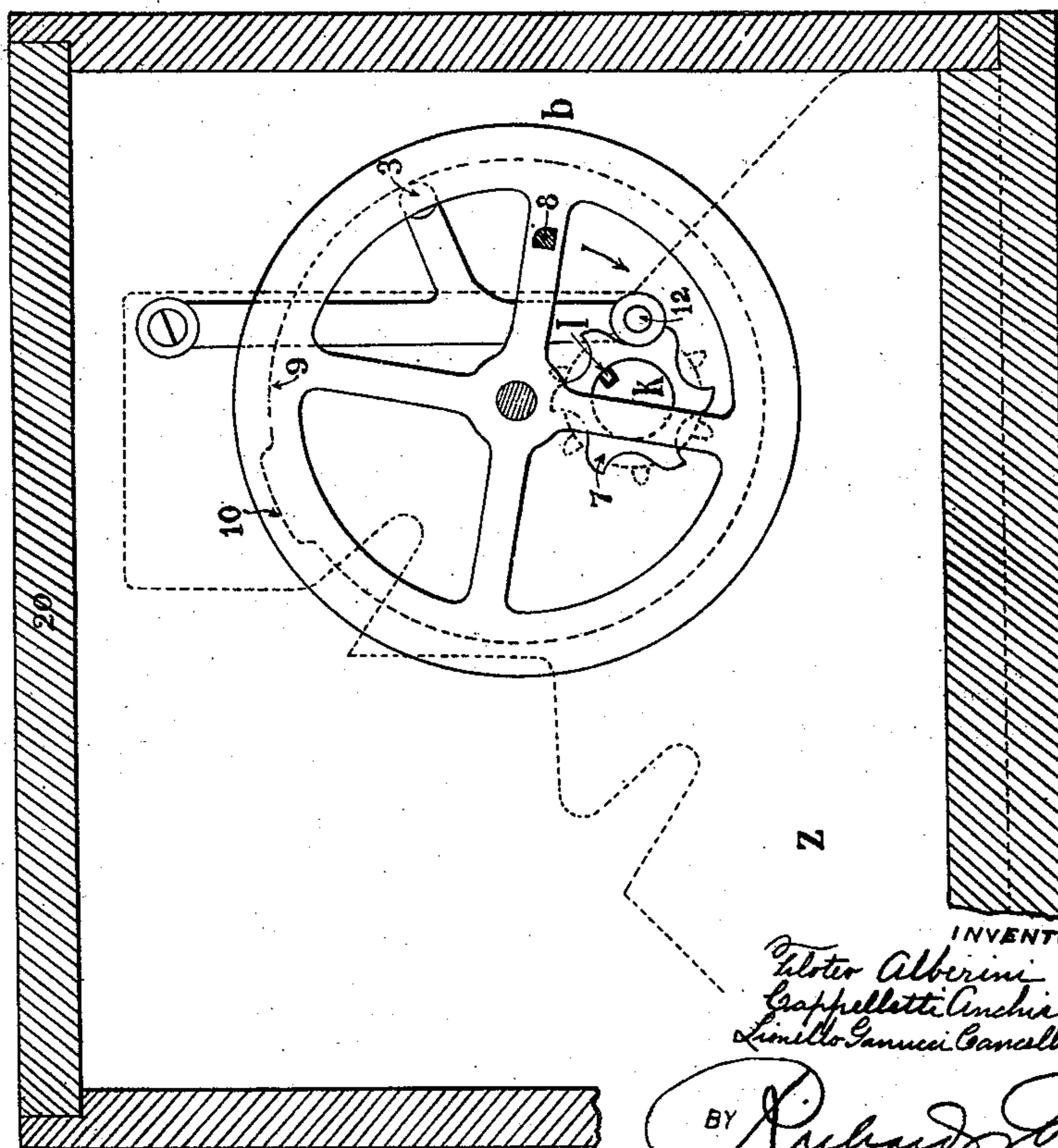
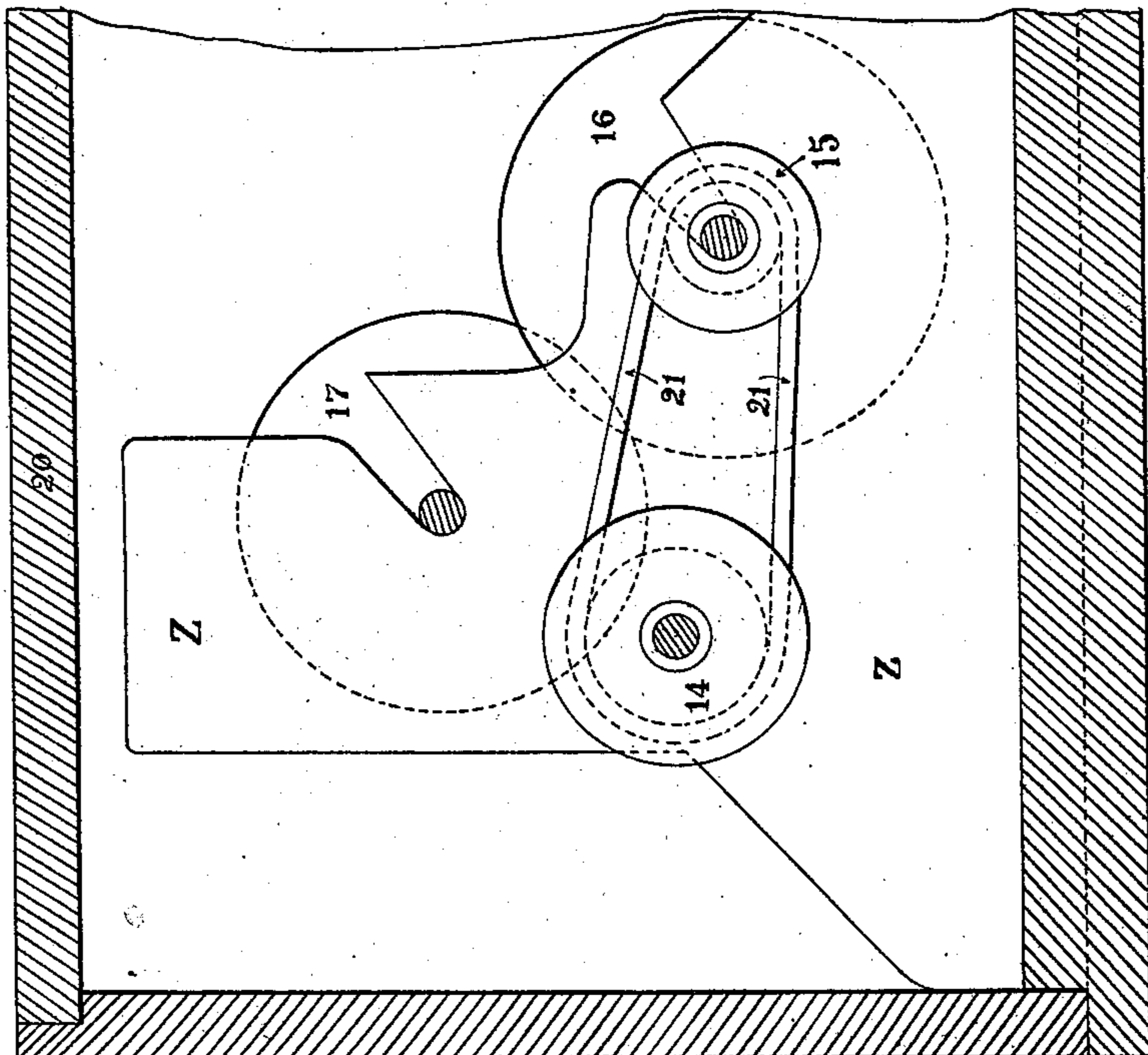
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

FILOTEO ALBERINI, CAPPELLETTI ANCHISE, AND LIONELLO GANUCEI-CANCELLIERI, OF FLORENCE, ITALY.

CINEMATOGRAPHIC APPARATUS.

SPECIFICATION forming part of Letters Patent No. 690,815, dated January 7, 1902.

Application filed October 18, 1899. Serial No. 733,944. (No model.)

To all whom it may concern:

Be it known that we, FILOTEO ALBERINI, CAPPELLETTI ANCHISE, and LIONELLO GANUCEI-CANCELLIERI, subjects of the King of Italy, residing at the city of Florence, in the Kingdom of Italy, have made certain new and useful Improvements in Cinematographic Apparatus, of which the following is a specification.

10 This chronophotographic apparatus is intended to render possible the arrangement of a series of photographic pictures with an alternating direction in the travel of the photographic film, the whole operation for winding and guiding the film taking place on a movable frame, which receives the necessary movement for the travel of the film from the main shaft, which travel is effected every time directly from the main shaft at the termination of one of the transverse movements. In
15 other similar apparatus the photograms follow each other throughout the whole length of the film, the width of which is occupied by the surface of each photogram, while in our apparatus they succeed each other in horizontal series—that is to say, normal to the edge of the length of the film—and parallel, and the number of photograms for each series is determined by the relation between the width
20 of the film and the field covered by each photogram. The application of this idea may be carried out by means of a suitable mechanism, which may vary according to circumstances and which may be susceptible of improvement. We give an example of this system of application in the apparatus represented in the accompanying drawings, in which—

Figure 1 is a longitudinal view; Fig. 2, a transverse section, and Figs. 3, 4, and 5 supplementary sections to that shown in Fig. 2.

40 The same letters and numbers indicate the same parts in the different figures.

The mechanism of this apparatus is composed of a crank *a*, which by means of the rotary movement imparted thereto either by hand or by any motive power actuates the toothed wheel *b*, with which gear the pinions *c d e*. The pinions *c d* transmit the rotary movement to the shafts *f g*, to which they are

connected, and the pinion *e* transmits it to the regulating fly-wheel *h*. On the middle of these shafts *f g* are fixed in the same position two tangential or intermittent endless screws *i j*, with a single thread and having their helices the one opposite to the other. These two
55 tangential screws are called “intermittent,” because their thread passes for one-third transversely and for two-thirds normally with the line of the shafts *f g*. Between the two centers of these latter and above is situated the main shaft *k*, in the length of which there is a groove *l*. Upon this shaft slides the movable frame *m*, on the under part of which and on the two sides are situated eight revolving cylinders *n*, which gear alternately with the
60 said tangential screws. The under part of the said frame *m* terminates in its center in a projection *o*, intended to slide alternately in the two grooves *p*, which are situated beneath. At one of the ends of the shafts *f g* and in opposite positions are situated eccentrics *r r*, which at each end of the travel of the frame *m* force the frame itself to engage alternately with the small cylinders in the tangential screws above described. On the shaft *k* also
70 travels the cylinder *s*, which is situated between the sides of the frame *m*, which has edges at its bases and which is provided with six small pins *s'* at each end, the object of which is to engage with the holes pierced in the edges of the photographic film and to regulate its tension with exactitude. In the inside the cylinder *s* is provided with a web, which engages in the said groove *l* of the shaft *k*. To the edges of this cylinder are connected a plate *t*, having a rectangular opening *u*,
85 kept in place by means of the knobs *v*, which slide between the two bars *x y*, fixed to the uprights *z* of the frame of the apparatus. To the lower bar *y* is fixed an objective-carrier 1, which terminates at its back side in a rectangular opening 22, serving to limit the size of each photogram. To this same bar *y*, at its center, is pivoted the bell-crank lever 2, the horizontal arm of which terminates in an obturator 3, provided with an opening 4, while the vertical arm carries a part 5, which is
95 caused to engage in the grooves of the cam 6,

situated beneath, and which is attached to the shaft *f*, already mentioned. These grooves run parallel for two-thirds of their course and for the other third transversely to the central intersection, so that the cam in its rotary movement compels the bell-crank to make an oscillating movement with pauses at the ends.

At one end of the main shaft *k*, and consequently quite close to the toothed wheel *b*, is fixed a small wheel having six teeth 7. A projection 8, fixed to the driving-wheel *b*, at each revolution of the latter encounters a tooth of the small wheel above mentioned, so as to cause it to be displaced one-sixth. With it are displaced the main shaft *k* and the cylinder *s*, with pins *s'*. Inside and near to its periphery the driving-wheel *b* carries a flange 9, which at the point 10 is recessed to a given extent. A lever with forked arms 11 centered to the upright *z* carries at its two ends a small revolving roller. One of these two small rollers (marked 12) bears in the space between two of the teeth of the small wheel 7. The other (marked 13) bears against the flange 9, so that in a complete revolution of the driving-wheel *b* the projection 8 will encounter one of the teeth of the small wheel 7, so as to cause it to make one-sixth of a turn, thus effecting a displacement of the lever 11, the small roller 12 of which will be disengaged from the teeth by the fact that the other roller 13 will have reached the recess at point 10 of the said flange 9. Immediately the point 10 has passed the roller 12 will again engage the space between two successive teeth of the wheel 7, while the other, 13, will be slightly depressed by the flange 9, so that the toothed wheel 7 will find itself unable to move. The pulley 14, fixed to the other end of the main shaft *k* by means of a cord 21, transmits the movement to a second pulley 15, to which is connected the pinion 16, serving to receive the photographic film already exposed to the light. The pinion 17 carries the photographic film intended to receive the impression. This film passes from this pinion between the plate and the counterpart *t*, afterward engages the small pins of the cylinder, and by making a bend over the support 18 proceeds to engage the said receiving-pinion 16.

When once the apparatus is put in operation, so that the frame *m* is situated at the end of its travel, and taking as a basis one revolution of the driving-wheel *b*, which is in the proportion of one to eight to the pinions *c d*, all the other parts will operate as follows, viz: First, the tangential intermittent screws *ij* will make eight revolutions, and consequently the frame *m*, which engages with the small cylinders *n* in the forward tangential screw, will make a forward intermittent travel; second, the cam 6 also will make eight revolutions, producing as many passages of the obturator 3 behind the objective 19, and consequently a series of eight photo-

graphic impressions will be produced on the film; third, at the eighth turn of the shaft *f* the eccentric *r* will encounter the frame *m* and will suffice to cause it to engage with the other tangential screw, which, as has been stated, having its helicoidal thread opposed to that of the forward screw will compel the frame to make an intermittent backward travel, and, fourth, at the same time as the said passage of the frame *m* is effected the cylinder with pins *s'* will be displaced for one-sixth, and this in regard to the movement already described produced by the projection 8, the small toothed wheel 7, and the lever 11. With such a perfect connection of the parts described and by actuating the apparatus provided with a photographic film of any length upon such film there will be produced as many continuous series of photographic pictures as the film can receive.

In the apparatus described, and shown in the drawings, series each of eight photograms have been adopted; but this number may vary as much as desired.

What we claim as our invention in our application for patent is—

1. In combination, the cylinder for moving the film, a frame carrying the cylinder and arranged to move in a direction longitudinally of the cylinder, a shaft to which the cylinder is splined, means for rotating the shaft intermittently, means for automatically reciprocating the frame carrying the cylinder and means for intermittently exposing the film, substantially as described.

2. In combination, the cylinder for the film, the shaft to which the cylinder is splined, a frame movable in a direction longitudinally of the cylinder to shift the same, said frame being arranged to have swinging movement in a direction laterally of the cylinder, means for giving the cylinder a longitudinal reciprocating movement including devices for swinging the frame laterally and means for giving to the shaft of the cylinder an intermittent rotary motion, substantially as described.

3. In combination, the cylinder for the film, a shaft to which the cylinder is splined, means for giving the shaft an intermittent rotary movement, a frame arranged to move in a direction longitudinally of the cylinder to shift the same and having movement laterally of the shaft, the shafts *f, g*, the cams *i* on said shafts for engaging portions of the frame and eccentrics on said shafts for swinging the frame at the end of its longitudinal movement in either direction, substantially as described.

4. In combination, the cylinder for the film, a shaft to which the cylinder is splined, means for rotating the shaft intermittently, a frame carrying the cylinder, the cams for moving the frame longitudinally, back and forth, the shafts for the cams, a cam 6 on one of the

shafts and an arm carrying a shutter and arranged to be operated by the said cam; substantially as described.

5 In combination, the cylinder for moving the film, means for reciprocating said cylinder lengthwise step by step, a plate movable lengthwise with the cylinder and having an opening, and a shutter with means for operating the same, substantially as described.

In witness whereof we have hereunto set our hands in presence of two witnesses.

FILOTEO ALBERINI.

CAPPELLETTI ANCHISE.

LIONELLO GANUCEI-CANCELLIERI.

Witnesses:

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SPIRITO BERNARDY.