(No Model.) 2 Sheets—Sheet 1.

L. E. BROOKES.

PAPER CUTTING MECHANISM FOR PRINTING PRESSES.

No. 448,806. Patented Mar. 24, 1891.

Fig. 1.

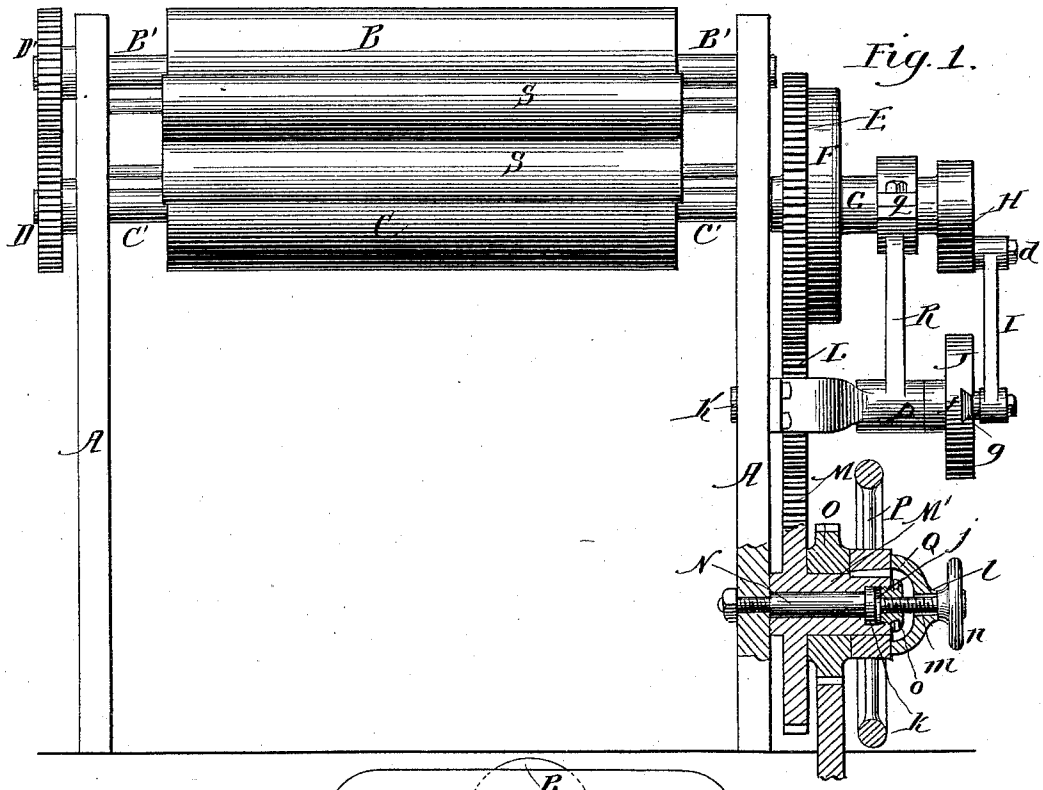
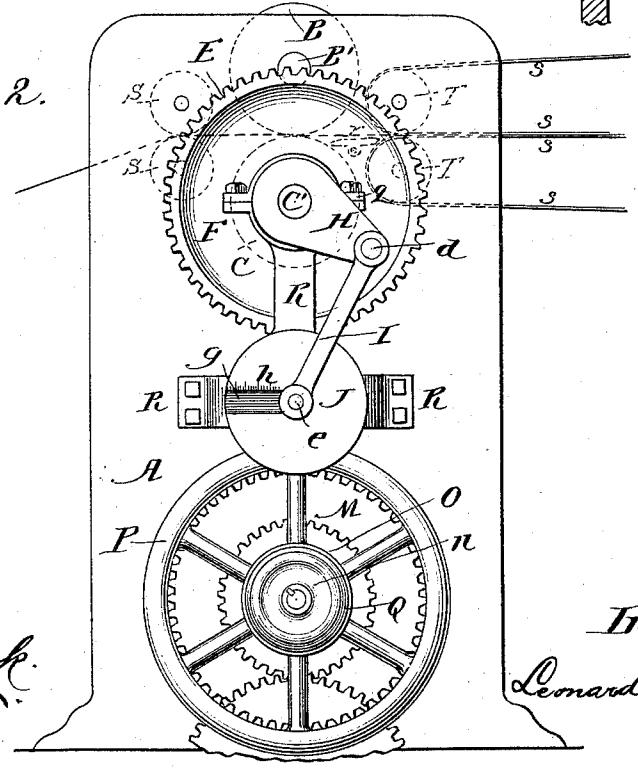


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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PAPER CUTTING MECHANISM FOR PRINTING PRESSES.

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Fig. 3.

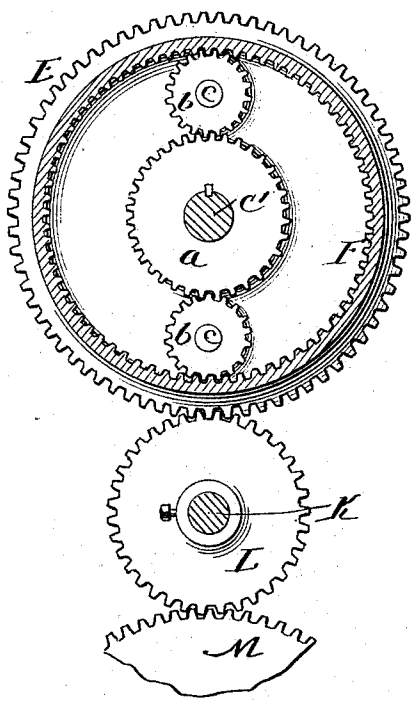


Fig. 4.

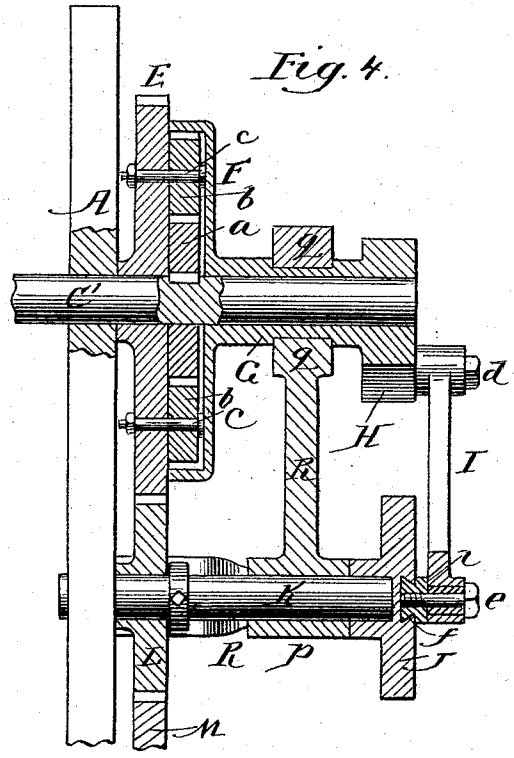
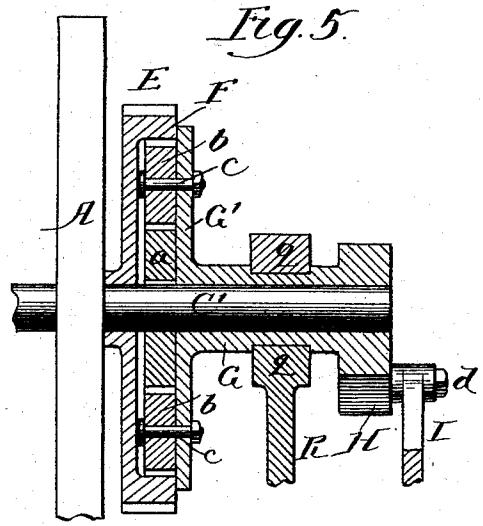


Fig. 5.



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UNITED STATES PATENT OFFICE.

LEONARD E. BROOKES, OF CHICAGO, ILLINOIS, ASSIGNOR TO HIMSELF AND WILLIAM H. SMITH, OF SAME PLACE.

PAPER-CUTTING MECHANISM FOR PRINTING-PRESSES.

SPECIFICATION forming part of Letters Patent No. 448,806, dated March 24, 1891.

Application filed December 2, 1889. Serial No. 332,349. (No model.)

To all whom it may concern:

Be it known that I, LEONARD E. BROOKES, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Paper-Cutting Mechanism for Printing-Presses; and I do hereby declare that the following is a full, clear, and exact description of the invention, that will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, forming a part hereof, in which—

Figure 1 is an end elevation. Fig. 2 is a side elevation. Fig. 3 is a sectional elevation of the internal gear and the driving-pinions. Fig. 4 is a sectional elevation of the several parts. Fig. 5 is a sectional elevation showing the pinions and the internal gear in a modified form.

This invention is primarily designed for use in connection with a printing-press where the sheets to be printed on are severed from a continuous web of paper by the action of cutting-cylinders, and has for its object to regulate the action of the cutting-cylinders to correspond to the feed of the web for producing sheets of different lengths; and its nature consists in the several parts and combination of parts hereinafter described, and pointed out in the claims as new.

In the drawings, A represents the frame.

B is the male cutting-cylinder, the shaft B′ of which is mounted in the frame A.

C is the female cutting-cylinder, the shaft C′ of which is mounted in the frame A. The cylinder B is provided with a knife and the cylinder C with a matrix, as usual.

D is a gear-wheel secured to the end of the shaft C′ and meshing with a gear-wheel D′ on the shaft B′ for driving the cylinder B from and with the cylinder C.

E is a gear-wheel having an external or outside gear and loosely mounted on the end of shaft C′.

F is a gear-wheel having an internal or inside gear and loosely mounted on the end of the shaft C′ adjacent to the gear E. The shaft C′ has keyed or otherwise secured thereto to lie within the gear-wheel F a pinion *a*, and this pinion *a* meshes with two pinions *b*, each of which mesh with the internal gear of the wheel F, as shown in Fig. 3. The pinions *b* are located on opposite sides of the pinion *a* in line with each other, and are each mounted on a spindle *c*, one end of each spindle, as shown in Fig. 4, passing through the body of the gear-wheel E and receiving a nut by which the spindle *c* is held in place.

G is the hub or sleeve of the gear-wheel F, mounted on the end of the shaft C′, so as to turn freely on the shaft.

H is an arm or crank extending out from the hub or sleeve G.

I is a rod attached at one end to a pin or pivot *d* in the end of the arm or crank H.

J is a disk having in its outer face a dovetail slot *g*, extending from the periphery to the center of the disk, as shown in Fig. 2, which slot *g* receives a sliding block *f*, having side faces to fit the slot *g*, and into this block *f* is entered a pin or pivot *e*, which attaches the end of the rod I to the block *f* on disk J, and, as shown, between the end of the rod I and the face of the disk J is a collar *i* around the pin or pivot *e* for locking the block *f* in its groove *g*, and the face of the disk J on one side of the slot *g* has a graduated scale *h* for determining the position at which to adjust the block *f* to give any desired throw to the crank H. The block *f*, when at the inner end of its slot *g*, is at the center of motion of the disk J, and in this position the crank H is not moved by the rod I; but if the block *f* be moved outward in its slot *g* it will revolve with the disk J and, through the rod I, reciprocate the arm or crank H more or less, according to the position of the block *f* in its slot *g*.

K is a shaft or spindle, in the outer end of which is keyed or otherwise secured the disk J, so as to revolve with the shaft, the inner end of the shaft being mounted in the frame A, as shown in Fig. 4.

L is a gear-wheel keyed or otherwise fastened to the shaft K to revolve such shaft, and also meshing with the gear-wheel E.

M is a gear-wheel meshing with the wheel L for driving such wheel and rotating the shaft or spindle K and the wheel E.

N is a shaft or spindle, on which is loosely mounted the hub or sleeve M′ of the gear-wheel M. This shaft N at its inner end is

secured to the frame A by a nut or otherwise, and its outer end has a flange or head *k* to enter a socket or opening *j* in the end of the hub or sleeve M′ and hold the hub or sleeve against end movement on the shaft or spindle N.

O is a gear-wheel loosely mounted on the sleeve M′ adjacent to the gear-wheel M, and this wheel is driven by a gear rotated from the printing-press or other motive power.

P is a hand-wheel keyed or otherwise fastened onto the end of the hub or sleeve M′.

Q is a yoke, the ends of which bear against the end face of the hub of the hand-wheel P, but do not touch the end face of the hub or sleeve M′. At the center of the yoke Q is a hub *l*, through which and the body of the yoke passes a screw *m*, having a head *n*, which bears against the hub *l* when the screw is in use, and this screw *m* enters a nut *o*, screwed into the end of the hub or sleeve M′, as shown in Fig. 1. The turning down of the screw *m* by the head *n* will force the ends of the yoke Q against the hand-wheel P, moving the wheel and tightly clamping the gear-wheel O between the hub of the hand-wheel and the wheel M, so that the rotation of the wheel O will turn the hub or sleeve M′ and drive the gear-wheel M and impart rotation to the parts driven therefrom.

R is a support attached to the frame A and extending up to furnish a bearing *p* for the shaft or spindle K and a bearing *q* for the sleeve G, as shown in Fig. 4.

S are the feed-rollers, through which the web of paper passes, as usual.

T are a series of pulleys on the delivery side of the cutting-cylinders for tapes *s*, by which the sheets are carried to the press, and, as shown, between the cutting-cylinders and the pulleys T is a series of fingers *r*, as usual, for bridging the space.

The gear-wheel O, when clamped to the wheel M by the action of the yoke Q and wheel P, will drive the wheel M, which wheel drives the wheel L, and this wheel rotates the shaft K and revolves the disk J, and also drives the wheel E, which wheel as it revolves carries around the pinions *b*, and these pinions *b* drive the pinion *a* to rotate the shaft C′ and revolve the cutting-cylinders C, and this shaft C′, through the gears D and D′, rotates the shaft B′ and drives the cutting-cylinder B. The gears D and D′ are one-half the diameter of the gear E, as is also the gear L, and the pinion *a* is one-half the diameter of the internal gear F and the pinions *b* one-half the diameter of the pinion *a*, and for dimensions the gears D, D′, and L can be twelve inches, the gear E twenty-four inches, the gear F twenty inches, the pinion *a* ten inches, and the pinions *b* five inches, and when the internal gear F is stationary the cylinders B and C will operate to sever the longest sheets of paper, the feed-rollers S traveling accordingly and with a speed to feed forward the web of paper as required. The feed-rollers are driven in the usual manner, and to change the speed of the web change-gears for the feed-rollers are employed, as usual. The internal gear F is locked and held stationary when the block *f* is at the inner end of its groove *g* and at the center of motion of the disk J, in which position the arm or crank H is immovable, and when the parts are in this position the pinions *b* will travel around with the gear E on the internal gear and impart a uniform rotation to the pinion *a* during the entire revolution of the gear E, and such rotation will drive the cutting-cylinders at a uniform speed their entire revolution, which speed corresponds to that of the feed-rollers, producing sheets of the longest length desired.

A change in the gear for the feed-rollers to make a slower feed for sheets of less length necessitates a change in the running of the cutting-cylinders to produce such shorter sheets, and this change is effected in the arrangement shown in Figs. 1, 2, 3, and 4 by oscillating the internal gear F through its sleeve G, the crank H, the rod I, and the disk J with the sliding block *f*, and the extent of the oscillation of the gear F depends on the position of the block *f*. The farther the block is from the center of motion of the disk J the greater the oscillation of the gear F, and the greater the oscillation of the gear F the shorter the sheets of paper produced.

The oscillation of the internal gear F will retard the speed of the cutting-cylinders in its travel in one direction and increase the speed in its travel in the opposite direction; but the combined two speeds will produce the normal speed for the cutting-cylinders, and this result is had by the movements of the arm or crank H, through the rod I, from the rotation of the disk J. The crank or arm H at the limit of its upward movement has no effect on the internal gear, and at this point the speed of the cutting-cylinders is normal. As the crank or arm descends, it will turn the gear F in the opposite direction to the travel of the cutting-cylinders and against the rotation of the pinions *b*, producing a retardation of these pinions and a consequent retardation of the pinion *a*, and such retardation will be the greatest at the half-way point in the travel of the crank or arm, and when the crank or arm has reached the limit of its descent the oscillation of the internal gear ceases and the cutting-cylinders are at their normal speed. The return of the crank or arm H will oscillate the internal gear in the opposite direction and in the direction of travel of the cutting-cylinders and with the direction of travel of the pinions *b*, producing an increased speed for such pinions and a consequent increased speed for the pinion *a*, and such increase will be the greatest at the half-way point in the return of the crank or arm H. The movement of the crank being uniform, it will be seen that the increase is as much greater than the normal speed as the decrease is less than the normal speed, and the two added will produce the normal speed at opposite points, just the same

as the two added at the limits of the crank movement produces the normal speed, and the result will be that for a continuous revolution the normal speed is maintained, but is retarded for half a revolution and increased for half a revolution.

The operation in cutting sheets of paper is as follows: The producing of the longest sheets is had by setting the block *f* at the center of motion of the disk J, which holds the crank H stationary and locks the internal gear F, so that the pinions *a* and *b* drive the cutting-cylinders to correspond to the speed of the web and the length of the sheet. If the speed of the feed-rollers is changed for a slower feed and a shorter sheet, the block *f* is moved out in its groove *g* to bring the center of the pin *e* at the figure or mark on the scale *h* indicating the length of the sheet, and the rotation of the disk J will carry around the pin *e*, reciprocating the rod I and moving the crank or arm H the distance required to oscillate the internal gear F and produce a retardation and increase in the speed of the cutting-cylinders for the cylinders to act and sever the web at a point to produce a sheet of the length for the feed of the rollers S, such length being from half a whole-length sheet up to a full-length sheet. The change in the length of the sheet will cause a change in the delivery of the sheet to the press by which the head of the sheet will fall as much short on the printing-cylinder as the sheet is less in length than the full sheet designed to be printed, and this necessitates a change in the position of the cutting-cylinders to advance the line of severence the distance of the difference in the length of sheet. This is accomplished by advancing the cutting-cylinders a distance equal to the difference in length between the full sheet and short sheet. The cutting-cylinders are advanced by loosening the screw *m*, relieving the pressure on the hand-wheel P from the yoke Q, and releasing the gear-wheel O, so that by turning the wheel P by hand the sleeve M′ will be turned, rotating the wheel M, which turns the wheel L and advances the wheel E, which, through the pinions *a* and *b*, shaft C′, gear D and D′, and shaft B′, will advance the cutting-cylinders, and when the cutting-cylinders have been advanced the required distance the screw *m* is turned to again clamp the wheel O to the wheel M by the action of the yoke Q through the wheel P. This advance of the cutting-cylinders brings the action of the knife at the same point in relation to the delivery of the sheet to the printing-cylinder as it was for the full-length sheet, which brings the head of the sheet correctly on the printing-cylinder, with the tail of the sheet short, which does not matter, as the head of the sheet is what is required to be correctly delivered. The change of the cutting apparatus from a short sheet to a long sheet is had by moving the block *f* back in its groove as required for the length of the sheet, and when changed from a short sheet to a long sheet the cutting-cylinders are adjusted for the head of the sheet by turning them backward instead of forward by loosening the screw *m* and turning back the wheel M. The internal gear in this construction by its oscillation produces the change in the speed of the cutting-cylinder, and, as shown, this gear is formed independent of the gear-wheel E; but this gear can be formed inside of the gear E, as shown in Fig. 5, in which case the internal gear would have a continuous rotation, and to produce the changeable speed the pinions *b* would have to oscillate, which is accomplished by the arrangement shown in Fig. 5, in which a plate G′ is formed with or attached to the sleeve G, and to this plate is attached the pinions *b*, by means of the pins or pivots *c*, in the the same manner as described for the attachment of the pinions *b* to the gear-wheel G. The operation is the same precisely as that described for the arrangement of Figs. 1, 2, 3, and 4, except that the pinions *b* are oscillated, instead of the internal gear F, by the action of the crank H, rod I, and rotary disk J.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with the cutting-cylinders, of a rotary disk, a sliding block carried by the disk, a crank, a rod connecting the sliding block and the crank, an oscillating internal gear, and a driving-gear for the cutting-cylinders, substantially as and for the purposes specified.

2. The combination, with the cutting-cylinders, of a rotary disk, a sliding block carried by the disk, a crank, a rod connecting the sliding block and crank, and an oscillating connecting-gear for driving the cutting-cylinders, substantially as and for the purposes specified.

3. The combination, with two rotary cutting-cylinders, of a gearing for rotating the cylinders, and an oscillating gear having a variable range of movement, substantially as specified.

4. The cutting-cylinders B C, gear E, pinions *a b*, and gear F, in combination with the crank H, rod I, disk J, and block *f*, substantially as and for the purposes specified.

5. The feeding-rolls S, cutting-cylinders B C, gear E, pinions *a b*, and gear F, in combination with the crank H, rod I, disk J, and block *f*, substantially as and for the purposes specified.

6. The gear E, pinions *a b*, and gear F, in combination with the crank H, rod I, rotary disk J, and sliding block *f* for rotating the cutting-cylinders to produce sheets of varying lengths, substantially as specified.

7. The gear E, pinions *a b*, gear F, and crank H, in combination with the rod I, disk J, sliding block *f*, rotating shaft K, and gear L, substantially as and for the purposes specified.

8. The combination, in a paper-cutting

mechanism for printing-presses, of a gear-wheel driving the gear-wheel of the cutting-cylinders and having an extension at its hub to form a sleeve, a gear-wheel loosely mounted on the sleeve, and a connection for the sleeve for moving its gear-wheel without moving the loose gear-wheel, substantially as and for the purposes specified.

9. The combination, in a paper-cutting mechanism for printing-presses, of a gear-wheel driving the cutting-cylinders and having an extension at its hub to form a sleeve, a loose gear-wheel mounted on the sleeve, a connection for the sleeve for moving its gear-wheel without moving the loose gear, and a lock for tightening the loose gear to revolve the sleeve, substantially as and for the purposes specified.

10. The combination, in a paper-cutting mechanism for printing-presses, of a gear-wheel driving the cutting-cylinders and having an extension at its hub to form a sleeve, a loose gear mounted on the sleeve, and a hand-wheel attached to the sleeve for moving its gear-wheel without moving the loose gear, substantially as and for the purposes specified.

11. The combination, in a paper-cutting mechanism for printing-presses, of a gear-wheel driving the cutting-cylinders and having an extension at its hub to form a sleeve, a loose gear mounted on the sleeve, a hand-wheel attached to the sleeve, and a locking-yoke for uniting the gear-wheel, its sleeve, and the loose gear-wheel, substantially as and for the purposes specified.

12. The combination, in a paper-cutting mechanism for printing-presses, of a gear-wheel driving the cutting-cylinders and having an extension at its hub to form a sleeve, a spindle on which the wheel and sleeve are mounted, a loose gear-wheel mounted on the sleeve, a hand-wheel attached to the sleeve, a yoke clamping the sleeve gear-wheel and the loose gear-wheel, and a set-screw for operating the yoke, substantially as and for the purposes specified.

13. The combination, in a paper-cutting mechanism for printing-presses, of a changeable-speed gear for the cutting-cylinder, a gear-wheel driving the main gear-wheel of the changeable-speed gear and having an extension at its hub to form a sleeve, a loose gear mounted on the sleeve, and a connection for the sleeve for moving the loose gear, substantially as and for the purposes specified.

14. The combination, in a paper-cutting mechanism for printing-presses, of a changeable-speed gear for the cutting-cylinders, a gear-wheel driving the main gear-wheel of the changeable-speed gear and having an extension at its hub to form a sleeve, a loose gear mounted on the sleeve, a connection for the sleeve to move the cutting-cylinders without moving the loose gear, and a lock for uniting the loose gear-wheel and the gear-wheel of the sleeve, substantially as and for the purposes specified.

15. The cutting-cylinders B C, gear-wheel E, pinions *a b*, gear-wheel F, crank H, rod I, rotary disk J, with sliding block *f*, shaft K, gear-wheel L, gear-wheel M, and sleeve M′, in combination with the hand-wheel P, substantially as and for the purposes specified.

16. The gear-wheel E, gear-wheel L, and gear-wheel M, having the sleeve M′, in combination with the gear-wheel O, loosely mounted on the sleeve M′, and hand-wheel P, secured to the sleeve M′ for adjusting the cutting-cylinders without rotating the wheel O, substantially as and for the purposes specified.

17. The gear-wheel E, gear-wheel L, and gear-wheel M, having the sleeve M′, in combination with the gear-wheel O, loosely mounted on the sleeve M′, hand-wheel P, attached to the sleeve M′, and yoke Q, clamping the gear-wheel M to the gear-wheel O, substantially as and for the purposes specified.

18. The gear-wheel E, gear-wheel L, gear-wheel M, having the sleeve M′ and spindle N, in combination with the gear-wheel O, loosely mounted on the sleeve M′, hand-wheel P, attached to the sleeve M′, and yoke Q, clamping the gear-wheels M and O together, substantially as and for the purposes specified.

19. The gear-wheel M, having the sleeve M′, and gear-wheel O, loosely mounted on the sleeve M′, in combination with the hand-wheel P, attached to the sleeve M′, for moving the wheel M without moving the wheel O, substantially as and for the purposes specified.

20. The wheel M, having the sleeve M′, and wheel O, loosely mounted on the sleeve M′, in combination with the hand-wheel P, attached to the sleeve M′, and yoke Q, clamping the wheels M and O together, substantially as and for the purposes specified.

21. The wheel M, having the sleeve M′, spindle N, and wheel O, loosely mounted on the sleeve M′, in combination with the hand-wheel P, attached to the sleeve M′, and yoke Q, clamping the wheels M and O together, substantially as and for the purposes specified.

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