(No Model.)

4 Sheets—Sheet 1.

# O. KROMER.

## LATHE.

No. 422,809

Patented Mar. 4, 1890.

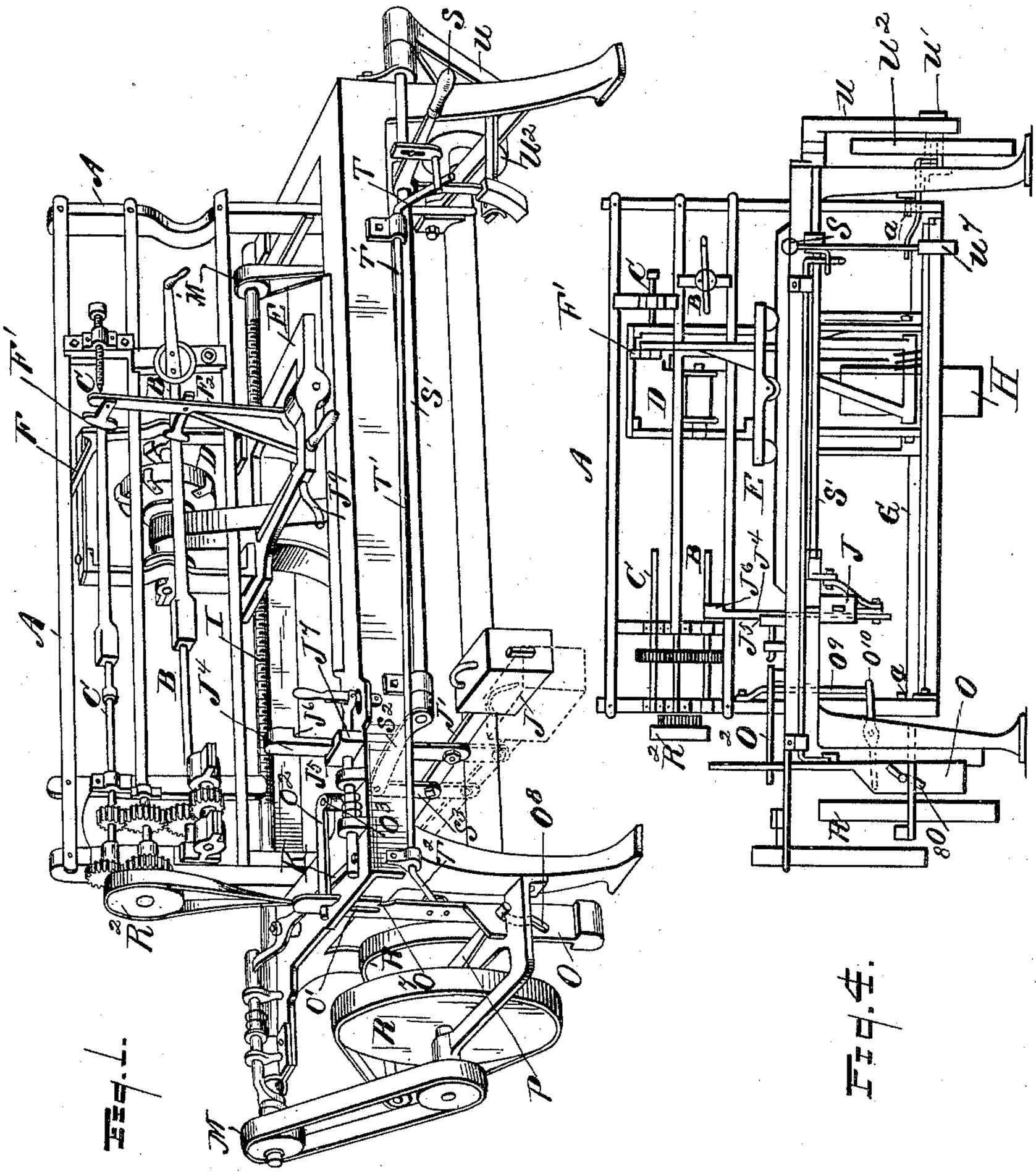

FIG. 1.



FIG. 2.

WITNESSES

P. M. Hulbert

Chas. A. Gregg

INVENTOR

Otto Kromer

By Thos. L. Sprague & Son

Attorney.

(No Model.)

4 Sheets—Sheet 2.

# O. KROMER.

## LATHE.

No. 422,809. Patented Mar. 4, 1890.

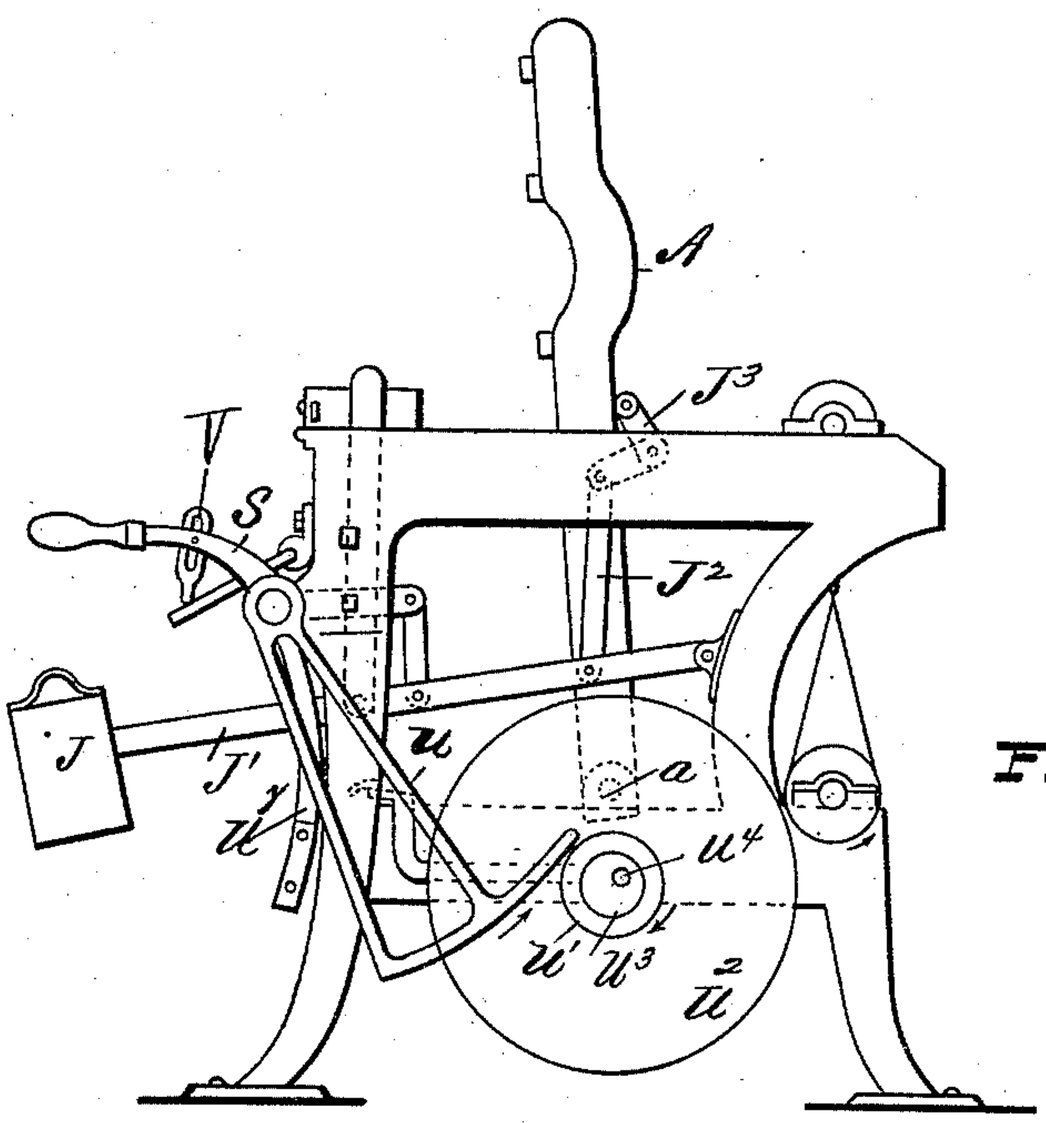


Fig. 5.

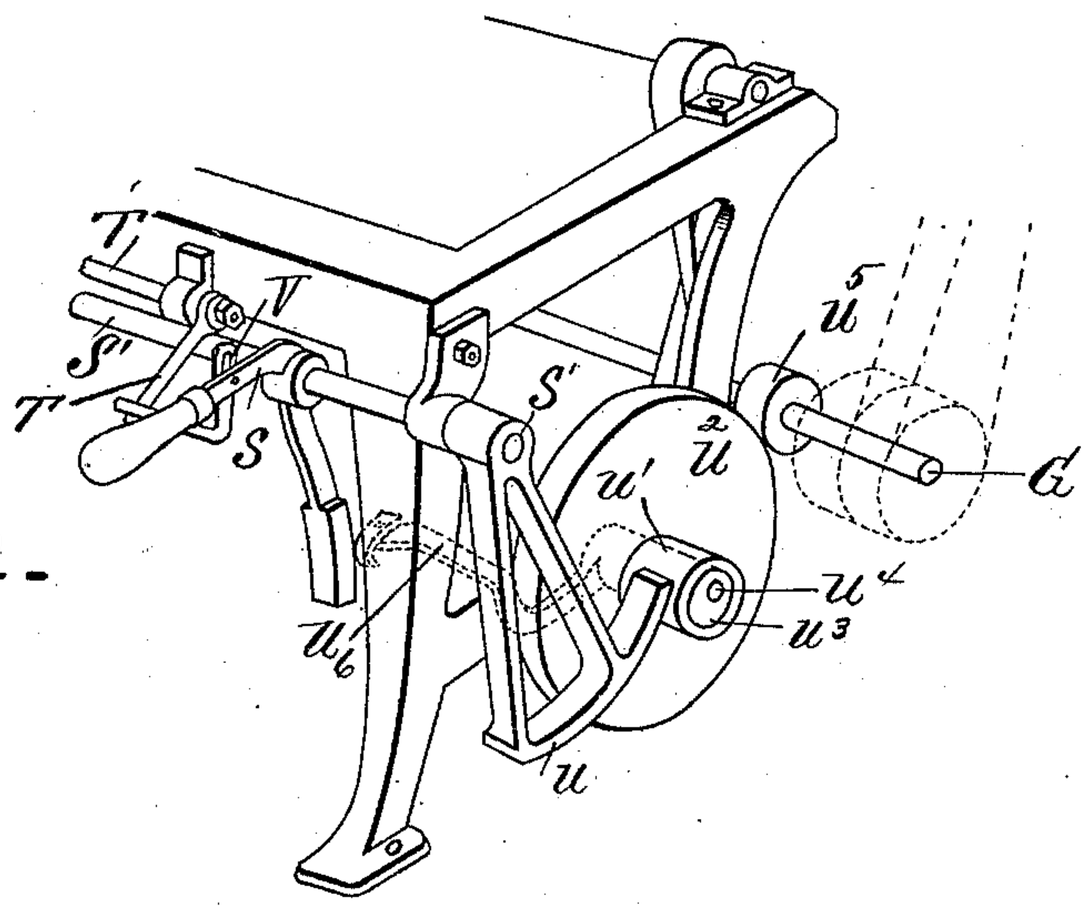


Fig. 2.

WITNESSES

P. W. Hulbert

Chas. A. Gregg.

INVENTOR

Otto Kromer

By Thos. S. Sprague & Son

Attorney.

(No Model.)

4 Sheets—Sheet 3.

# O. KROMER.

## LATHE.

No. 422,809. Patented Mar. 4, 1890.

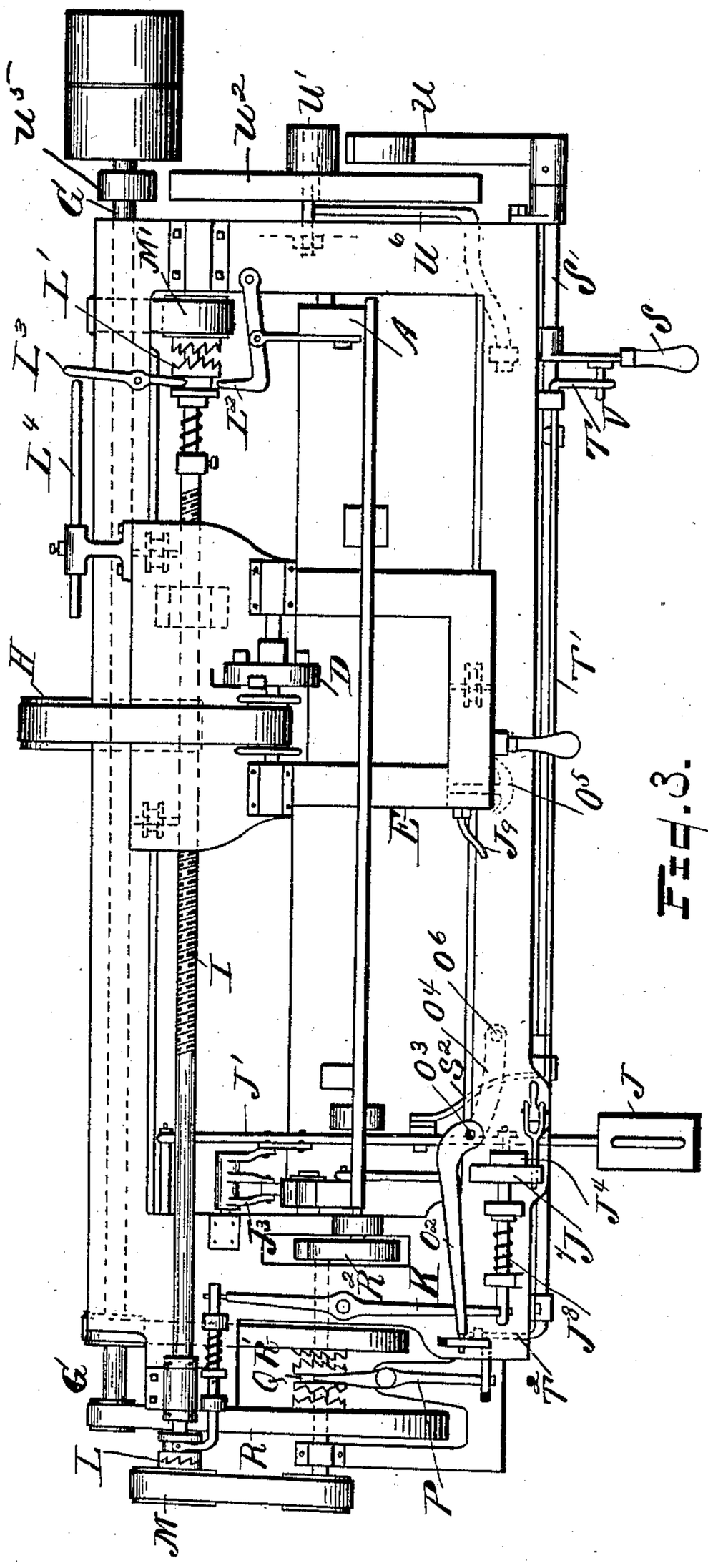

Fig. 3.

WITNESSES

P. M. Hulbert

Chas A Gregg

INVENTOR

Otto Kromer

By Thos. L. Sprague & Son

Attorney.

(No Model.)

4 Sheets—Sheet 4.

# O. KROMER.

## LATHE.

No. 422,809. Patented Mar. 4, 1890.

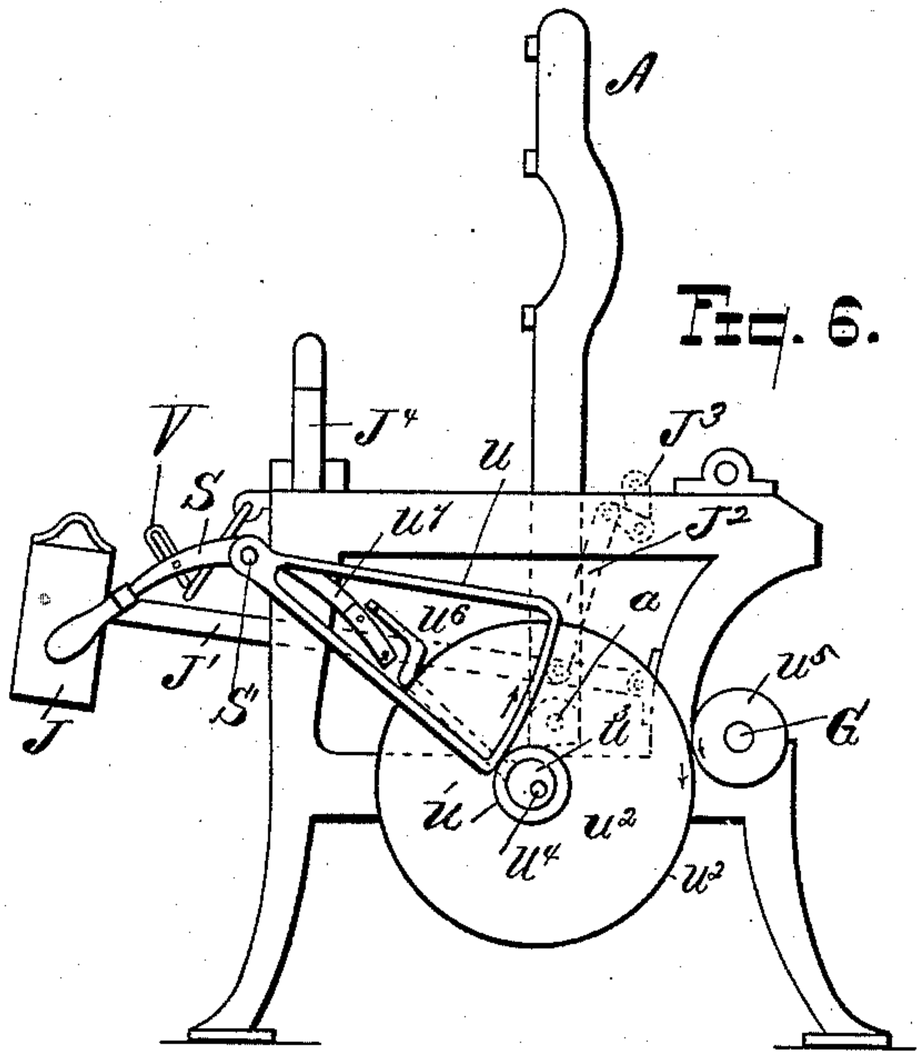


Fig. 6.

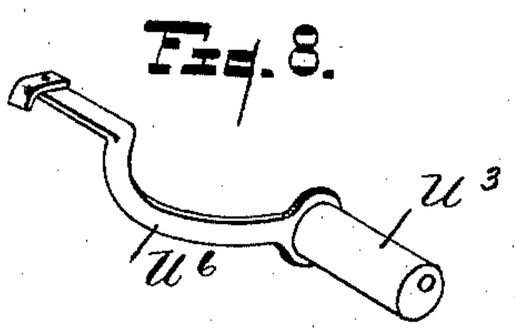


Fig. 8.

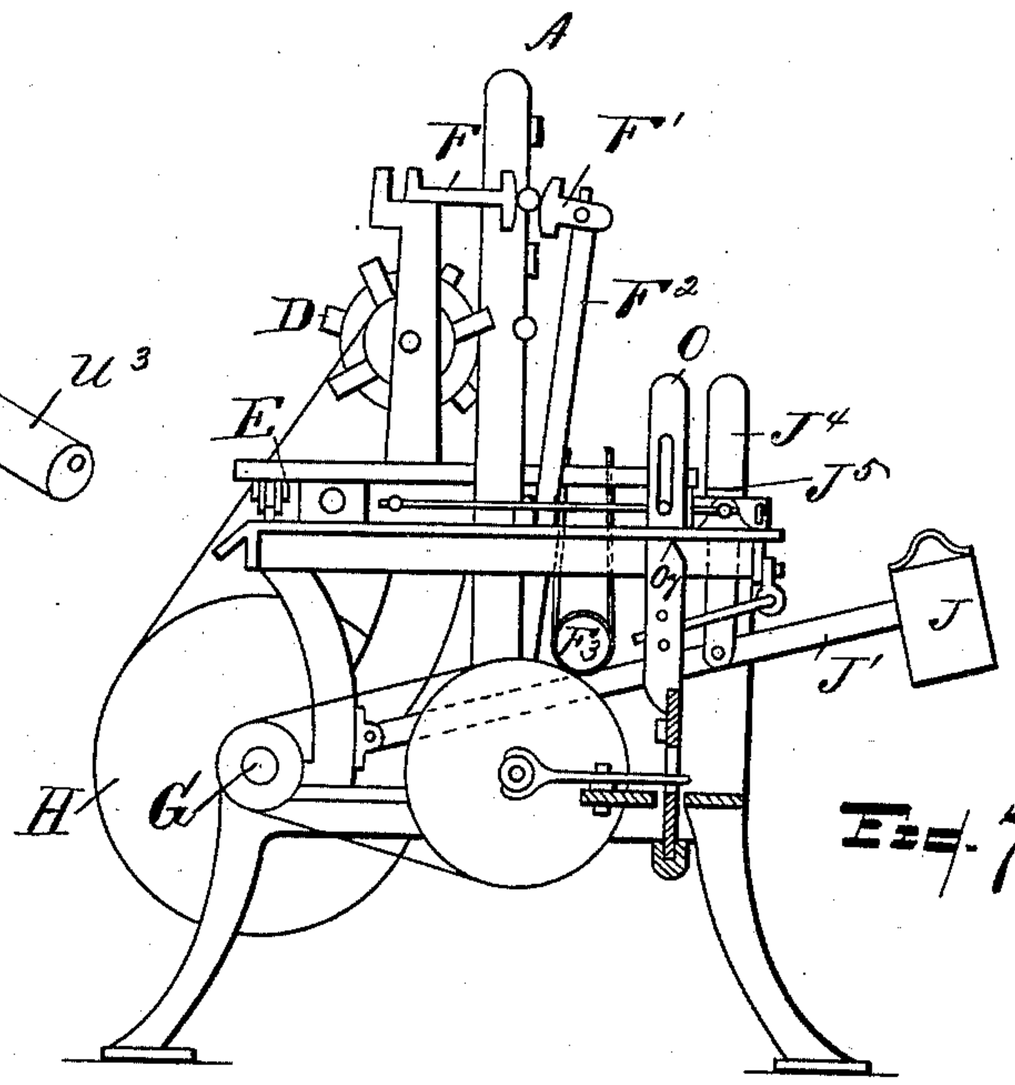


Fig. 7.

WITNESSES

P. M. Hulbert

Lew. A. Gregg.

INVENTOR

Otto Kromer

By Thos. L. Sprague & Son

Attorney.

# UNITED STATES PATENT OFFICE.

OTTO KROMER, OF SANDUSKY, OHIO.

## LATHE.

SPECIFICATION forming part of Letters Patent No. 422,809, dated March 4, 1890.

Application filed July 1, 1889. Serial No. 316,174. (No model.)

*To all whom it may concern:*

Be it known that I, OTTO KROMER, a citizen of the United States, residing at Sandusky, in the county of Erie and State of Ohio, have invented certain new and useful Improvements in Lathes, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to new and useful improvements in automatic lathes of that kind in which the work is turned after a pattern or templet. In this class of lathes, which is variously known as the "Blanchard lathe," so named after its inventor, or more commonly as a "spoke-lathe," the work and the pattern are revolved in fixed centers secured to an oscillating frame which automatically approaches or withdraws the work from a revolving cutter-head mounted on a carriage in accordance with the shape of the pattern by means of guides bearing against the pattern or templet. This oscillating frame falls away from the cutters when the work is finished by the action of a heavy counter-weight which is automatically released at the proper time. This is done for the purpose of removing the finished work and securing new work in the centers and to allow the carriage carrying the cutter-head to return to its starting position for the next operation. Even in the most improved lathe of this character the oscillating frame after having thus fallen away from the cutter-head can only be restored back into its operative position by the operator, who has to lift the counter-weight back into its normal position. Whether he does this by directly lifting the weight or by the aid of a lever, as in the most improved machines, it entails on the operator a great deal of expenditure of power in the course of a day, and thereby necessarily forms an important factor in the possible amount of work that can be done with the lathe.

The object of my invention is to restore the oscillating frame into working position again by the action of power derived from the power which drives the lathe; and, further, my invention consists in combining into a single operation the two operations of restoring the frame into its working position and starting the work, which, as such lathes are now arranged, requires two distinct operations on the part of the operator.

My improvement is applicable to any kind of a lathe of the character described, but in order to give a full and exact description thereof and explain its operation I have applied it to a spoke-lathe of known construction; but I do not wish to be understood as confining my invention to any particular construction of such lathe.

In the drawings which accompany this specification, Figure 1 is a perspective view of a spoke-lathe of known construction and to which my improvement is applied. Fig. 2 is a perspective view of one end of the lathe, with particular reference to the parts representing my improvement. Fig. 3 is a plan of the lathe. Fig. 4 is a diagram elevation thereof. Fig. 5 is an end elevation of that portion of the lathe shown in perspective in Fig. 2. Fig. 6 is a similar elevation in diagram, showing the parts as in operation. Fig. 7 is a sectional view looking from the opposite end of the lathe; and Fig. 8 is a detached perspective view of the eccentric and its lever, hereinafter more specifically referred to.

A is the oscillating frame of the lathe. *a* *a* are its centers of oscillation.

B B are the centers, in which the work is held and which revolve it.

C C are the centers, which hold the pattern and revolve it at the same speed with which the work revolves.

D is the revolving cutter-head.

E is the traversing carriage, on which the cutter-head is mounted.

F is a guide mounted on the carriage E and bearing against the pattern to govern the proximity of the work to the cutter-head.

F′ is a guide bearing against the pattern on the opposite side of the guide F. It is mounted to an arm $F^2$, against which a spring $F^3$ bears to press the guide against the pattern, whereby the latter is kept in contact with the pattern-guide.

G is the main shaft, to which the power is applied.

H is a pulley sliding on the main shaft for transmitting the power to the rotary cutter.

I is the feed-screw for feeding the carriage, and J is a counter-weight swung on an arm

J′, which projects out in front of the lathe. In the working position of the frame A this weight is suspended; but it is automatically liberated when the work is finished, and in dropping it causes the frame A, by means of suitable connections therewith, to fall away from the cutter-head. The particular construction for accomplishing this automatically is differently devised in different machines. The devices shown in the drawings for the purpose of illustrating my invention are those which have been patented to me by Letters Patent No. 336,813, dated February 23, 1886, and are constructed and operated as follows: The arm J′ of the weight is connected by means of the link J″ to one arm of the bell-crank $J^3$, the other arm of which is adapted to bear against the rear side of one of the uprights of the frame A, and a vertical bar $J^4$, pivotally secured to the arm J′, passes through a slot in the table of the frame of the machine and is provided with two shoulders $J^5$ and $J^6$ upon opposite sides of the bar. The shoulder $J^5$ is adapted to engage upon the sliding block $J^7$, which, as shown in Fig. 3, is held by a spring $J^8$ in contact with the bar $J^4$, all so arranged that when the carriage E has arrived at the end of its travel a finger $J^9$ on said carriage pushes the sliding block $J^7$ out of engagement with the bar $J^4$, thereby liberating the weight, which drops until the shoulder $J^6$ strikes the table of the frame and prevents the further falling of the weight. The falling of the weight J causes the bell-crank $J^3$, by means of the connection described, to bear against the back of the frame A and thereby push it forward out of contact with the cutter-head. Simultaneously with this falling away of the frame the further feeding of the carriage is discontinued by suitable connections—such as the lever K, which is actuated by the sliding block $J^7$, and actuates through intermediate connection the clutch L, thereby disconnecting the feed-shaft from its drive-pulley at one end, while at the same time a clutch L′ at the other end of the feed-shaft is thrown into gear, as the falling away of the frame A withdraws the dog L″ from the clutch. This transmits the motion from the pulley M′ to the feed-shaft in the opposite direction and returns the carriage into its starting position, where it is arrested by the action the trip-lever $L^3$, which trips the clutch L′, when the arm $L^4$, secured to the carriage, strikes said trip-lever, as shown in Fig. 3. The falling away of the frame A when the weight J is liberated also automatically stops the rotation of the pattern and of the work. The devices shown in the drawings for accomplishing this work automatically are constructed and operated as follows: At one end of the machine is slidingly secured in vertical guides of the frame the rising and falling bar O. The upper end of this bar is provided with a slot O′, into which engages one end of the horizontally-vibrating lever O″, which is pivotally secured at $O^3$, and has an arm $O^4$ extending into the path of an arm $O^5$ on the carriage, as shown in Fig. 3. This arm, as the carriage arrives near the end of its forward travel, strikes a pin $O^6$ on the arm $O^4$ of the vibrating lever and thereby disengages the shoulder $O^7$, when the rising and falling bar O is in the position shown in Fig. 7, from its engagement on the vertical guide-bearing of the frame of the machine, thereby allowing said bar O to drop by the action of its gravity. This drop of the bar O vibrates the shifting-lever P, one end of which engages into a curved slot $O^8$ in the lower end of the rising and falling bar O. The shifting-lever P, as shown in Fig. 3, carries the sliding member Q of a double clutch between the pulleys R and R′, which revolve the shaft from which the motion is carried to the pulley R″, which communicates the motion to the centers. The pulleys R and R′ are both geared from the main shaft G; but the pulley R communicates a faster motion while the round portion of the spoke is being turned, and the pulley R′ a slower motion while the square portion of the spoke is being turned, and the falling of the bar O causes the change from the fast to the slow motion by the shifting of the clutch. As soon as the work is completed and the frame A falls away from the work, a bar $O^9$ on said frame, as shown in Fig. 4, depresses one end of the lever $O^{10}$, which, as shown, engages with its other end with the rising and falling bar O, and thereby raises said bar up again sufficiently high to engage the shifting-lever P on the center of the curved slot $O^8$, whereby the shifting-lever keeps the sliding member Q of the clutch out of gear with both fixed members of the clutch on the pulleys R and R′, thus discontinuing the motion on the centers until the bar O is again raised into its highest position, as shown in Fig. 7. Thus, after the completion of each spoke the operator after removing the work and securing a new blank between the centers has two actions to perform, one of which requires the expenditure of considerable power. The first is to lift up the weight J, and the other is to lift the bar O into its highest position. Although this is accomplished in the most perfected machines by the aid of suitable hand-levers—such as the lever S—which may be made to act through the rock-shaft S′, rock-arm S″, and link $S^3$ to lift the weight J, and by means of the lever T, which acts through the rock-shaft T′ and rock-arm T″ to lift the bar O, nevertheless the work thus thrown upon the operator during a day's work considerably taxes his strength and contributes to reduce the output of the machine and forbids the employment of operators not endowed with the necessary physical strength. My invention is designed to improve this condition by doing away with the manual work, at least with that part requiring physical exertion, and by simplifying the work of the operator by combining the two actions into one. To this end I have constructed the following de-

vice: To one end of the rock-shaft S′, I secure the segment Q, the peripheral face of which is adapted to travel in frictional contact with the frictional pulley U′. This friction-pulley is concentrically secured to one side of a larger pulley $U^2$, both of which are journaled together upon the eccentric $U^3$, which in turn is journaled upon the stop-shaft $U^4$, which is secured, preferably, vertically adjustably to the side of the frame of the lathe. Another pulley $U^5$, with which the pulley $U^2$ is adapted to make frictional contact, is secured upon the main shaft G. The eccentric $U^3$ is provided with an arm $U^6$, which extends with its free end in proximity to the lever S. This latter, instead of being fast upon the rock-shaft, as required, by lifting the weight J by manual power, is loose upon the rock-shaft, and is provided with a downwardly-projecting weighted arm $U^7$, which holds by its weight the lever S in position, (shown in Figs. 2 and 5,) the arrangement of the parts being such that when the lever S is depressed the arm $U^7$ will strike the free end of the arm $U^6$ and lift it up, thereby causing the eccentric $U^3$ to revolve upon its shaft $U^4$, the adjustment being such that this turning of the eccentric throws the pulley U′ into frictional contact with the segment and the pulley $U^2$ into frictional contact with the friction-pulley $U^5$, thus transmitting the motion through the drive-shaft G, through the friction-pulleys $U^5$, $U^2$, and U′ to the segment U in the direction of the arrows shown in Fig. 6. Thus, instead of the operator being required to apply his power to lift the weight, the power from the motion of the drive-shaft does the work by actuating the segment U and lifting the weight until the bar $J^4$ is lifted up high enough to engage its shoulder $J^5$ upon the sliding block $J^7$. The length of the frictional face of the segment is sufficient to accomplish just this amount of work, and when the operator takes his hand off the lever S the arm $U^6$ will fall back by its own gravity into the position in which the parts are out of gear, a suitable stop being provided to hold the arm $U^6$ in this normal position. It will be seen that, as soon as the operator has initiated the movement by means of the lever S, it will be completed independent of the action of the lever S, as the direction of the arrows, as shown in Fig. 6, will readily explain that there is a natural tendency for the parts to remain in gear until the motion is completed, when they will be automatically thrown out of gear if the arm $U^6$ is free to return to its normal position. The arm $U^7$ is counterweighted for the purpose of returning it automatically into its normal position.

To accomplish the starting of the centers at the same time to save time, I secure, preferably adjustably, an arm V to the lever S, which arm is adapted to bear upon the hand-lever T. Thus, when the hand-lever S is depressed for the purpose of lifting the weight the hand-lever T is simultaneously depressed therewith, and by the connection with the lever T with the rising and falling bar O the latter is raised up to its highest position, in which the shifting-lever P throws the pulley R′ into gear with the main shaft G for communicating motion to the centers.

It will be seen that the construction of my device does not involve a structural change of the lathe, but may be readily applied to any construction of the lathe for the purpose described.

What I claim as my invention is—

1. The combination, with the oscillating frame of the lathe carrying the pattern and work and provided with the normally-suspended counter-weight arranged to draw said frame away from the cutter-head of the lathe at the completion of the work, of the mechanism connecting said weight to the main shaft of the lathe for lifting by power, said mechanism being provided with a lever under the control of the operator for throwing it out of gear, and having a definite limit of operation when thrown into gear, substantially as described.

2. The combination, in a lathe of the character described, of the suspended weight J, the rock-shaft S′ and its lifting-connection with the weight, the segment U, secured to said rock-shaft, the concentric friction-pulleys U′ U″, the eccentric $U^3$ upon which they revolve, the arm $U^6$ of the eccentric, and the lever S, adapted to lift said arm, substantially as described.

3. The combination, with a lathe of the character described, of the suspended weight J, the arm J′ on which it swings, the rock-shaft S′, the rock-arm S″, and link $S^3$, connecting said rock-shaft with the arm J′, the segment U, secured to said rock-shaft, concentric friction-pulleys U′ and U″, the eccentric $U^3$ upon which they revolve, the arm $U^6$ of the eccentric, and the lever S, provided with the counterweighted arm $U^7$, all combined to operate substantially as described.

4. The combination, in a lathe of the character described, of the suspended counter-weight, the mechanism connecting said weight with the main shaft for lifting it by power, the lever for throwing said mechanism into gear, and the starting-lever arranged in proximity to the lifting-lever and adapted to be operated thereby, substantially as described.

5. The combination, in a lathe of the character described, of the lifting and starting levers S and T, arranged in proximity to each other, and the arm V, adjustably secured to the lever S and bearing upon the lever T, substantially as described.

In testimony whereof I affix my signature, in presence of two witnesses, this 23d day of March, 1889.

OTTO KROMER.

Witnesses:
J. ERCKENER,
CH. ROEDER.