

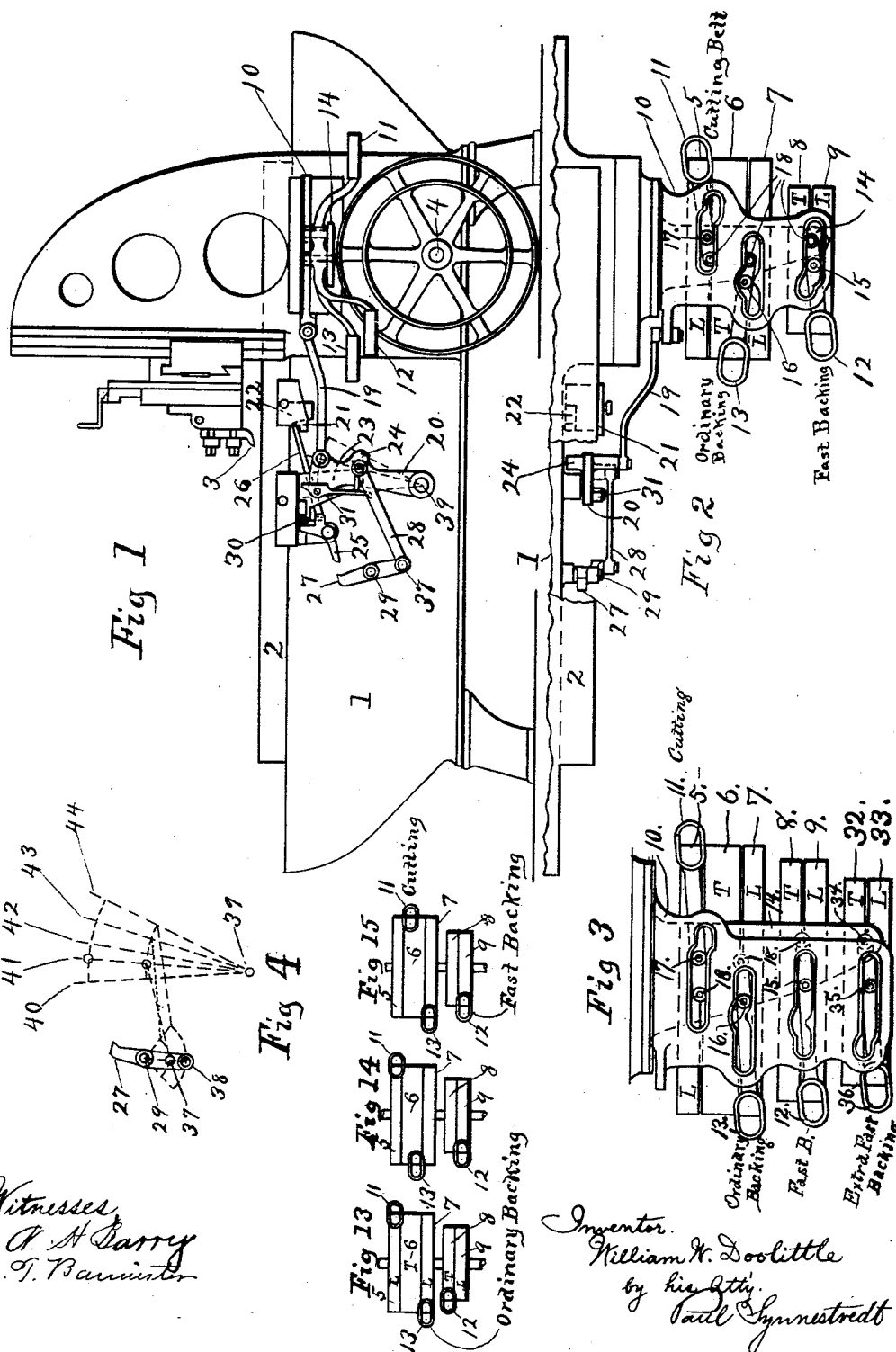
(No Model.)

W. W. DOOLITTLE.
PLANING MACHINE.

4 Sheets—Sheet 1.

No. 580,039.

Patented Apr. 6, 1897.



Witnesses
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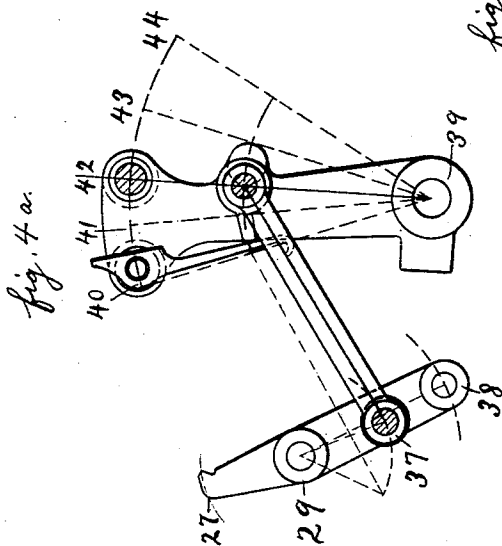
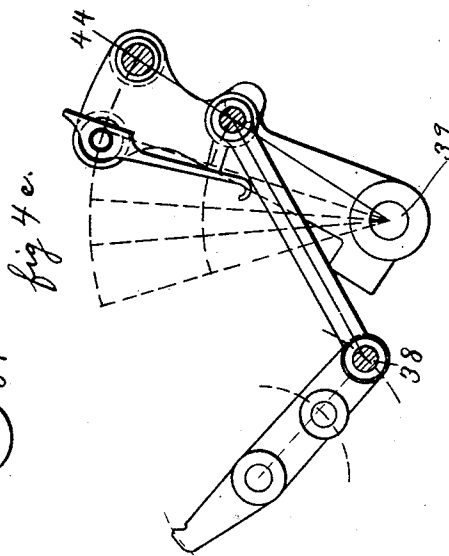
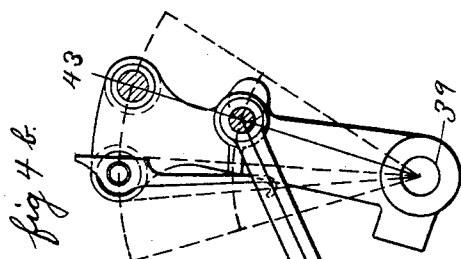
(No Model.)

4 Sheets—Sheet 2.

W. W. DOOLITTLE.
PLANING MACHINE.

No. 580,039.

Patented Apr. 6, 1897.



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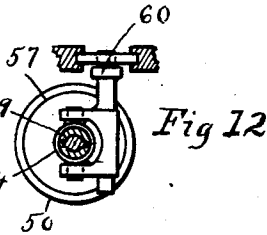
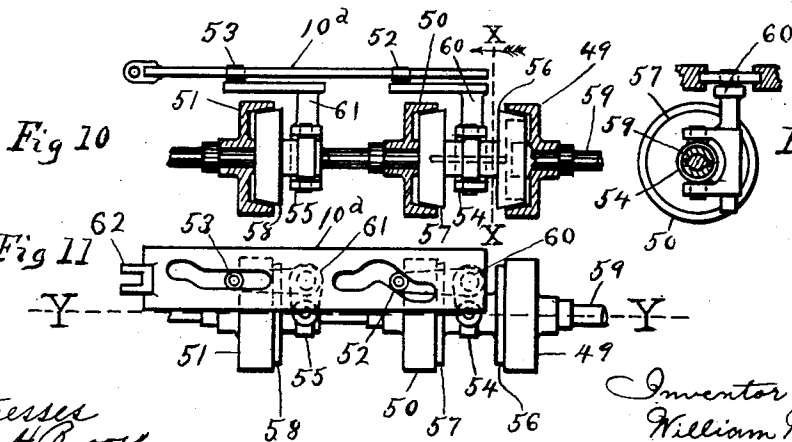
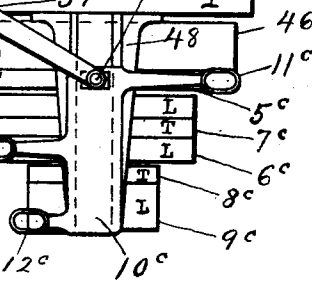
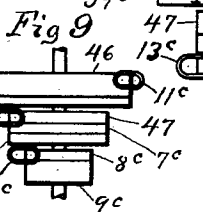
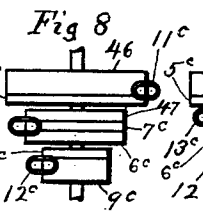
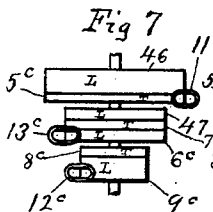
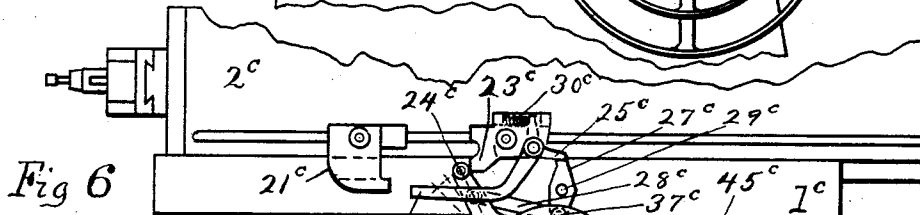
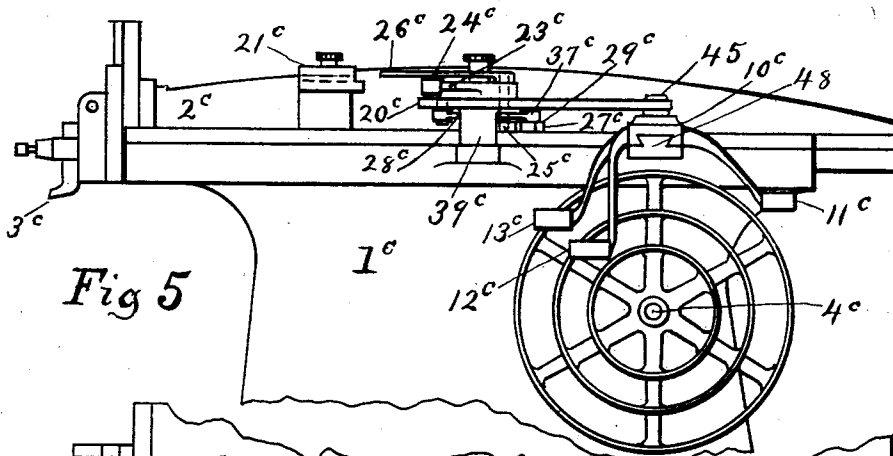
(No Model.)

W. W. DOOLITTLE.
PLANING MACHINE.

4 Sheets—Sheet 3.

No. 580,039.

Patented Apr. 6, 1897.



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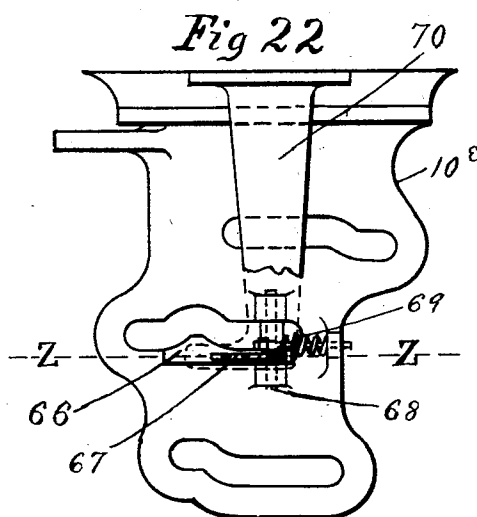
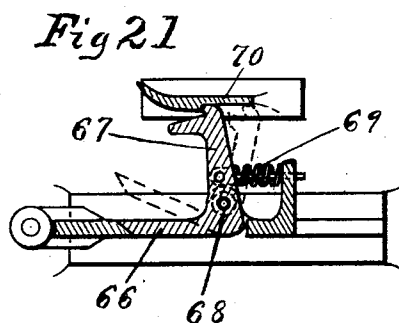
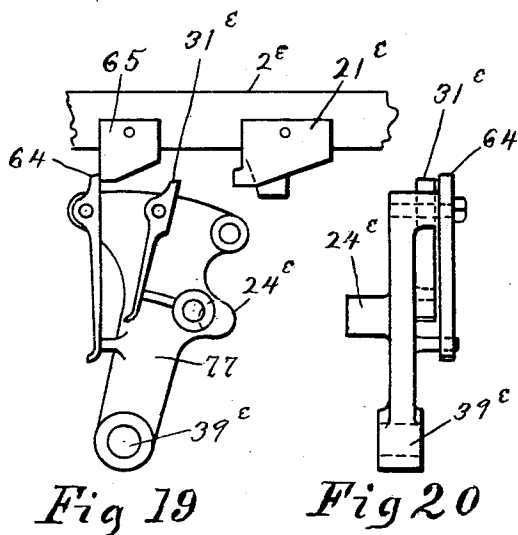
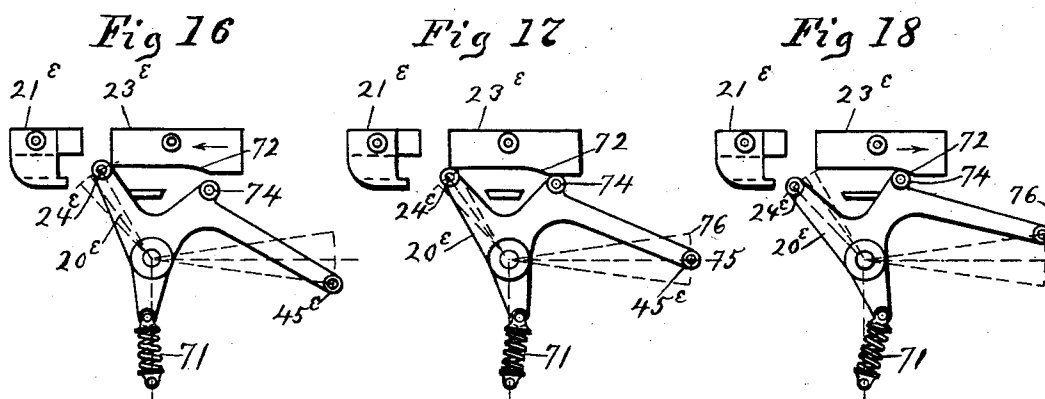
(No Model.)

4 Sheets—Sheet 4.

W. W. DOOLITTLE.
PLANING MACHINE.

No. 580,039.

Patented Apr. 6, 1897.



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UNITED STATES PATENT OFFICE.

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PLANING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 580,039, dated April 6, 1897.

Application filed March 14, 1896. Serial No. 583,178. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. DOOLITTLE, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Planing-Machines, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention is applicable to any form of planing-machine, whether it be of the type in which the work travels under the tool or of the type in which the tool travels over the work.

As at present constructed most planing-machines have two combinations of mechanism to drive them—one for cutting and the other for backing. These mechanisms are usually so arranged that the backing stroke will be more rapid than the cutting stroke, generally in the proportion of about three to one. It is perfectly obvious that even with such an arrangement much time is lost on the return stroke, especially on machines having a very long range of movement, and yet heretofore it has been found impracticable to increase the backing speed beyond the amount stated because of the violence of the jar and strain which is thrown on the mechanism at the time of reversal. On some machines employed in heavy work the momentum of the parts is so great that the reversal of their movement, even at the speed mentioned, strains not only the machine itself, but also the connected shafting. By my invention I am enabled to materially increase the backing speed without any additional strain on the mechanism when reversing. In fact, by my invention the backing speed may be accelerated to any degree of rapidity which may be desired, and the strain of reversal at the same time even reduced below that which is encountered in present practice.

To the accomplishment of the above-mentioned objects I provide, in combination with a planing-machine and its ordinary cutting and backing mechanism, a supplemental fast backing mechanism for increasing the backing speed above that of said ordinary backing mechanism and shifting devices (to be hereinafter particularly described) whereby said various mechanisms are actuated, the

manner of such actuation being in the nature of a cycle or regular series of movements occurring in the following order: First, the planer at the termination of the cutting stroke is reversed by throwing the cutting mechanism out of action and the backing mechanism into action; second, the backing mechanism is thrown out of action and the supplemental fast backing mechanism is brought into action; third, said supplemental fast backing mechanism is thrown out of action and the ordinary backing mechanism is again brought into action to reduce the speed before reversing, and, fourth, said ordinary backing mechanism is again thrown out of action and the cutting mechanism brought into action, reversing the machine preparatory to the commencement of another cutting stroke.

A further object of my invention is the combination and novel arrangement of certain mechanical constructions of preferred form by which the above-mentioned objects are most satisfactorily obtained, and which I will now proceed to describe in detail, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of a planing-machine of the class in which the work travels under the tool with my invention applied thereto. Fig. 2 is a broken plan view of the same. Fig. 3 is a partial plan view of a modification of the construction shown in Fig. 2. Fig. 4 is a diagrammatic side view of one of the detail parts of the shifting mechanism. Figs. 4^a, 4^b, and 4^c are views showing various positions of the device of Fig. 4. Fig. 5 is a side elevation of a planing-machine of the class in which the tool travels over the work with my invention applied thereto. Fig. 6 is a partial plan view of the same. Figs. 7, 8, and 9 represent in diagrammatic form the various positions of the shifting devices of Figs. 5 and 6 at different points in the stroke. Figs. 10, 11, and 12 are three views of a modification of my invention in which friction-clutches are substituted for shifting belts in a machine containing my invention. Figs. 13, 14, and 15 are diagrammatic representations of the different positions of the shifting mechanism of Figs. 1 and 2 at the different points of the stroke. Figs. 16, 17, and 18 illustrate a modification of the construction shown in

Figs. 5 and 6. Figs. 19 and 20 show a modified arrangement for reversing at the end of the backing stroke. Figs. 21 and 22 illustrate a construction embodying some of the advantages of my invention, but avoiding the exact cycle of operations above described.

For convenience of reference I have throughout the drawings marked the tight pulleys T and the loose pulleys L, and opposite the ends of the shifting arms I have marked the names of the respective belts which are controlled by them. It will thus be seen on an inspection of Figs. 1 and 2 that through the shifter 11 runs the ordinary cutting-belt and through the shifter 13 runs the ordinary backing-belt, and, further, that 6 is a tight pulley and 5 and 7 are loose ones. On the extreme end of the shaft 4 I provide a supplemental or fast backing mechanism comprising a tight pulley 8 and a loose pulley 9, arranged to run in the same direction as the pulley 7, but at a higher rate of speed. Around the belt which drives this last-mentioned pair of pulleys is arranged a shifter 12. Working in a guide in the side of the planer is provided a shifting plate 10, having cam-shaped grooves which engage with movable studs on the shifting arms, numbered, respectively, 15, 16, and 17, whereby the arms are operated as the plate is moved, the shifting arms being pivoted to a bracket 14 by fixed studs 18, as shown.

The cam-shaped groove which engages the movable stud 16 is so made as to impart to said stud a double movement—*i. e.*, a movement in one direction and then back again—this being accomplished by making this groove or slot with an offset or double incline, as will be clear on an examination of the drawings. This provision accomplishes two things—first, it throws the backing-belt off before the fast backing-belt is thrown into action, and, second, at the end of the backing stroke it momentarily shifts the backing-belt on after the fast backing-belt is thrown off, thus reducing the speed before reversal.

Connecting the plate 10 with a rocker-arm 20 is a link 19, and operating with the planer-table are two stops 21 and 23, these being of usual construction, except that on the stop 21 is cast an extra lug 22, for a purpose to be described later. On the arm 20 is cast a lug 24, adapted to be engaged by the stop 23 to reverse the machine at the end of the cutting stroke. Attached to the arm 20, which is pivoted to the bed at 39, is a link 28, which in turn is connected by a pivot-pin 37 to a short lever 27, pivoted to the bed at 29. In a position to engage the upper end of this lever 27 is arranged a pawl 25, which is normally held in the position shown in the drawings by the spring 30. Integral with the pawl 25 is a tail 26, which is provided for the purpose of holding the pawl out of action when the machine is set for such a short stroke as would bring the tail 26 under the lug or projection 22. This provision is made because it is not thought

desirable to use my fast backing mechanism on very short strokes, but this is not at all material to my invention. The projection 31, which is pivoted to the arm 20 to receive the impact of the stop 21, being a construction in common use and to the object of my device entirely immaterial, could also be omitted, if desired.

The operation of the mechanism above described is as follows: In the position shown in Figs. 1 and 2 the table has just completed its cutting stroke, and, the stop 23 having struck the lug 24, the cutting-belt has been thrown onto the loose pulley 5, and the ordinary backing-belt has been thrown onto the tight pulley 6, and the machine is beginning its backward travel, the shifting of the belt having been accomplished by the plate 10 in the usual manner. Now as the table continues on its backward movement the pawl 25 catches on the end of the lever 27 and through the link 28, arm 20, and link 19 moves the plate 10 still farther in the direction of reversal, as will be clearly understood by an examination of Fig. 1. This, by means of the cam-grooves in the plate 10, brings the shifters and their belts to the position shown in Fig. 13, throwing the ordinary backing-belt onto the loose pulley and the fast backing-belt onto the tight pulley, the speed being thus accelerated until about the end of the backing stroke, when the reverse movement takes place, (see Fig. 14,) the fast backing-belt being shifted to the loose pulley, the ordinary backing-belt being momentarily shifted to the tight pulley to reduce the speed, and then (Fig. 15) being shifted back to its loose pulley and the cutting-belt shifted to the tight pulley, reversing the machine preparatory to the commencement of another cutting stroke. If it be desired, still another and even more rapid movement may be added by the provision of an additional extra-fast backing mechanism adapted to be thrown into action after the fast backing mechanism has accelerated the speed to the point described. An arrangement for this purpose is shown in Figs. 3 and 4, the extra-fast backing-pulleys being marked 32 and 33 and the shifter 36, its pivot and roller being 34 and 35, respectively. To bring this device into operation, a fourth cam-groove is provided in the shifting plate at its outer end, and the pin, which is numbered 37 in Fig. 1, is moved down sufficiently far on the lever 27 to secure the needed additional range of movement of the plate 10. This is clearly illustrated in Figs. 4, 4^a, 4^b, and 4^c, No. 40 designating the position of the rocker-arm 20 at the point of reversal just before the beginning of a cutting stroke, No. 41 being the position of the same when all belts are on loose pulleys, No. 42 being its position when the reversal at the end of the cutting stroke takes place, No. 43 its position as the fast backing-belt is thrown into action, and No. 44 its position as the extra-fast backing-belt is brought into use.

It is of course to be understood that in the arrangement of the cam-grooves care must be taken to see that no two different belts will be on tight pulleys at the same time, one belt being shifted off just before or coincidentally with the shifting on of another.

Attention is now directed to Figs. 5, 6, 7, 8, and 9, in which is illustrated a modification of my invention as applied to a machine of the class in which the tool travels over the work. In these figures parts which correspond to parts in Figs. 1, 2, 3, and 4 are marked with the same numeral, but with the letter "c" added, as they are in some instances slightly different in form, although performing the same functions in substantially the same manner. In these figures, 1^c is the planer-body; 2^c, the ram; 3^c, the cutting-tool, and 4^c the shaft. With this construction no cam-plate is necessary, in its place being substituted the laterally-moving shifting plate 10^c, the three shifting arms being fixed to said plate, so as to secure simultaneous movement thereof. 20^c is the rocker-arm, and 21^c and 23^c are the stops which operate it. 25^c is the pawl, and 27^c the supplemental shifting lever against which it operates. The bracket 48 is provided with a guide on which works the combination-shifter 10^c. On account of the continuous movement of the shifter-arm 13^c in the same direction at each reversal it has been necessary in this arrangement of my invention to add an additional loose pulley onto which the ordinary backing-belt can be shifted as the fast backing-belt is thrown into action, and this has been numbered 47.

In Figs. 6 and 7 the shifters are shown in the position they occupy during the cutting stroke.

In Fig. 8 the stop 23^c has moved the arm 20^c so as to throw on the ordinary backing-belt, reversing the machine, and in the position of the parts shown in Fig. 9 the pawl 25^c has caught the end of the lever 27^c and thrown the shifters over to bring the fast backing-belt into action, all of which will be clearly understood by an examination of the views referred to, and especially Fig. 6.

In Figs. 10, 11, and 12 is illustrated a construction in which friction-pulleys have been substituted for shifting belts. Fig. 10 is a view, partly in section, on the line Y Y of Fig. 11, and Fig. 12 is a section on the line X X of Fig. 10, looking in the direction of the arrow. In these figures the shifting plate is marked 10^a, the three loose pulleys 49, 50, and 51, the shifting arms 60 and 61, their rollers 52 and 53, their collars 54 and 55, and the three tight pulleys 56, 57, and 58, respectively. As shown, 49 is for cutting; 50, which runs in the opposite direction and at a more rapid speed, is for ordinary backing, and 51, which runs in the same direction as 50, but at a higher rate of speed, is for fast backing. Considering the plate 10^a to be attached at the point 62 to the link 19 of Figs 1 and 2, the operation will now be apparent.

Figs. 16, 17, and 18 illustrate a modification of the construction shown in Figs. 5 and 6, in which the pawl 25^c, the lever 27^c, and their connections are dispensed with, the shifting lever proper, 20^c, being operated by the stops 21^c and 23^c and the spring 71. In the position shown in Fig. 16 the machine is near the end of the cutting stroke. As the stop 23^c strikes the roller-stud 24^c the lever 20^c moves to the position shown in Fig. 17, in which it will be noticed the end 45^c has moved to the position indicated at 75, but cannot go to the position marked 76 because of the roller 74 bearing against the under face of the stop 23^c. As soon, however, as the stop has moved back sufficiently far to permit the roller 74 to run up the incline 72 the spring 71 will move the lever 20^c to the position 76, as shown in Fig. 18, which corresponds to the position of the parts in Fig. 9, and in which the fast backing mechanism is brought into action.

The specific form of construction shown in Figs. 16, 17, and 18, with improvements thereon, forms the subject-matter of another application for Letters Patent filed by me November 20, 1896, Serial No. 612,793.

It is possible to construct a machine embodying some of the advantages of my invention without causing the shifting devices to go through the exact cycle of operations described in the beginning of this specification, and therefore, although I consider the constructions already described as preferable, I do not wish to be understood as limiting myself to the precise details given. To illustrate this point, I have shown in Figs. 21 and 22 a construction which will throw the ordinary backing-belt into and out of action at the beginning of the backward stroke, but need not operate at all to throw on the backing-belt to reduce speed before the reversal which precedes the cutting stroke. In these figures, 10^c is the shifting plate, and 66 the projection in the cam-groove which operates the ordinary backing-belt. This projection I have arranged to swing on a pivot 68 in such a manner that it will remain in place at the beginning of the backing stroke, but be tilted up out of operative position as the machine approaches the end of the backing stroke by means of the engagement of the arm 67 with the spring-arm 70, which is fastened to the body of the machine.

In the use of a construction similar to that last above described it might prove desirable that the fast backing mechanism be shifted out of action a sufficient length of time before the cutting-belt is again thrown on to allow the speed to reduce of itself somewhat before reversal. To accomplish this end, I have designed a construction (illustrated in Figs. 19 and 20) in which 77 corresponds to the lever 20 of Fig. 1, but has added to it an extra swinging projection 64, adapted to be struck by the stop 65, but so arranged as to allow the latter to slip by after the shifting devices have thrown the fast backing mech-

anism out of action, but before the second stop 21^e has abutted against the projection 31^e, which of course, as shown in Figs. 1 and 2, would reverse the machine.

5 Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a planing-machine the combination with its ordinary cutting and backing mechanism, of a supplemental fast backing mechanism, and shifting devices whereby said supplemental fast backing mechanism is brought into action as the ordinary backing mechanism is thrown out of action, and whereby said
10 fast backing mechanism is thrown out of action as said ordinary backing mechanism is again thrown into action, to reduce the speed before reversal, substantially as described.

2. In a planing-machine, the combination with its ordinary cutting and backing mechanism, of a supplemental fast backing mechanism, and shifting devices, comprising a cam-plate 10, operating-lever 20, supplemental lever 27, and pawl 25, combined and arranged
25 substantially as shown and described.

3. In a planing-machine, the combination with its cutting and backing mechanism, of a fast backing mechanism, and an extra-fast backing mechanism, and shifting devices
30 whereby the movements of said various mechanisms are controlled, substantially as described.

4. In a planing-machine the combination with a cutting and backing mechanism, of a cam-plate 10, a slot in said plate engaging a stud 16, said slot being constructed with an offset or double incline, means for reciprocating said plate, and shifting mechanism operated by said stud, substantially as described.
35

40 5. In a planing-machine the combination with its ordinary backing mechanism, and a

shifting arm and stud for moving the same, of a cam-plate 10 containing a slot adapted to receive said stud, said slot being made with an offset or double incline, adapted to throw
45 said backing mechanism both into and out of action by movement of said plate in one direction, in a manner substantially as shown and described.

6. In a planing-machine the combination with a cutting, backing, and fast backing mechanism, of three simultaneously-moving shifting arms, for throwing said mechanisms into and out of operation, and suitable devices for operating the same, substantially as
50 described.

7. In a planing-machine, the combination with a cutting, backing, and fast backing mechanism, and shifting devices for actuating the same; of a rocker-arm so constructed
60 as by a partial movement to throw said cutting mechanism out of action and said backing mechanisms into action, and then by a further movement, to throw said backing mechanism out of action and said fast backing mechanism into action, connections between said rocker-arm and said shifting devices, and suitable means for actuating said
65 rocker-arm, substantially as described.

8. In a planing-machine the combination of a cutting-belt, a backing-belt, a fast backing-belt, tight and loose pulleys for carrying the same, shifting devices controlling the movements of said belts, and mechanism co-acting therewith whereby after reversal said
70 backing-belt is thrown onto its loose pulley and the fast backing-belt is shifted onto its tight pulley, substantially as described.

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