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PATENTED DEC. 1, 1903.

W. A. GRAY.
SPACING MACHINE.
APPLICATION FILED DEC. 1, 1902.

NO MODEL.

3 SHEETS—SHEET 1.

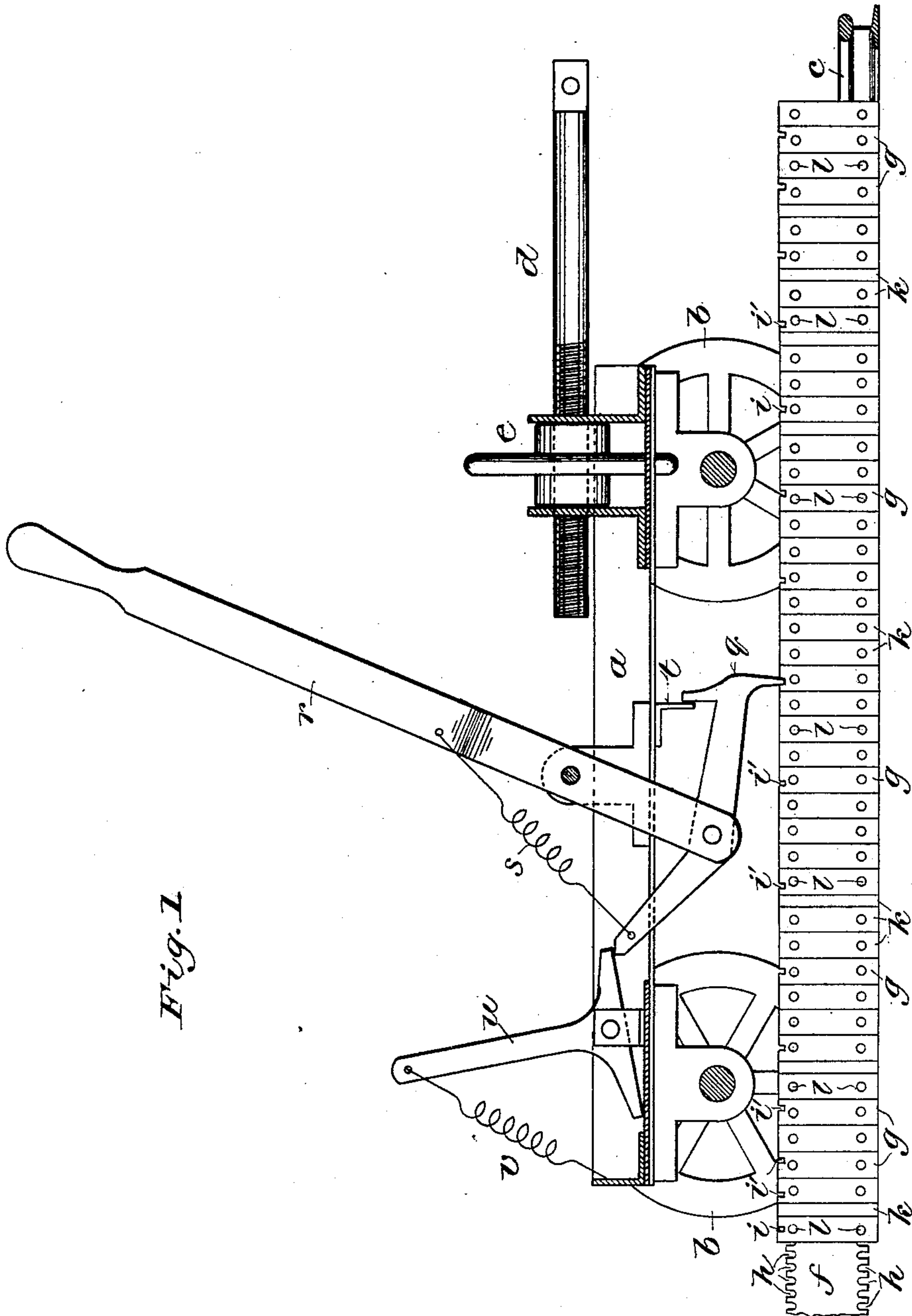


Fig. 1

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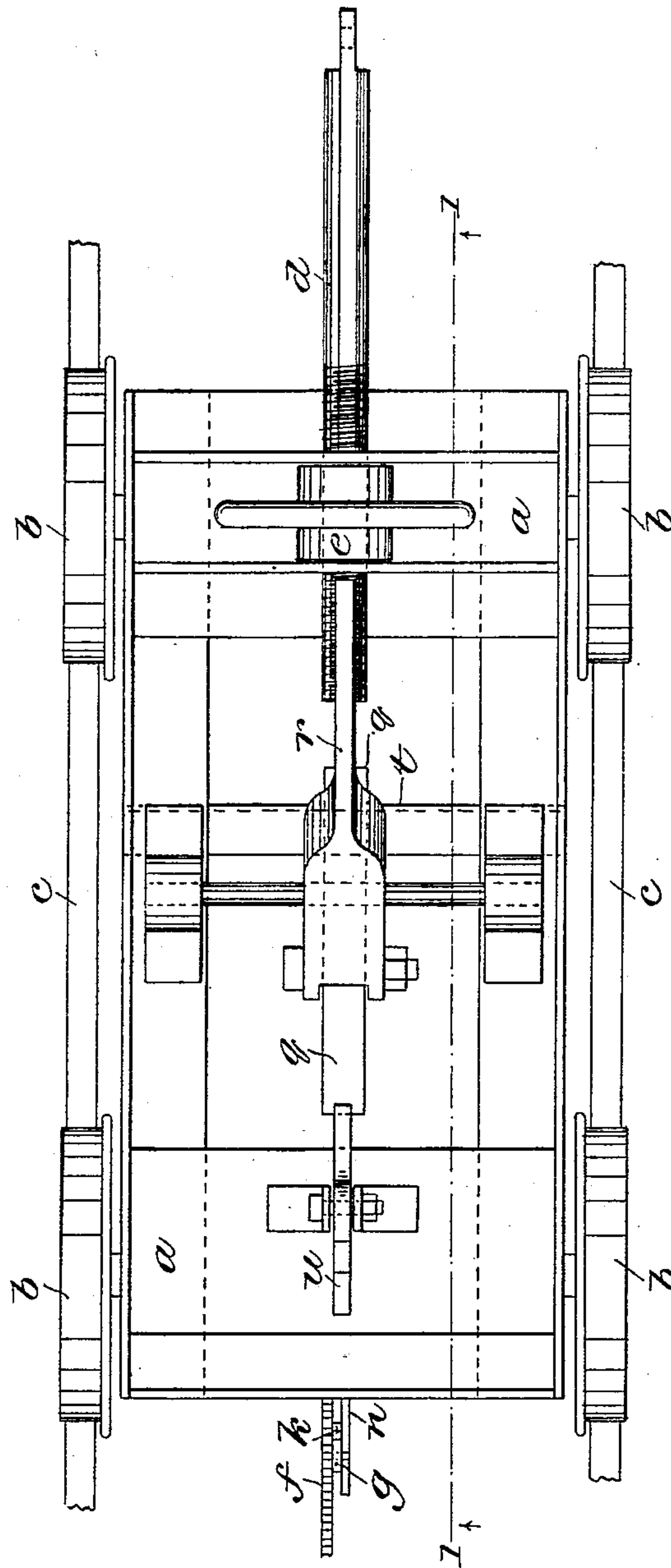
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SPACING MACHINE.

APPLICATION FILED DEC. 1, 1902.

NO MODEL.

3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 3.

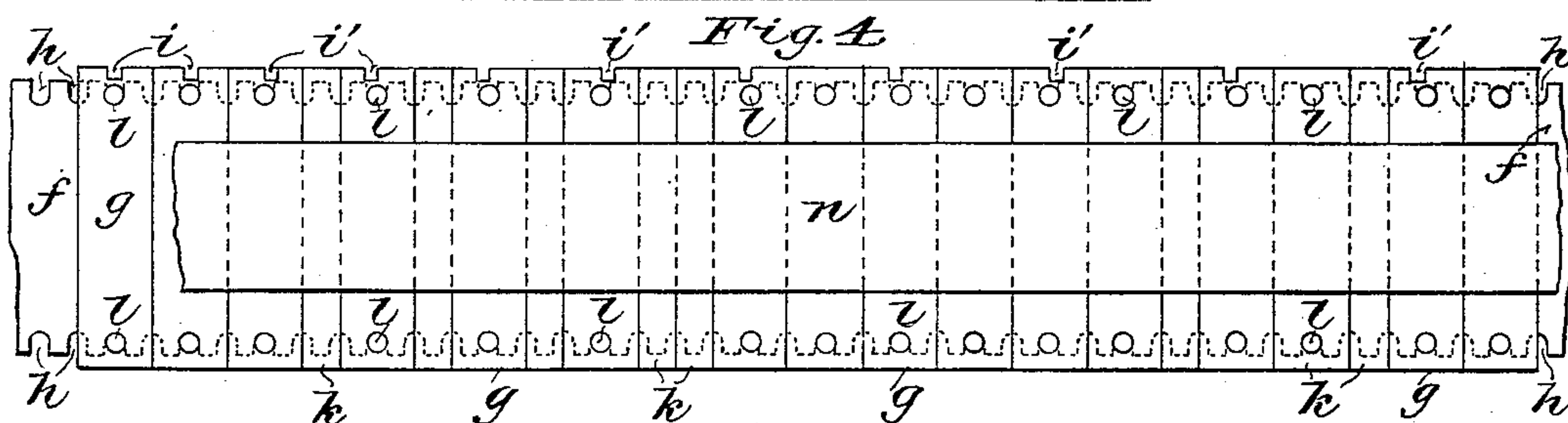
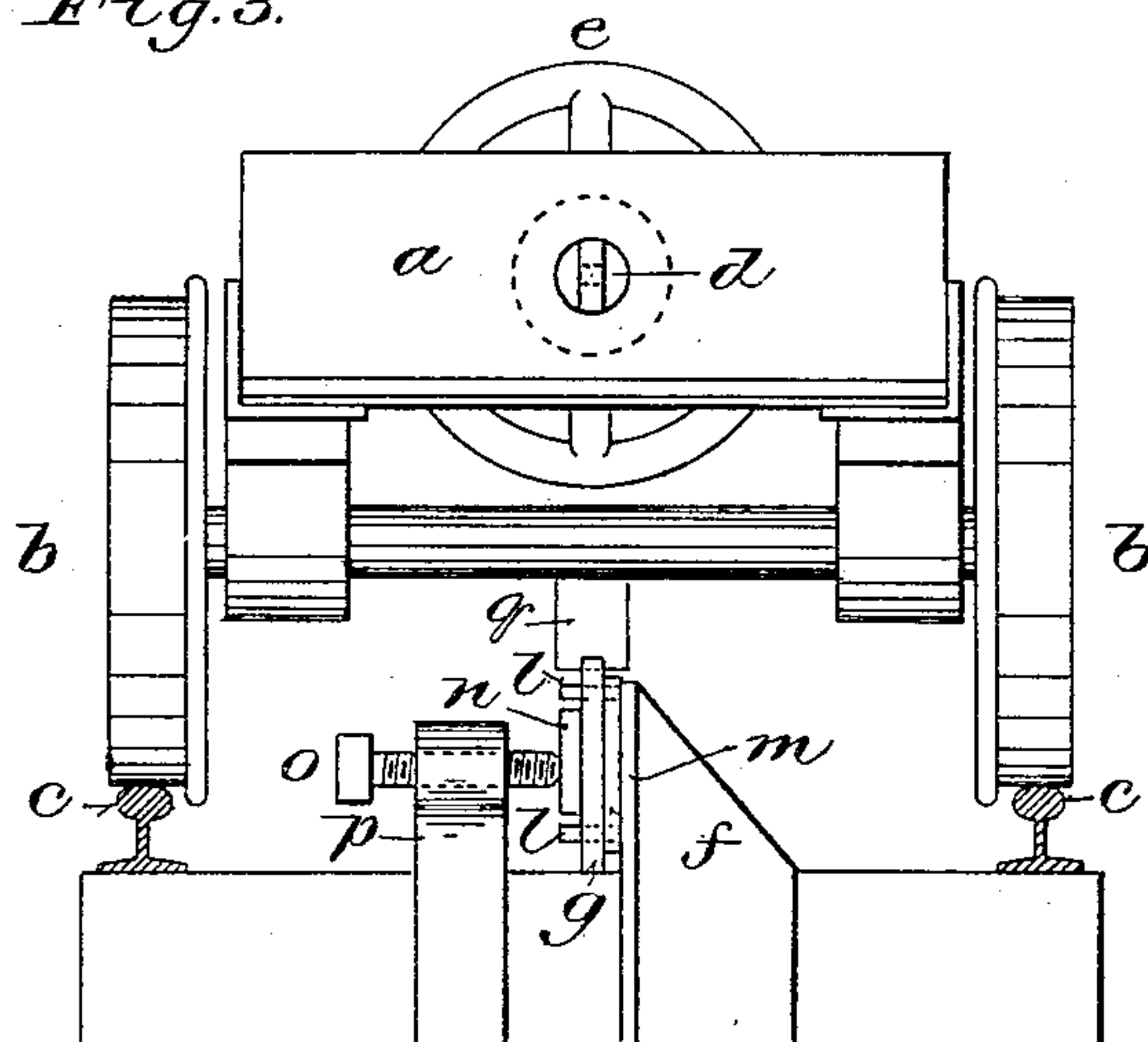
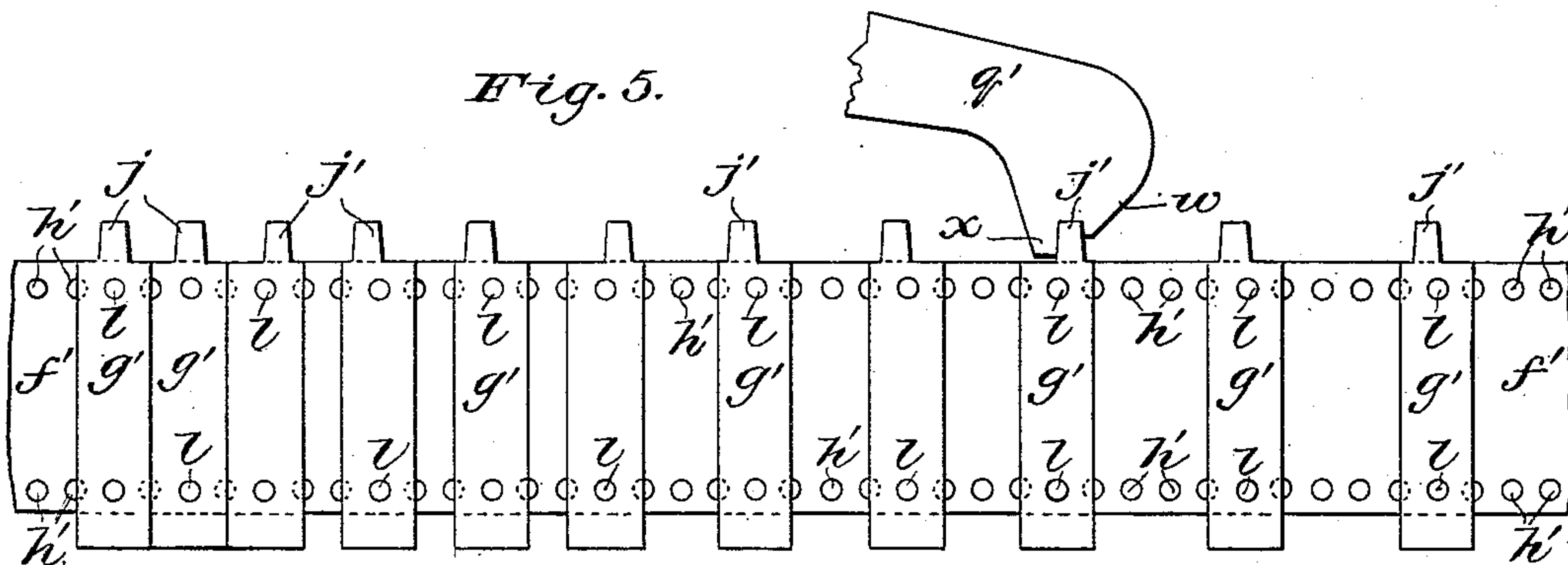


Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLARD A. GRAY, OF MILWAUKEE, WISCONSIN.

SPACING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 745,723, dated December 1, 1903.

Application filed December 1, 1902. Serial No. 133,328. (No model.)

To all whom it may concern:

Be it known that I, WILLARD A. GRAY, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Spacing-Machines, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

This invention relates to machines designed to feed work—such, for example, as structural iron—to punches, drill-presses, or other tools in which it is desirable to advance the work or material to be operated upon by predetermined intervals.

The main objects of the invention are to provide simple and effective means for varying the spacing of the machine according to the requirements of different kinds of work and generally to simplify and improve the construction and operation of machines of this class.

It consists in certain novel features of construction and in the arrangement and combinations of parts hereinafter particularly described, and pointed out in the claims.

In the accompanying drawings like letters designate the same parts in the several figures.

Figure 1 is a vertical longitudinal section on the line 1 1, Fig. 2, of a machine embodying the invention. Fig. 2 is a plan view of the same. Fig. 3 is an end elevation as viewed from the right with reference to Figs. 1 and 2. Fig. 4 is an enlarged view of one form of adjustable rack constituting a part of the machine, and Fig. 5 is a similar view of a modification of the rack with a portion of the carriage-detent which works therewith.

Referring to Figs. 1, 2, and 3, *a* is a work-feeding carriage, which in the present case is shown as consisting of a frame mounted on trucks having flanged wheels *b*, which run and are guided on track-rails *c*. The carriage is provided with suitable means for attaching the work thereto—as, for example, a screw-threaded rod *d*, adjustably connected with the carriage-frame by a nut *e*. Parallel with the track-rails *c* or the way on which the carriage travels is an adjustable rack consisting of a bar or plate *f* and blocks or lugs *g*, adjustably mounted thereon. The bar or plate *f* is formed or provided with uniformly-

spaced stops arranged lengthwise thereof. These stops may consist of notches *h*, formed in the upper and lower edges of the bar or plate *f*, as shown in Figs. 1 and 4, or of holes *h'*, as shown in Fig. 5.

The blocks or lugs *g* are each provided at one or both ends with stops for engaging a pawl or detent on the carriage and determining the advance movement of the carriage, as hereinafter explained. These stops may consist of notches *i* or *i'*, as shown in Figs. 1 and 4, or of teeth *j* or *j'*, as shown in Fig. 5. With the notched bar or plate *f* (shown in Figs. 1 and 4) spacing blocks or lugs *k* of the same length or vertical dimension as the blocks or lugs *g* are used to afford a continuous unobstructed bearing for the tooth or point of the pawl or detent on the carriage to ride upon between adjacent notches *i* or *i'*. In case a perforated bar *f'* like that shown in Fig. 5 is employed the spacing-blocks *k* are unnecessary, the upper straight edge of said bar affording a bearing for the pawl or detent to ride upon between the teeth *j* or *j'*. The blocks or lugs *g* or *g'*, with the intermediate spacing-blocks *k*, may be held in place when arranged and adjusted as desired by means of bolts or pins *l* passing through them and the notches *h* or holes *h'* and may be secured with the bar or plate *f* or *f'* to a fixed beam *m*, parallel with the track-rails *c*, by means of a clamping bar or plate *n* and screws *o*, threaded in fixed supports *p* opposite the beam *m*, as shown in Fig. 3.

The carriage is provided with a pawl or detent *q*, movable lengthwise thereof and adapted to be engaged with the notches or stops *i* and *i'* in the lugs *g* and thereby determine the intervals by which the carriage is advanced. This pawl or detent may be pivoted to the lower end of a lever *r*, which is fulcrumed on the carriage and serves to advance the pawl or detent from one notch to another and may also serve to advance the carriage and work by hand and to control their movement. A spring *s*, connecting the tail of said detent with said lever, tends to hold the point or tooth of the detent in engagement with the rack. A stop *t* is provided to limit the backward movement of said detent at a fixed point. A trip-lever *u*, fulcrumed on the carriage and retracted by a spring *v*, bears

against the tail of the detent q when it is at the limit of its backward movement and serves to disengage said detent from the rack.

With the modified form of rack shown in Fig. 5 the pawl or detent q' is made with a beveled nose w and a notch to ride over and automatically engage with the teeth j and j' on the lugs g' . It is also made with a projection x behind the notch to bear on the upper edge of the bar f' while the detent is passing from one tooth to another.

To provide for a small variation in spacing without bringing the notches or holes h or h' in the bar f or f' too close together, the stops on some of the lugs g or g' may be offset or eccentrically arranged. For example, the notches i' , as shown in Fig. 4, may be located one-eighth of an inch from the centers of the lugs g . Assuming that the notches h in the bar f are three-fourths of an inch apart, the lugs g , having centrally-located notches i , may be arranged on the bar f , so that said notches will be three-fourths of an inch or any multiple of three-fourths of an inch apart. With the lugs g having the notches i' offset or eccentrically arranged the aforesaid intervals or spaces may be increased or diminished by one-eighth of an inch. As shown in Fig. 4, the lugs g are arranged for the following intervals or spaces from left to right: one and one-half, one and five-eighths, two, two and one-fourth, two and one-half, two and three-fourths, three, three and one-fourth, three and one-half, and three and three-fourths inches. For the wider or longer spaces the spaces between the lugs g are filled in by spacing-blocks k , which may be made of different widths corresponding with the spaces between the notches h —as, for example, three-fourths of an inch and multiples thereof. The wider spacing-blocks may, like the lugs g , be provided with pins l to assist in holding them in place. When arranged as shown in Figs. 1 and 2, it will be seen that the upper ends of the lugs g and of the spacing-blocks k form unbroken bearings for the nose or point of the detent q to ride upon between the notches i and i' .

With the form of rack-bar shown in Fig. 5 the spacing-blocks are dispensed with, the projection x on the detent q' extending laterally over the upper continuous edge of the bar f' , so as to carry said detent in operative position between the teeth j and j' .

Assuming that the holes h' in the bar f' are spaced three-fourths of an inch apart, the same as the notches h in the bar f , and that the teeth j' are offset one-fourth of an inch from the centers of the lugs g' , the spaces between the teeth on the lugs arranged as shown in Fig. 5 will be as follows from left to right: one and one-half, one and three-fourths, two and one-fourth, two and three-fourths, two and one-half, three, three and one-half, three and one-fourth, and three and three-fourths inches.

In both forms of the rack-bar the lugs may

be reversed—that is, either side may be placed against the bar f or f' —so that the amount that the notches i' or teeth j' are offset from the center of the lugs may be either added to or subtracted from the spaces on either side of such notches or teeth as may be desired.

The lugs g may be provided with notches similarly or differently arranged at both ends, and the lugs g' may in like manner be provided with teeth at both ends, so that by inverting some or all of the lugs a wider range of adjustment or spacing may be obtained with any given number of lugs.

The machine operates as follows: The work being bolted or otherwise attached to the bar d and adjusted by means of the nut e , so that the machine to which the work is to be fed will operate thereon at exactly the desired point for starting, the carriage a being set at the proper point and its detent q engaged with the first notch or tooth at the left of the series to be used while the work is held by the punch, drill, or other tool in its first operation thereon, the detent q or q' is disengaged from the spacing-rack and advanced by the lever r or other means into engagement with the next notch or tooth. As soon as the work is released it is moved forward with the carriage a by means of the lever r or other suitable means till it is arrested by the stop t . The punch, drill, or other tool then operates again upon the work, holding it in place while the detent q or q' is advanced into engagement with the next notch. These operations are thus repeated, the work being advanced by intervals or spaces exactly corresponding with the spaces between the notches or teeth i or j till the series of operations thereon is completed. The carriage a is then withdrawn to the starting-point and another piece of stock or material is attached thereto and fed forward in the manner above explained.

Any suitable means other than the hand-lever r —such, for example, as a power connection—may be employed to move the carriage and work forward when released by the detent q or q' , and various changes may be made in details of construction and arrangement of parts, particularly with respect to the carriage, without departing from the principle and intended scope of my invention.

I claim—

1. In a spacing-machine the combination of a rack comprising a bar and lugs adjustable thereon, and a work-feeding carriage provided with a detent having a limited movement relative to and lengthwise of the carriage, and adapted to be successively engaged with said lugs and to permit the movement of the carriage by corresponding intervals, substantially as described.

2. In a spacing-machine the combination of a rack comprising a bar having uniformly-spaced stops and lugs adjustable lengthwise of said bar, their positions thereon being determined by said stops, and a work-feeding

carriage provided with a detent movably connected therewith and adapted to be successively engaged with said lugs and to permit the movement of said carriage by intervals corresponding with the spaces between said lugs, substantially as described.

3. In a spacing-machine the combination of a rack comprising a bar having a uniformly-spaced series of stops, and lugs adjustably mounted on said bar, their positions thereon being determined by said stops, and having eccentrically-arranged stops and a work-feeding carriage provided with a longitudinally-movable detent arranged to be engaged with the stops on said lugs one after another, and thus permit the advance of said carriage by intervals corresponding with the spaces between the stops on the lugs, substantially as described.

4. In a spacing-machine the combination of a rack comprising a bar having uniformly-spaced stops and lugs adjustably mounted on said bar and having centrally-arranged stops, the positions of said lugs on said bar being determined by said stops, and a work-feeding carriage provided with a detent movable lengthwise thereof and adapted to engage with the stops on said lugs, substantially as described.

5. In a spacing-machine the combination of a rack comprising a bar having a longitudinal series of uniformly-spaced stops and lugs adjustably mounted on said bar, some of said lugs having centrally-arranged stops, and others offset or eccentrically-arranged stops, and the positions of the several lugs being determined by the stops on said bar, and a work-feeding carriage provided with a detent movable lengthwise thereof and adapted to engage successively with the stops on said lugs, substantially as described.

6. In a spacing-machine the combination of a rack consisting of a bar having a longitudinal series of uniformly-spaced stops, and lugs whose positions are determined by said stops and which are also provided with stops, and a work-feeding carriage provided with a longitudinally-movable detent adapted to engage successively with the stops on said lugs, and a stop for limiting the backward movement of said detent, substantially as described.

7. In a spacing-machine the combination of a rack provided with adjustable stops, and a work-feeding carriage movable parallel with said rack and provided with a lever having a pivoted pawl movable lengthwise of the carriage and adapted to engage successively with said stops, substantially as described.

8. In a spacing-machine the combination of a rack provided with adjustable stops, and a work-feeding carriage movable parallel with

said rack and provided with longitudinally-adjustable means for attaching the work thereto and with a detent movable lengthwise of the carriage and adapted to engage successively with said stops and to limit the advance movement of said carriage by intervals corresponding with the distances between said stops, substantially as described.

9. In a spacing-machine the combination of a rack comprising a bar having a longitudinal series of uniformly-spaced stops and reversible lugs having offset or eccentrically-arranged stops and adjustably mounted on said bar, their positions thereon being determined by the stops on said bar, and a work-feeding carriage movable parallel with said rack and provided with a longitudinally-movable detent adapted to engage successively with the stops on said lugs, substantially as described.

10. In a spacing-machine the combination of a rack comprising a bar or plate having two longitudinal series of correspondingly and uniformly spaced openings and lugs provided with stops and adjustably held on said bar in predetermined positions by projections entering said openings, and a work-feeding carriage movable lengthwise of said rack and provided with a longitudinally-movable detent adapted to engage successively with the stops on said lugs, substantially as described.

11. In a spacing-machine the combination with a work-feeding carriage provided with a detent movable lengthwise thereof, of a rack comprising a bar or plate having two longitudinal series of correspondingly and uniformly spaced openings, notched lugs adjustably held on said bar or plate in predetermined positions by projections entering said openings, and spacing-blocks forming continuous bearings between the notches in separated lugs, substantially as described.

12. In a spacing-machine the combination with a work-feeding carriage provided with means for attaching the work thereto and with a detent movable lengthwise thereof, of a beam or abutment arranged parallel with the carriage-way, and a rack comprising a bar or plate having a longitudinal series of uniformly-spaced openings, lugs provided with stops for the engagement of said detent and adjustably held on said plate or bar by projections entering said openings, said plate or bar and lugs being secured together between said beam or abutment and a clamping plate or bar, substantially as described.

In witness whereof I hereto affix my signature in presence of two witnesses.

WILLARD A. GRAY.

Witnesses:

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CHAS. L. GOSS.