

(Model.)

J. B. CROCKER, Jr. & B. FRESE.

PANTOGRAPH.

No. 246,663.

Patented Sept. 6, 1881.

Fig. 1.

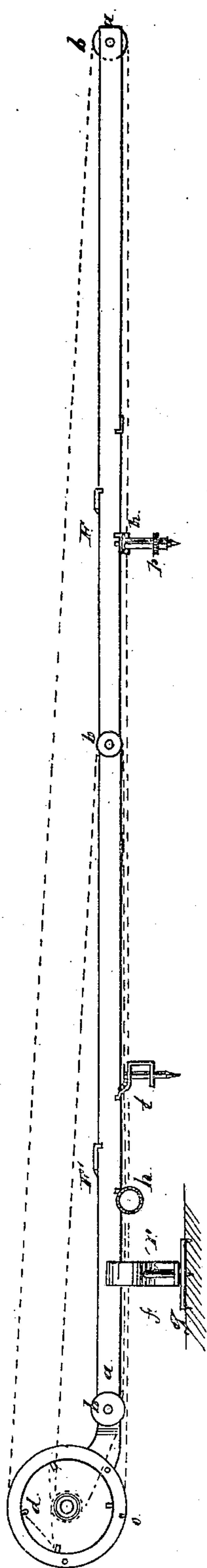


Fig. 2.

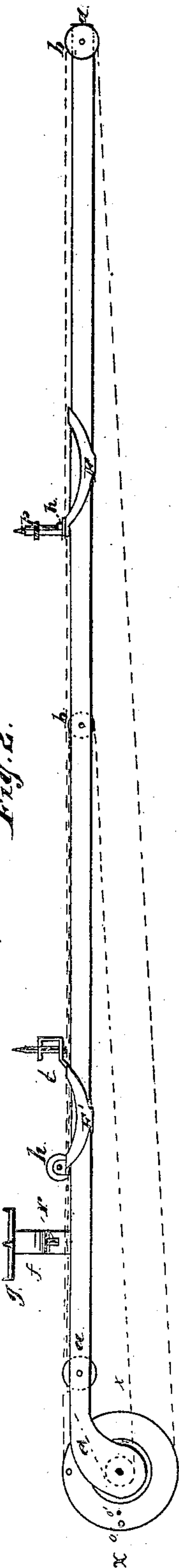


Fig. 3.



Fig. 4.

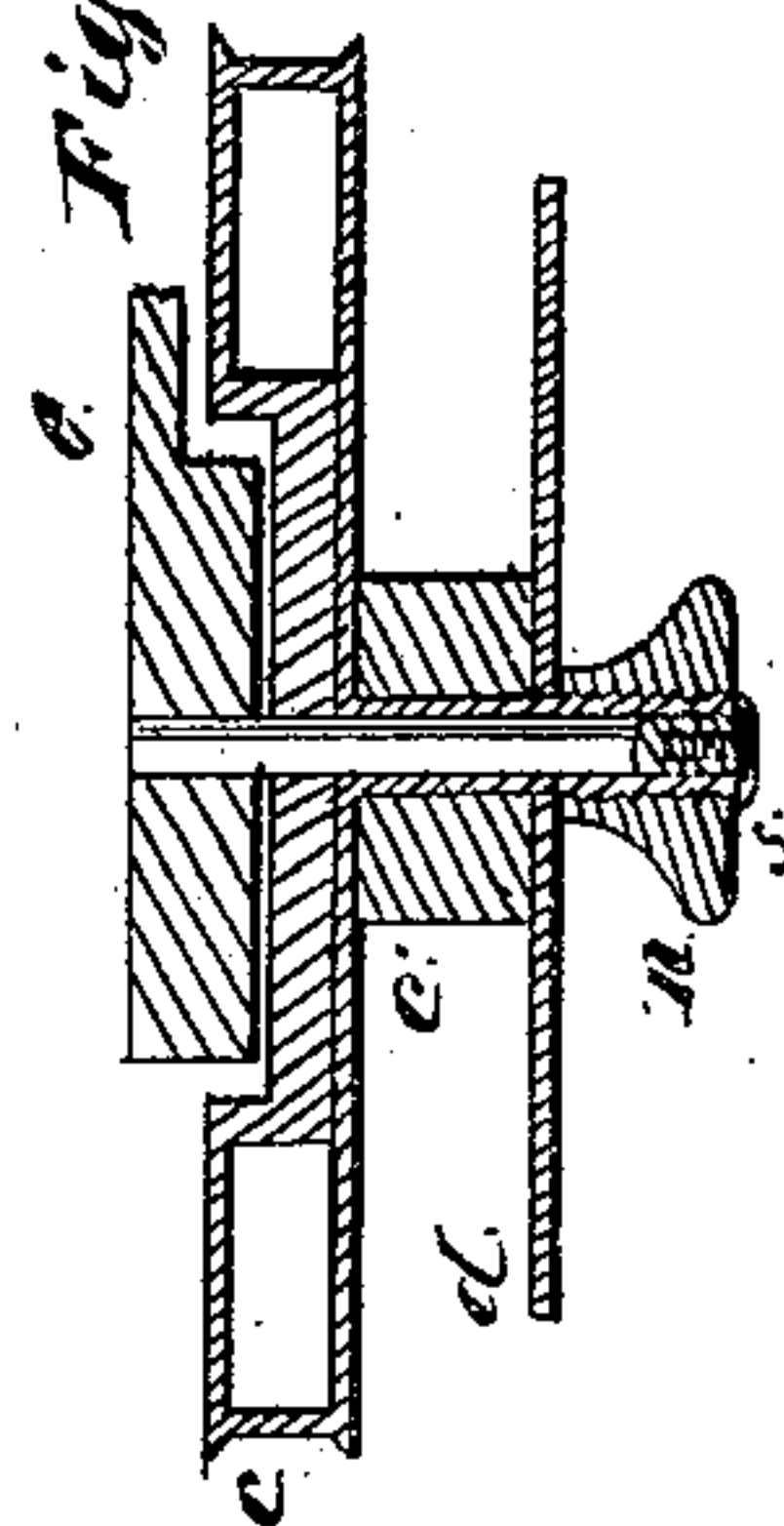
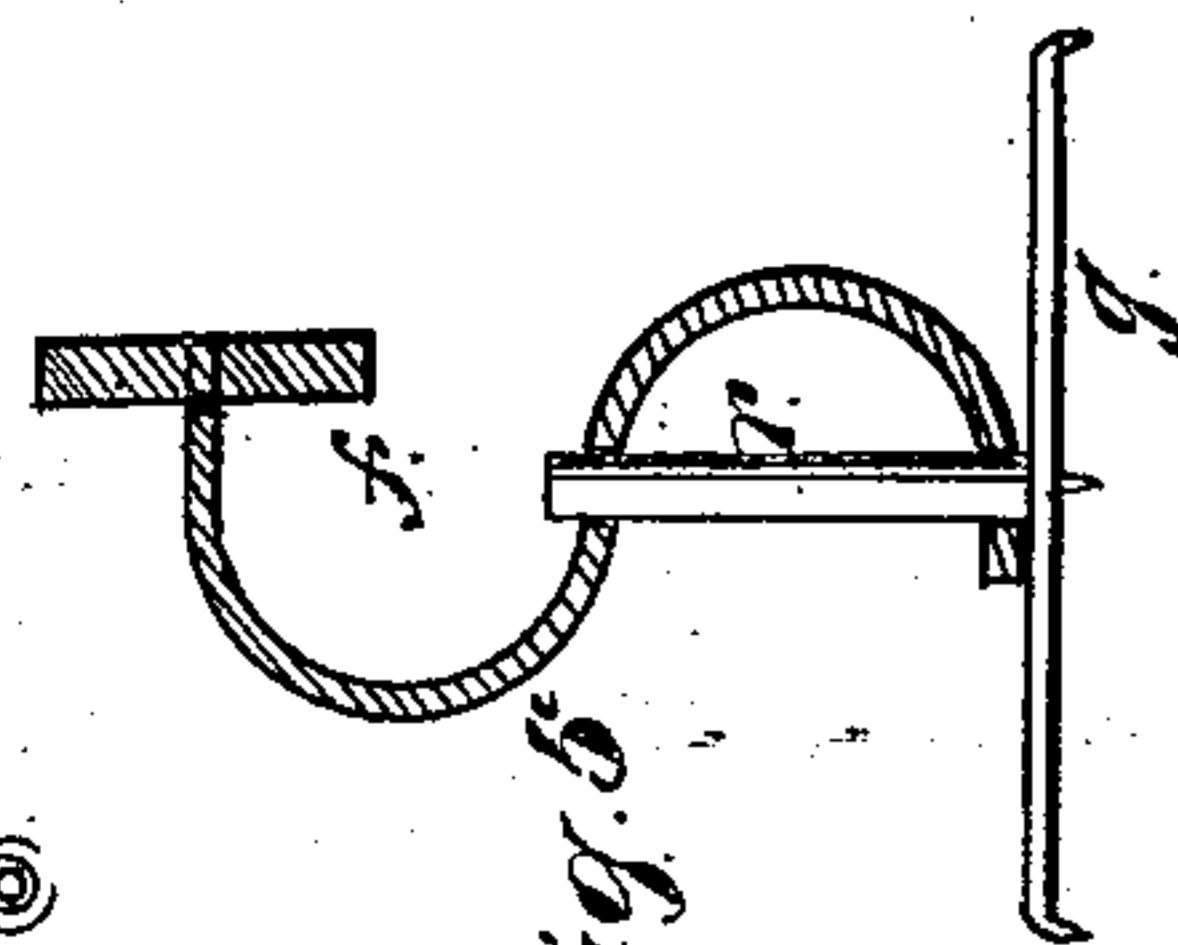


Fig. 5.



Witnesses:

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# UNITED STATES PATENT OFFICE.

JAMES B. CROCKER, JR., AND BERNARD FRESE, OF CHICAGO, ILLINOIS.

## PANTOGRAPH.

SPECIFICATION forming part of Letters Patent No. 246,663, dated September 6, 1881.

Application filed November 13, 1880. (Model.)

*To all whom it may concern:*

Be it known that we, JAMES B. CROCKER, Jr., and BERNARD FRESE, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Copying-Machine, of which the following is a specification.

Our invention relates to machines for copying and enlarging or reducing given shapes by means of either a tracing-point and pencil or a guiding-point and cutter.

The object of our invention is, first, to provide a mechanism by means of which numerous copies of outlines can be made at one operation; and, second, to avoid inaccuracy by dispensing with joints and many connections. We attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a front view of the machine. Fig. 2 is a reverse view of the same. Fig. 3 is a top view of the same. Fig. 4 is an enlarged sectional view of the pulleys on line *xx* of Fig. 2. Fig. 5 is a cross-section at the fulcrum of the machine.

Similar letters refer to similar parts throughout the several views.

Our machine consists of a parallel strip or frame, *a*, pivoted on a support, *g*, by means of a frame, *f*, fastened to the frame *a*, and a fulcrum-pivot, *r*, fastened to the support *g*. An extension, *e*, on which two flat-faced separable pulleys, *cc'*, held firmly together by means of a nut, *n*, and a washer, *d*, are supported on a pivot, on which they revolve freely, and are retained by a screw, *s*; two cords, wires, or chains, fastened with their ends to the faces of each of the pulleys *cc'*, and led over grooved pulleys *bbb*, and two sliding carriages, *FF'*, one of which is provided with a tracing-point, *t*, and the other with a marking-point or cutter, *p*, and both provided with clamping-screws *h*. The sliding carriages *FF'* are formed so that when the points *tp* are removed and the frame *a* is removed from the pivot *r* they can be slid together, so that the two holes from which the points were removed and the hole from which the fulcrum-pivot was removed will be in a vertical line. The cords are of sufficient length to contain the length of the frame *a* wound on the large pulley and a proportionate length on the small pulley. The ends of the cord on the pulley *c* are fastened on each side of the same. One end of the cord wound on the pulley *c'* is fastened to the pulley *c* and

the other to the washer *d*, so that when the nut *n* and washer *d* are removed and the pulley *c'* changed for a larger or smaller one, the slack of the cord may be wound on the pulley by turning the washer before binding it tight with the nut *n*. The pulleys *c* and *bbb* are placed so that one side of each cord will be stretched parallel with the frame *a*. The carriages *FF'* are clamped to the cords on the pulleys *cc'* when the under side of the cord is wound on the pulley, and the carriages placed so that the holes from which the points *p t* were removed are in a vertical line with the fulcrum *r*. When thus fastened and the carriages are moved out on the frame the cords will unwind on the under side and wind on the upper side of the pulleys.

For copying pictures the tracing-point *t* has a vertical sliding motion, which secures constant contact with the surface of the picture to be copied. The pencil-holder *p* is screwed to the carriage *F*, and consists of a split tube and a sliding collar. On moving the point *p* the pulleys *cc'* will be revolved by the cord attached to the carriage *F* and pulley *c'*, and the carriage *F'* will be moved at the same time by the cord on the smaller pulley; but the carriage *F* will move at a proportionate greater speed than the carriage *F'*, this proportionate speed being correlated to the proportionate diameters of the two pulleys *cc'*. Having thus secured a uniform relative linear motion of the two points proceeding from a fulcrum, it is evident that the circular motion required to lead the points to all directions is of the same proportionate increase or decrease, and thus a correct copy of a picture or of any given surface shape may be reproduced in larger or smaller size.

We have shown our invention as adapted for copying drawings; but we do not restrict ourselves to this adaptation only. It is evident the same may be adapted to numerous other uses in making copies.

It is also evident that more than one frame may be extended from the same fulcrum, and that the carriages on the same may be moved by a single pulley by leading cords to them that are stretched by pulleys parallel with each frame, and that in this way many copies may be made at one time and of different sizes.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. A frame supported on a fulcrum and pro-

vided with two or more carriages sliding to-  
ward and from the fulcrum, which carriages are  
connected by stretched cords, wires, or chains to  
pulleys pivoted on the frames, by the relative  
5 diameter of which the relative travel of the  
carriages is governed, all for the purpose of  
making copies of or reproducing enlarged or  
reduced given outlines by tracing a point or  
its equivalent on one of the carriages over, on,  
10 or in such outlines.

2. In a machine for making copies, the frame

*a*, pivoted on a support, *g*, the pivoted pulleys  
*c c'*, having the two ends of cords attached to  
them, the pulleys *b b b*, and the frames *F F'*,  
having points *t* and *p* attached, all constructed 15  
as shown and described.

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Witnesses:

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