No. 728,928. PATENTED MAY 26, 1903.

F. A. JAPS.

FEED INDICATOR FOR SCREW CUTTING ON LATHES.

APPLICATION FILED MAY 12, 1902.

NO MODEL. 4 SHEETS—SHEET 1.

Fig. 1.

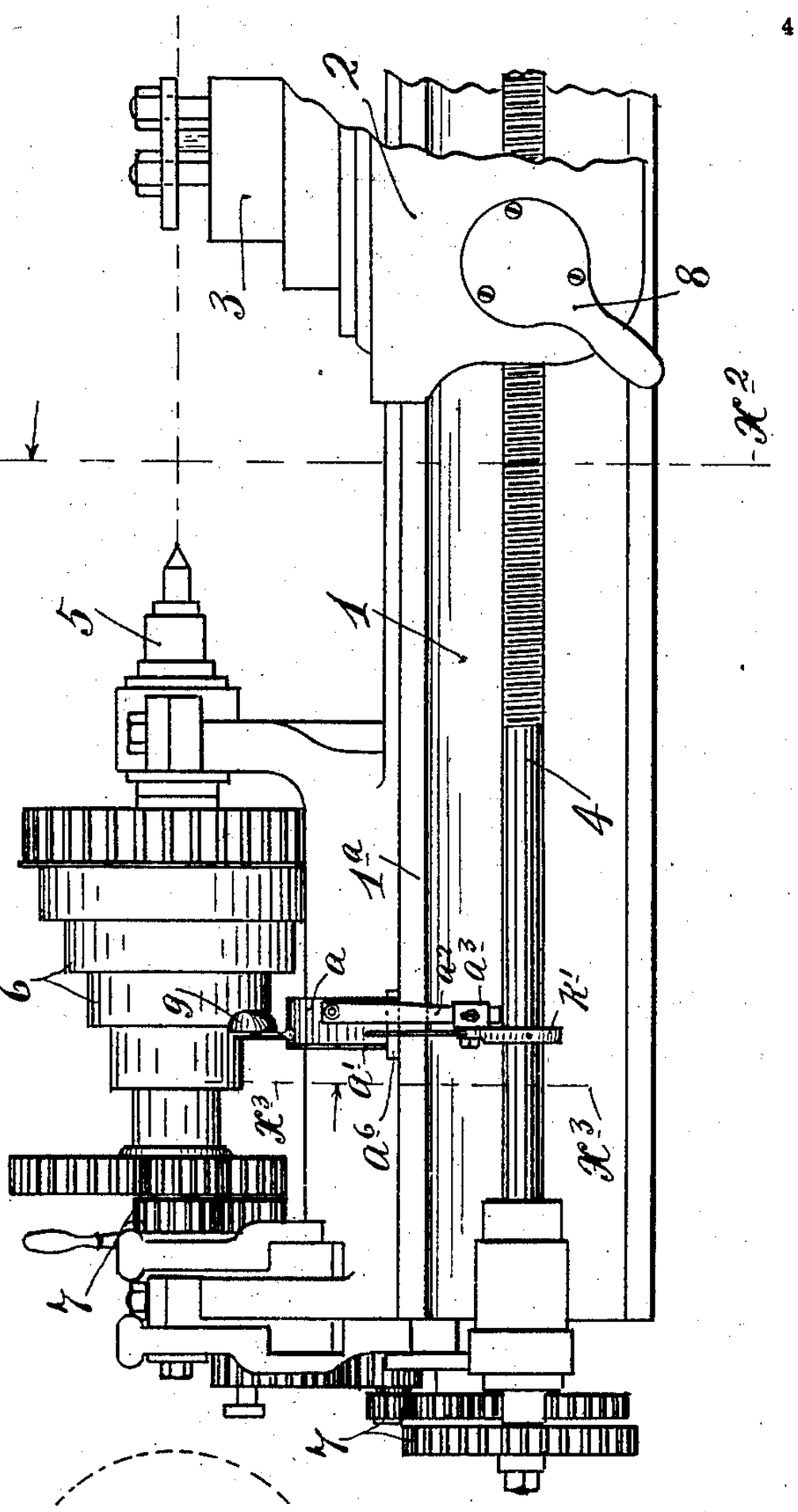
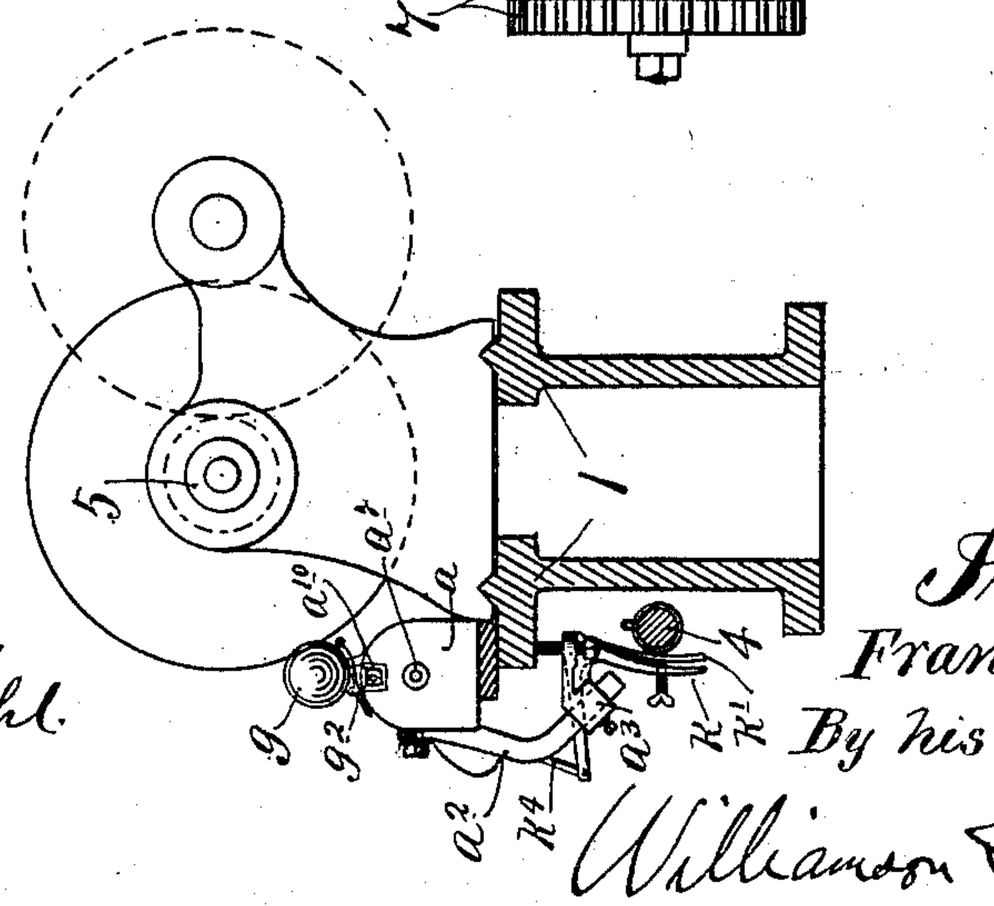


Fig. 2.



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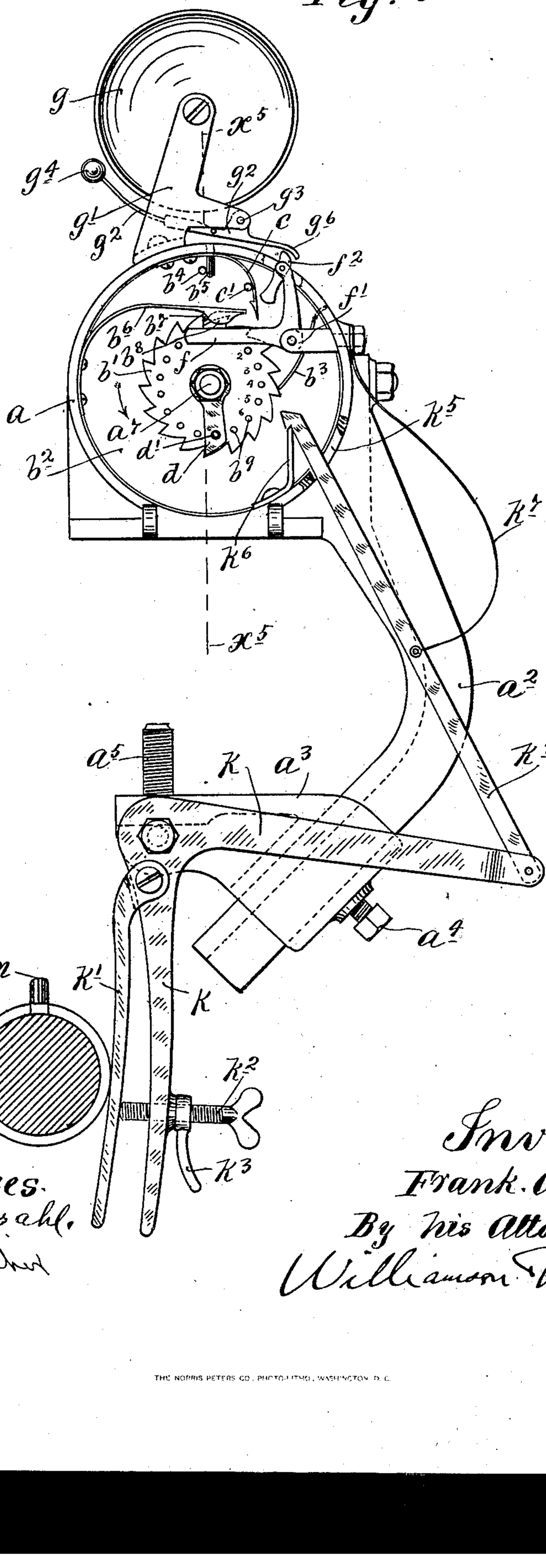
NO MODEL. 4 SHEETS—SHEET 2.

Fig. 3.



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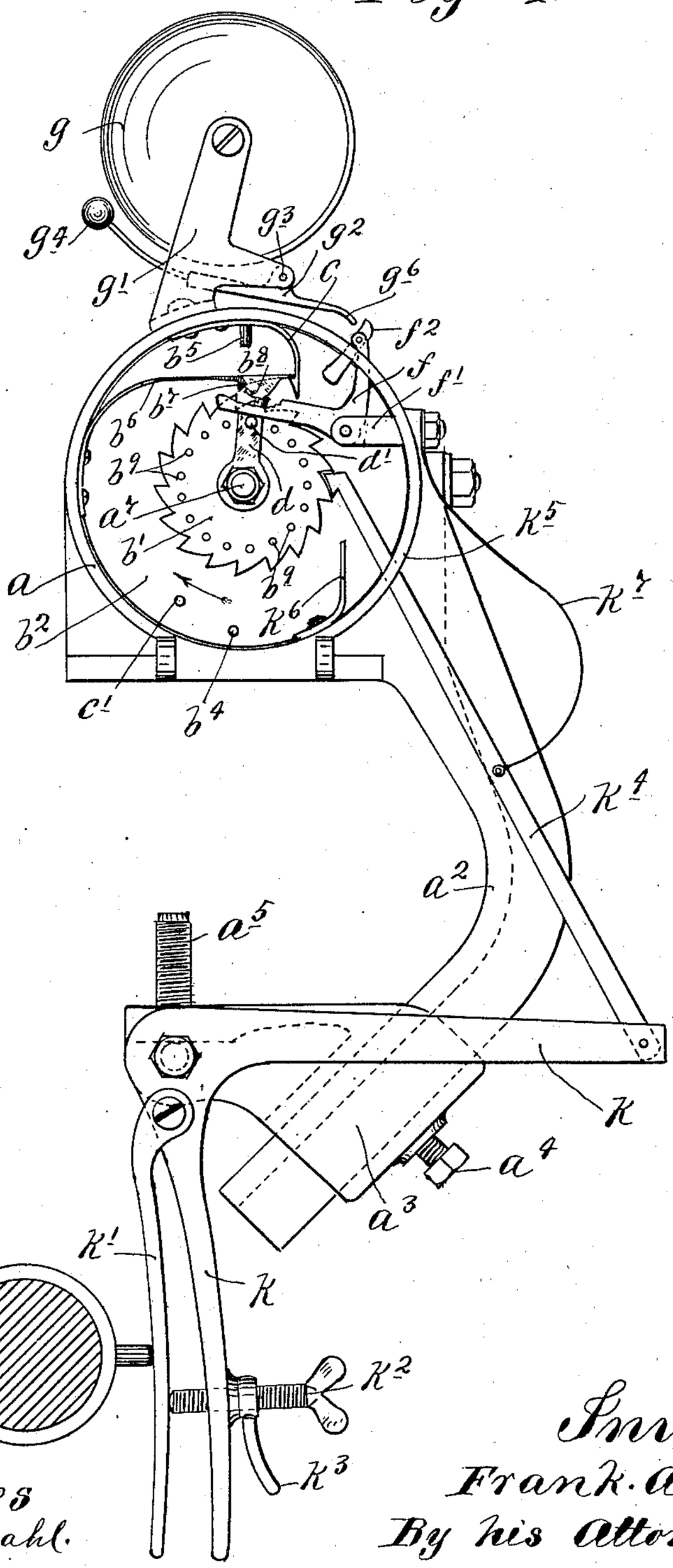
NO MODEL. 4 SHEETS—SHEET 3.

Fig. 4.



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NO MODEL. 4 SHEETS—SHEET 4.

Fig. 5.

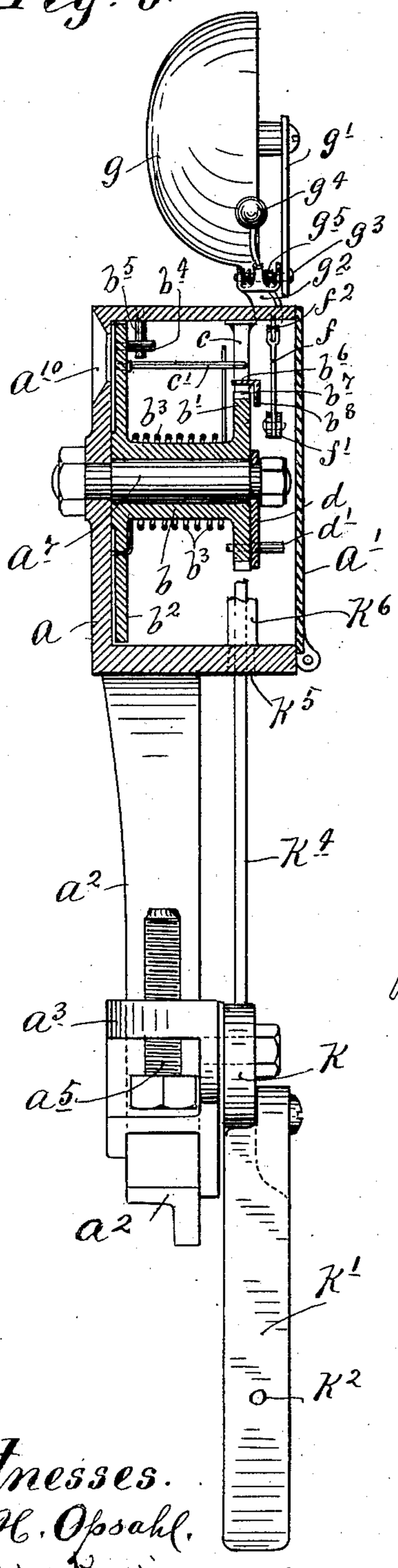
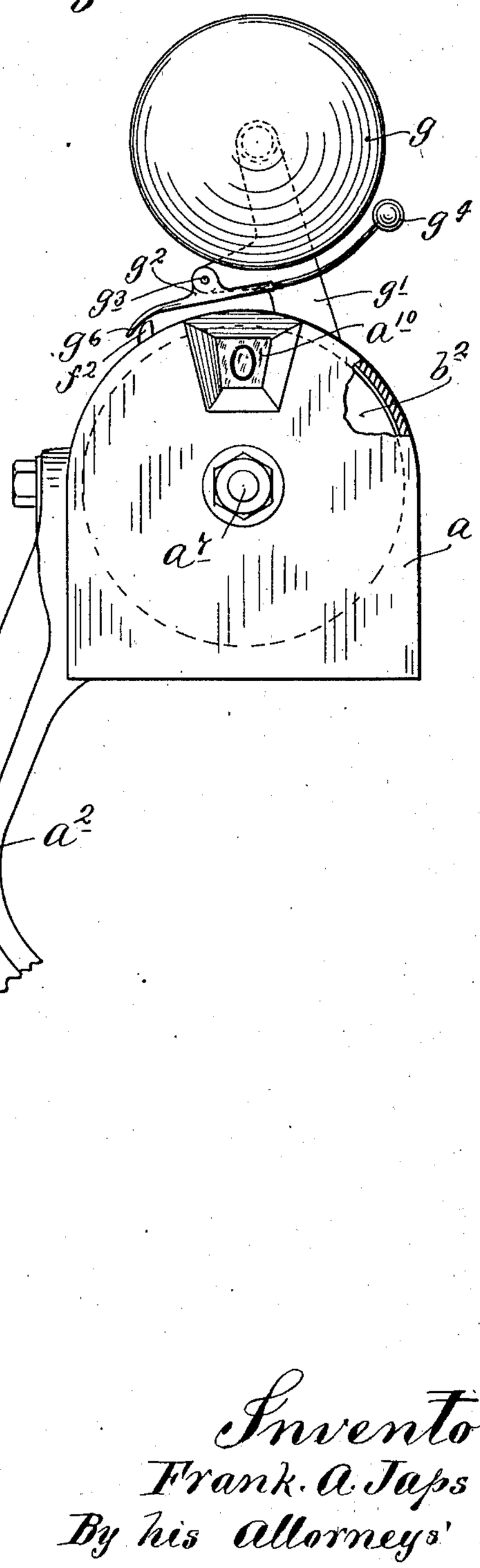


Fig. 6.



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UNITED STATES PATENT OFFICE.

FRANK A. JAPS, OF CARVER, MINNESOTA.

FEED-INDICATOR FOR SCREW-CUTTING ON LATHES.

SPECIFICATION forming part of Letters Patent No. 728,928, dated May 26, 1903.

Application filed May 12, 1902. Serial No. 106,864. (No model.)

To all whom it may concern:

Be it known that I, FRANK A. JAPS, a citizen of the United States, residing at Carver, in the county of Carver and State of Minnesota, have invented certain new and useful Improvements in Feed-Indicators for Screw-Cutting on Lathes; and I do 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 appertains to make and use the same.

My invention has for its object to provide an efficient feed-indicator for thread-cutting on lathes; and to this end it consists of the novel devices and combinations of devices hereinafter described, and defined in the claims.

The invention is illustrated in the accompanying drawings, wherein like characters indicate like parts throughout the several views.

Figure 1 is a view in side elevation with some parts broken away, showing an ordinary lathe having one of my improved indicating devices applied thereto. Fig. 2 is a section on the line x^2 x^2 of Fig. 1, some parts being shown only in diagram. Fig. 3 is a section on the line x^3 x^3 of Fig. 1, showing the parts of the feed-indicator in normal positions. Fig. 4 is a view corresponding to Fig. 3, but showing the parts in different positions. Fig. 5 is a view, partly in side elevation and partly in section, on the line x^5 x^5 of Fig. 3; and Fig. 6 is a view with parts broken away, showing the feed-indicator looking at the same from the opposite direction from that in which Figs. 3 and 4 are viewed.

The numeral 1 indicates the bed, the numeral 2 the carriage or slide, the numeral 3 the tool-rest, the numeral 4 the feed-screw, the numeral 5 the spindle, the numeral 6 the driving-pulleys, and the numeral 7 the gears for transmitting motion from said spindle 5 to the feed-screw 4, all of which parts are of the ordinary well-known construction.

The numeral 8 indicates the hand-lever portion of the coupling for connecting the carriage 2 to the feed-screw 4 and disconnecting the same at will in a manner also well understood.

To persons familiar with the use of a lathe in cutting screws it is a well-known fact that as long as the thread being cut is the same or any exact multiple of the thread of the feed-screw 4 then without reversing the lathe the carriage may be disconnected from the feed-screw after each cut, hurriedly run back approximately to the starting-point, and then again connected to the feed-screw, and the tool necessarily brought to the proper cutting-point on the threads of the screw being cut. It is, however, equally well known that where a thread is being cut which is not an even multiple of the threads of the lathe feed-screw the lathe cannot be handled as above stated. More clearly stated, if the feed-screw of the lathe has six threads to the inch, for instance, and eleven, thirteen, or twelve and one-half threads, for instance, are to be cut the exact relative position between the feed-screw and the carriage must be maintained, or at least they must bear the same exact relation at each time the tool is started into action on the threads which are being cut. Prior to my invention this has been accomplished in two different ways—to wit, first, by reversing the lathe and forcing the carriage back to the starting-point without disconnecting the carriage from the feed-screw, and, second, by stopping the lathe, disconnecting the carriage from the feed-screw, and moving the same back to an exact starting position, usually indicated by a mark made on the bed of the lathe. Both of the above manipulations are objectionable in that they are very slow, and consequently waste valuable time.

My invention provides a device which will indicate the exact time when the carriage should be coupled to the feed-screw and in this way makes it possible to cut threads which are not multiples of the threads in the feed-screw with as great rapidity as threads which are multiples thereof may be cut. This device will now be described.

The character *a* indicates a case, preferably having a flat bottom and a door or hinged side *a'*. Said case *a* is also provided with a depending and crooked leg a^2, which is adjustably held in a suitable seat formed in a clamping-block a^3 by means of a set-screw a^4. A clamping-screw a^5 works upward through the clamping-block a^3. The case *a* is adapted to be secured in working position, as shown in

Figs. 1 and 2, by placing the bottom of the same either directly on top of the bed-flange 1^a or upon an interposed spacing-block a^6 and screwing the clamping-screw a^5 against the bottom of said flange.

Within the case a or projecting from one side thereof is a bearing-stud a^7, upon which is loosely mounted a hub b, provided at its outer end with a ratchet-wheel b' and at its inner end with a disk b^2. A spring b^3, wound on the hub b and connected at one end to the disk b^2 and at its other end to the case a, puts said disk and the ratchet-wheel b' under strain to move in a direction reverse from that indicated by the arrow marked on Fig. 3 and in the direction indicated by the arrow marked on Fig. 4. The return movement of the said disk and ratchet-wheel is limited by the engagement of a stop-pin b^4, carried by said disk, with a pin b^5, depending from the top of the case a, as best shown in Figs. 3 and 5. A spring-pawl b^6, secured at one end to the case a, is provided at its free end with a tooth b^7, which coöperates with the teeth of the ratchet-wheel b'. At its free end the said spring-pawl b^6 is provided with a depending cam-flange b^8 for a purpose which will hereinafter appear. A spring-detent c, which is also in the form of a pawl and is connected at its upper end to the case a, coöperates with the free end of the pawl b^6 in a manner which will also hereinafter appear. Normally the detent c tends to stand in a position to engage the free end of the pawl b^6 when the latter is raised, but is held in an inoperative position by the engagement therewith of a pin c', carried by the disk b^2. For each tooth, or at least for each of several of the teeth, the ratchet b' is provided with a perforation or pin-seat b^9. Loosely pivoted on the end of the stud a^7 is a trip-arm d, provided near its free end with a pin d', which is adapted to be inserted into any one of the pin-seats b^9 to lock said trip-arm in any desired position on the ratchet-wheel b'. When the trip-arm d is turned upward, its free end will engage the cam-flange b^8 of the pawl b^6 and raise the tooth b^7 thereof out of engagement with the teeth of the ratchet-wheel. Also when the said trip-arm is turned upward the outer end of its pin d' is adapted to engage the inner arm of a bell-crank f, pivoted to a lug f', projecting inward from the case a. The free end of the bell-crank f works through a slot in the case a and is provided with a gravity-held dog f^2, which operates as hereinafter described. Normally the bell-crank f and dog f^2 are gravity-held in the position indicated in Fig. 3.

The character g indicates a bell secured to a bracket g', which in turn is secured on top of the case a.

g^2 indicates the clapper or hammer pivoted at g^3 to the bracket g' and provided at its extended end with a ball g^4, which strikes the bell g when the hammer is operated. A spring g^5 (shown in Fig. 5) acts on the hammer g^2 to impart to the same its operative stroke in the same manner as in ordinary bells or gongs of this character. The hammer g^2 is further provided with a finger-like projection g^6, with which the outer end of the dog f^2 engages to trip the hammer into action.

The character k indicates a relatively large bell-crank which is pivoted to the clamping-block a^3 and is provided with a pivotally-adjustable lower arm-section k', which is adapted to be adjustably set by a thumb-screw k^2, working through the depending arm of the bell-crank and impinging thereon. The thumb-screw k^2 is adapted to be locked by a thumb-nut k^3. To the other end of the bell-crank k is pivotally connected the lower end of a long driving pawl or plunger k^4, the free end of which works inward through an opening k^5 in the case a and engages one after the other of the teeth of the ratchet-wheel b'. As shown, a stop-finger k^6, secured within the case a, engages a shoulder at the free end of the pawl k^4 and limits the downward movement of said pawl. The pawl k^4 is yieldingly pressed downward by a spring k^7, connected thereto at its lower end and to the case a at its upper end. Operative movements are imparted to the pawl k^4 by a lug or projection m, carried by the feed-screw 4, and which once for each rotation of the screw engages the adjustable section k' of the bell-crank k and oscillates the same in an obvious manner. By the proper adjustments of the thumb-screw k^2 and arm k' the exact desired throw may be given to the pawl k^4. For cutting threads which may be measured by integral or whole numbers—as, for instance, eleven or thirteen threads—the trip-arm d should be set to a ratchet-tooth marked with a numeral corresponding to the number of threads per inch of the lathe feed-screw 4. To illustrate in the drawings, we will assume the feed-screw 4 to have eight threads per inch, and hence the trip-arm d is properly set, as shown, in line with the ratchet-tooth marked "8." Of course it is not absolutely necessary that the ratchet-teeth be actually marked, since they may be easily counted. With the device set as described seven movements will be given to the ratchet-wheel without actuating the bell or signal; but the eighth movement will bring the parts into the position shown in Fig. 4, wherein it will be noted the free end of the trip-arm d has engaged the cam-flange b^8 of the pawl b^6 and raised its tooth b^7 into a position to release the ratchet-wheel b', while at the same time the pin d' by engagement with the inner arm of the bell-crank f has thrown the dog f^2 against the finger g^6 of the hammer g^2 and caused the bell or gong to be sounded. It will also be noted that when the free end of the pawl b^6 is forced upward it is caught and temporarily held by the detent c. Hence as soon as the cam-lug m of the feed-screw 4 is carried a little farther onward from the position shown in Fig. 4 the pawl k^4 will be lowered out of engagement with the ratchet-

wheel b', whereupon the spring b^3 becomes effective to quickly throw the said ratchet-wheel, trip-arm d, and disk b^2 back into their normal positions. As the said parts reach their normal positions the pin c' again engages the detent c and causes the same to release the pawl b^6, so that the latter again becomes operative on the ratchet-wheel b'. The bell-crank f is thrown back to normal position by its own gravity, under which movement the dog f^2 turns freely backward and clears the finger g^6 of the hammer g^2.

From what has been stated it will be understood that the bell or signal device or indicator, according to which form it may take, will be actuated to indicate each inch of feed movement imparted to the carriage 2 by the feed-screw 4. It is further evident that the same relations exist between the thread being cut and the threads of the feed-screw at each inch of feed movement of the latter, and hence that the lathe-carriage may be properly connected to the feed-screw whenever such relation takes place. As is obvious, the device above described indicates to the person running the lathe the exact time when the carriage may be properly coupled to the feed-screw.

The device herein broadly termed an "indicator" or "signal device" instead of being the form of a bell or device for making sound may be in the form of a sight-indicator. For instance, numerals from zero up to any desired number may be marked on the back of the disk b^2 and these numerals be exposed through a sight-opening a^{10}, formed in one side of the case a, as best shown in Figs. 5 and 6. This latter-noted device will be found serviceable even where the bell or gong is used, inasmuch as it will indicate the steps of movement imparted to the bell-actuator, and will thereby enable the operator to tell just how close in point of time the final indication or signal may be at any particular time.

In cutting fractional threads — such as eleven and one-half, for instance—with a feed-screw of six threads to the inch, for example, the arm d should be set at "12," since the full threads which are being cut repeat their relation to the threads of the feed-screw only once in every two inches. It will of course be understood that in all cases the proper feed movement of the feed-screw 4 for the particular thread being cut is regulated in the usual way by the proper combination of driving-gears.

By actual usage I have demonstrated the efficiency of the device herein disclosed and claimed.

What I claim, and desire to secure by Letters Patent of the United States, is as follows:

1. The combination with a lathe having a feed-screw, of an indicator, for indicating predetermined feed movements of said screw, and an actuator for said indicator involving a vibratory lever, and a tapper directly carried by said feed-screw and operating directly upon said vibratory lever, substantially as described.

2. The combination with a lathe having a feed-screw, of an indicator or signaling device for indicating predetermined feed movements of said feed-screw, said device involving a ratchet-wheel movable step by step to give the final indication, under yielding strain to return to normal position a retaining-pawl for preventing return movements thereof, a reciprocating pawl or driver driven from said feed-screw and acting on said ratchet-wheel, and means for releasing said retaining-pawl and permitting return movements of said ratchet-wheel, when the final indication or signal has been given.

3. The combination with a lathe having a feed-screw, of an indicator or signaling device for indicating predetermined feed movements of said feed-screw, said device comprising a suitable case, a ratchet-wheel b' mounted therein and under spring tension to remain in normal position, a retaining-pawl b^6 normally acting on said ratchet-wheel, the trip-arm d adjustably secured to said ratchet-wheel and operative on said retaining-pawl to release the same under a predetermined movement of said ratchet-wheel, and a vibrating pawl or driver receiving motion from said lathe feed-screw and acting on said ratchet-wheel to impart a step-by-step movement thereto, substantially as described.

4. The combination with a lathe having a feed-screw, of an indicator or signaling device for indicating predetermined feed movements of said screw, said device comprising a suitable case or support, the ratchet-wheel b' and disk or head b^2 mounted to move together within said case or support and under spring tension to remain in normal position, the retaining-pawl b^6 normally acting on said ratchet-wheel, the trip-arm d adjustably secured to said ratchet-wheel and operating under a predetermined movement to release said retaining-pawl b^6, the detent c coöperating with said pawl b^6, and the pin or projection c' carried by said disk b^2, and normally holding said detent c inoperative, substantially as described.

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

FRANK A. JAPS.

Witnesses:

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F. D. MERCHANT.