

No. 810,766.

PATENTED JAN. 23, 1906.

H. JOHN.
DRIVING MECHANISM.
APPLICATION FILED JAN. 6, 1905.

3 SHEETS—SHEET 1.

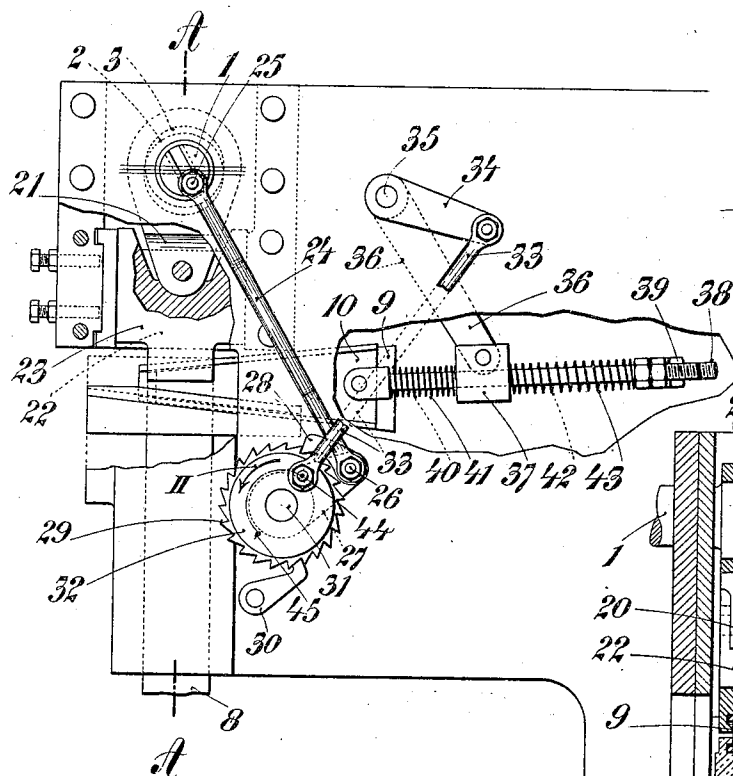


Fig. 1.

Fig. 2.

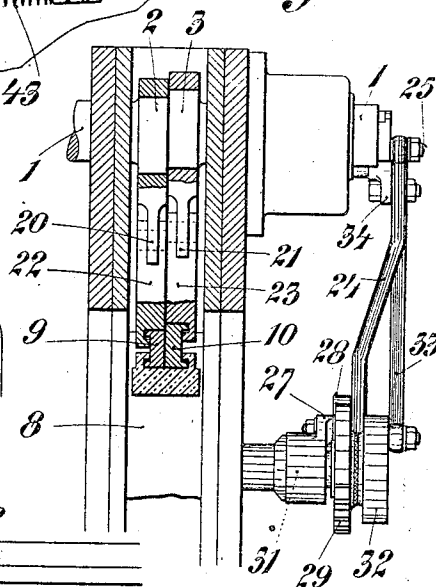
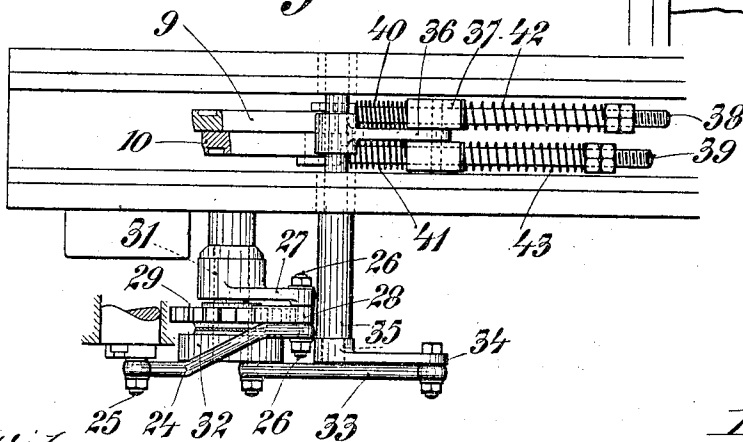


Fig. 3.



Witnesses:

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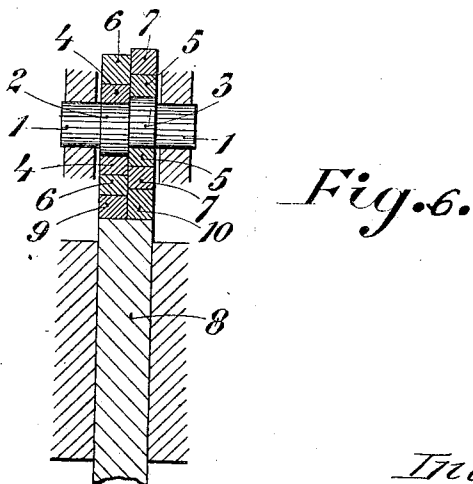
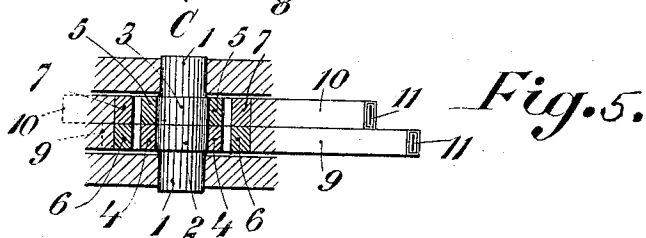
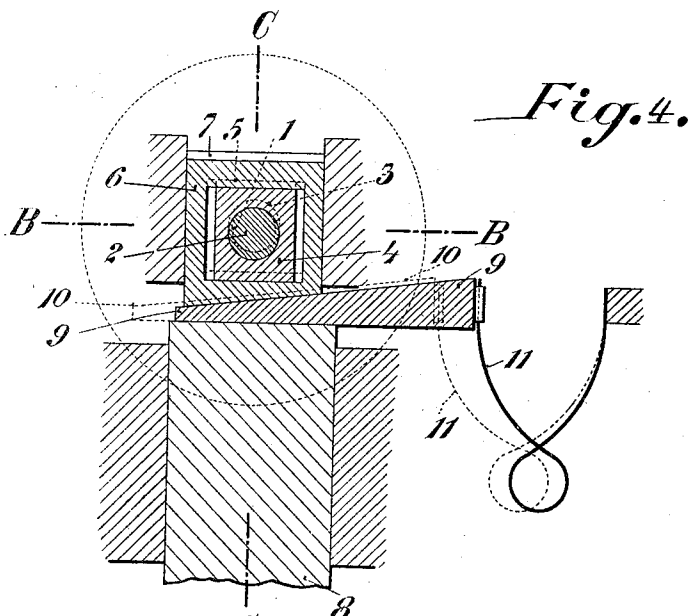
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3 SHEETS—SHEET 2.



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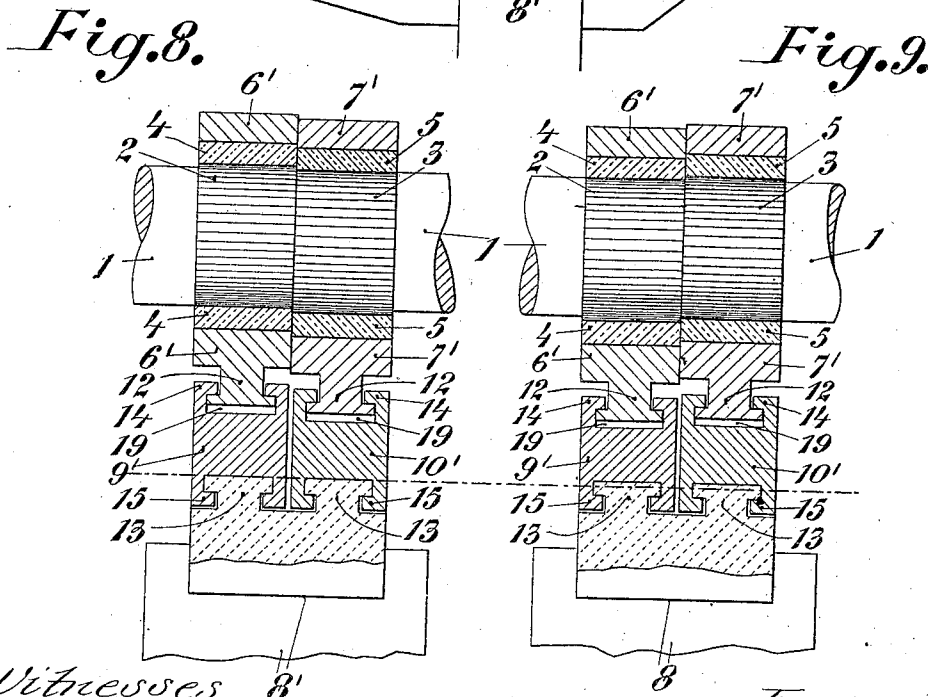
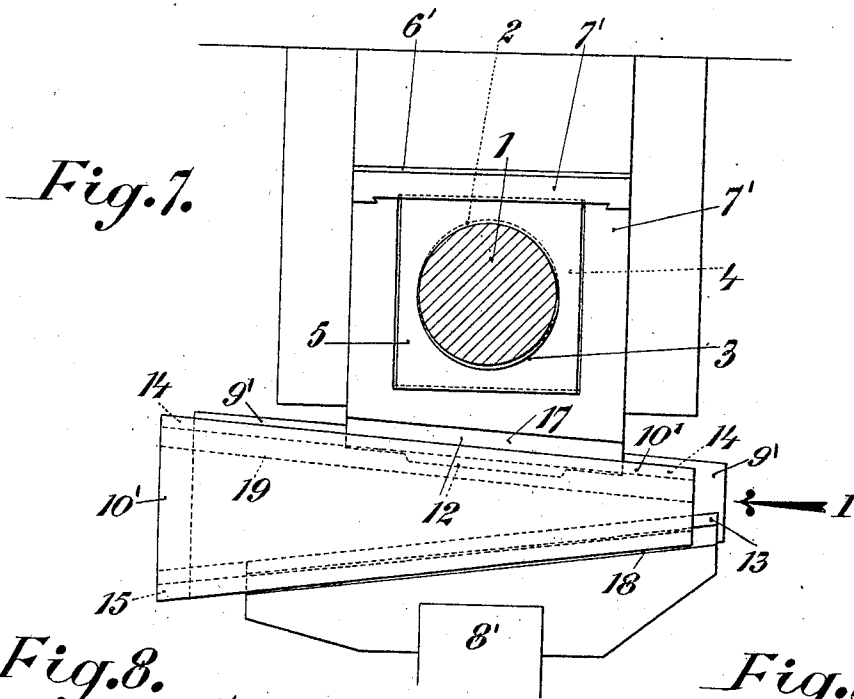
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3 SHEETS—SHEET 3.



Witnesses 8'

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UNITED STATES PATENT OFFICE.

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DRIVING MECHANISM.

No. 810,766.

Specification of Letters Patent.

Patented Jan. 23, 1906.

Application filed January 6, 1905. Serial No. 239,939.

To all whom it may concern:

Be it known that I, HUGO JOHN, manufacturer, a subject of the King of Prussia, German Emperor, residing at Erfurt, in the Kingdom of Prussia, German Empire, have invented certain new and useful Improvements in or Relating to Driving Mechanism, of which the following is a specification.

My invention relates to a driving mechanism for mechanically-operated tools, such as punches, shears, and presses for use in the working of metals. The intermittent feed movement of the tool is effected by inserting wedges between the vertically-reciprocating driving part and the tool-holder at the moment when the driving part recedes after having driven the tool or the tool-holder forward, when a space is produced between the driving part and the tool-holder. This space is then filled by a wedge which is driven into it in either a positive or a negative manner, so that when the pressure is again brought to bear upon the tool the driving part acts with the aid of and through the inserted wedge directly on the tool-holder, whereby intermittent feeding motion is given to the tool.

An intermittent driving mechanism according to this invention is illustrated, by way of example, in the accompanying drawings, in which—

Figure 1 is an elevation, partly in section, of one construction of driving mechanism according to this invention. Fig. 2 is a cross-section on the line A A of Fig. 1. Fig. 3 is a plan of the same, Fig. 4 being a longitudinal section through the mechanism, Fig. 5 a horizontal section on the line B B of Fig. 4, and Fig. 6 a vertical section on the line C C of Fig. 4. Figs. 7, 8, and 9 are respectively an elevation and vertical sections, on a larger scale, illustrating a device for automatically arresting the tool-holder after it has been moved forward by the holder.

The driving mechanism for machine-tools according to this invention chiefly comprises two eccentrics arranged at an angle of one hundred and eighty degrees to each other, the motion of the said eccentrics being transmitted by means of slide pieces or blocks to two wedges introduced in a positive or negative manner between the said blocks and the tool-holder. In this way one wedge acts alternately as a driving-wedge and the other as a locking-wedge. While the acting wedge is standing still the locking-wedge is positively

or non-positively introduced into the space between the tool-holder and the blocks.

The working of the intermittent driving mechanism will be clearly understood on examining Figs. 4, 5, and 6. On the rotating shaft 1 are mounted two eccentrics 2 3, arranged at an angle of one hundred and eighty degrees relatively to each other. The eccentrics 2 and 3 are inclosed by blocks 4 5, which are guided in slide-blocks 6 7 in such manner that they have free play only in one direction of movement at a right angle to the direction of the movement of the tool-holder 8. Between the slide-blocks 6 7 and the tool-holder 8 are placed movable wedges 9 10. To this end the slide-blocks 6 7 are tapered at their bottom surfaces to suit the angle of the wedge. (See Fig. 4.) These wedges 9 10 are caused to move at right angles to the movement of the tool in a negative manner by means of springs 11, weights, or the like or positively by a mechanical gear, preferably connected to the shaft 1.

The working of the mechanism is as follows: Assuming that the eccentric 2 begins to turn with its eccentricity downward, the block 4 will move downward, the slide-block 6 being also simultaneously moved downward. The slide-block 6 therefore presses upon the wedge 9, which transmits the downward movement to the tool-holder 8, and therefore to the tool itself. At the same time upon the descent of the eccentric 2 the eccentric 3 and its block 5, with the corresponding slide-block 7, rise, the clearance between the tool-holder 8 and the slide-block 7 is increased, and the wedge 10 forced farther into the said clearance. When the driving-shaft 1 continues to rotate, the eccentric 3 exercises the pressure which was formerly exercised by the eccentric 2, so that the wedge 10 acts as a driving-wedge and the wedge 9 as a locking-wedge. The driving mechanism works, therefore, in steps, or intermittently.

The driving mechanism described is illustrated in Figs. 7, 8, and 9 in a form in which the tool-holder is automatically raised after the work has been done, which constitutes a special advantage, because, as is well known, the raising of, say, a punch from the hole punched requires in most cases a considerable amount of work. In order to bring about this automatic rising of the tool-holder after each blow or stroke, the slide-blocks 6' 7' are connected to the tool-holder 8' by means of the wedges 9' 10' in such manner that during

the ascent of the eccentrics 2 and 3 the slide-blocks 6' 7' cause the tool-holder 8' to participate in their movement. At the same time the wedges are moved either in a negative or positive manner in such manner that they gradually move from the thin to the thick end in the direction of the arrow I of Fig. 7—that is to say, the distance between the tool-holder and the slide-blocks 6' and 7' is automatically and progressively decreased. A construction of this device is shown in Figs. 7, 8, and 9. The slide-blocks 6' 7' are provided with T-shaped lugs or guides 12, and the tool-holder 8' is provided with similarly-shaped guides 13. The corresponding claw-shaped grooves 14 and 15 in the wedges 9' and 10' engage the said guides. The wedges 9' and 10' are moved in the direction of the arrow I, Fig. 7—that is to say, both toward the same end. The slide-blocks 6' 7' and the tool-holder 8' are preferably provided with inclined paths or guides 17 and 18, corresponding to the angle of the wedges. In the position shown in Fig. 8 the eccentric 3 is in its lowest position and when it continues to turn raises the tool-holder 8' by means of the wedge 10, which has just stopped. The eccentric 2 passes downward from its highest position, and its movement is followed by that of the slide-block 6'. The wedge 9', on which there is no load, is moved in the direction of the arrow I. In this way the guide-lugs 12 of the slide-block 6 and the guides 14 of the wedge 9' always remain in engagement. When the lowest position is reached, the wedge 9' becomes the coupling-wedge, the eccentric 2 rises, and the eccentric 3 descends. The eccentric 2 raises the tool-holder 8', the wedge 10' pressing in the direction of its thicker end. Although the wedge which at the time does not raise the tool-holder ought to move automatically toward its thick end, whereby the space between the tool-holder and the eccentric descending at the time is reduced in accordance with the height of the rise plus the extent of the descent of the other eccentric, it will be found preferable in practice to have a space 19 between the guides 14 of the wedges 9' 10' and the guides 12 of the slide-blocks 6' 7' in order that, in case of a stoppage of the automatic movement of the inoperative wedge in the direction of the arrow I, the tool-holder will not be destroyed by the wedge which is acting as a locking-wedge at that time. The arrangement of a clearance is also advantageous, as the action of the wedges is to be neutralized during the continued rotation of the driving-shaft 1—that is to say, if the machine is to be stopped. It is also preferable to limit the relative movement of the wedges by providing suitable stops.

In the step-driving mechanism, hereinbefore described, the wedges are driven in an ordinary—that is to say, non-positive or neg-

ative—manner. In such adjustable wedges the movement of the wedge by the spring can be obtained in a positive manner from the driving-shaft of the machine or the eccentric-shaft 1 by gradually and positively compressing the springs for moving the wedges, so that the movement of the wedges takes place with the compression of the springs. This movement of the wedges by positive springs can also be utilized in the construction shown in Figs. 7, 8, and 9, in which the wedges are moved in a negative manner, and the springs can be compressed by a device positively operated from the driving-shaft 1 of the machine for the purpose of moving the wedges toward their thicker end. This arrangement is shown in the machine illustrated in Figs. 1, 2, and 3. 1 is the eccentric-shaft, which by means of links 20 21 transmits the movement of the two eccentrics 2 3, arranged at an angle of one hundred and eighty degrees to each other, to slide-blocks 22 23. Under the slide-blocks are arranged wedges 9 10, acting on the tool-holder 8 and provided with guides, as shown in Figs. 7, 8, and 9, for the purpose of raising the tool-holder 8 after a stroke has been made. A rod 24 is pivoted to the driving-shaft 1 by means of an eccentric-pin 25, Fig. 2. Through the bottom end of the rod 24 there passes a bolt 26 of a lever 27. On the same bolt 26 is mounted a pawl 28, engaging a ratchet-wheel 29. At each complete revolution of the shaft 1 the pawl 28 moves the ratchet-wheel 29 forward to the extent of one or more teeth, while a locking-pawl 30 prevents any return. The ratchet-wheel 29 is mounted loose on a fixed pin 31. On the same pin 31 in front of the ratchet-wheel 29 is mounted also loosely a disk 32. The ratchet-wheel 29 is adjustable to a very small extent on the pin 31 and is provided on its side facing the disk 32 with clutch-teeth or surface capable of engaging with similar teeth or surface on the disk 32 when, owing to the longitudinal movement of the ratchet-wheel by a lever or any other desired device, the ratchet-wheel 29 is moved toward the disk 32. In that case the disk 32 moves round with the ratchet-wheel 29, and in this way a rod 33, pivoted on the disk, is moved. The rod 33 engages at the top with an arm 34, which effects an up-and-down swinging movement during a complete revolution of the disk 32. On the shaft 35 of the arm 34 is mounted an arm 36, pivoted at its other end to a cross-bar 37 of the wedge-driving gear. The cross-bar 37 is loosely mounted on two spring-carrying rods 38 39, hinged to the front ends of the wedges 9 10. On the rods 38 39 are mounted springs 40 41 for effecting the advance of the wedges, which can be compressed in a suitable manner. Behind the cross-bar 37 are mounted springs 42 43 for returning the wedges, which can also be compressed to a certain extent.

The preliminary compression of the springs 40 41 42 43 is effected by means of nuts.

From the above description it will be seen that the action is as follows: Owing to the rotation of the disk 32 in the direction of the arrow II from the point 44 to the point 45, this movement is positively transferred by the rod 33 and arms 34 36 to the cross-bar 37, so that the springs 40 41 are correspondingly compressed. In this way the one of the wedges 9 10 which happens to be free at the time is moved forward by the compressed spring 40 or 41—that is to say, the movement of the wedge is effected by a spring compressed in a positive manner. This takes place until the point at which the disk 32 is connected with the rod 33 moves from the position 44 to 45. From that point up to the reaching again of the point 44 the wedges return—that is to say, the tool-holder 8 rises—the cross-bar 37 progressively acting on the springs 42 43, whereby the wedges which happen to be free are withdrawn in a non-positive manner. The operation is repeated as long as the machine is working and the clutch-faces between the ratchet-wheel 29 and the disk 32 remain in engagement. This disengagement of this clutch immediately stops the wedge-driving and the wedges, and therefore, also, the tool-holder. This stoppage can be brought about in any position of the support at or between the two limits. The same result is also obtained by releasing the pawl 28.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. An intermittent driving mechanism for machine-tools, comprising a pair of eccentrics arranged at an angle of one hundred and eighty degrees with respect to each other, slide members for transmitting the movement of the eccentrics to the tool, and a pair of wedges operating at an angle with respect to the direction of the movement of the tool and interposed between the said members and the tool-holder, one of said wedges acting alternately as a lock and the other of said wedges acting alternately as a driving means for the tool.

2. An intermittent driving mechanism for machine-tools, comprising a pair of eccentrics arranged at an angle of one hundred and eighty degrees with respect to each other, slide members for transmitting the movement of the eccentrics to the tool, a pair of wedges operating at an angle with respect to the direction of the movement of the tool and interposed between the said members and the tool-holder, one of said wedges acting alternately as a lock and the other of said wedges acting alternately as a driving means for the tool, and means for operating the wedges.

3. A driving mechanism for machine-tools,

comprising a pair of eccentrics arranged at an angle of one hundred and eighty degrees with respect to each other, blocks inclosing said eccentrics, slide members for guiding said blocks and adapted to transmit the movement of the eccentrics to a tool-holder, and a pair of wedges interposed between the members and the tool-holder, moving in a direction at an angle with respect to the direction of the movement of the tool-holder, one of said wedges alternately acting as a lock and the other of said wedges alternately acting as a driving means during the movement of the tool-holder.

4. A driving mechanism for machine-tools, comprising a pair of eccentrics arranged at an angle of one hundred and eighty degrees with respect to each other, blocks inclosing said eccentric, slide members for guiding said blocks and adapted to transmit the movement of the eccentrics to a tool-holder, a pair of wedges interposed between the members and the tool-holder, moving in a direction at an angle with respect to the direction of the movement of the tool-holder, one of said wedges alternately acting as a lock and the other of said wedges alternately acting as a driving means during the movement of the tool-holder, and means for operating the wedges.

5. An intermittent driving mechanism for machine-tools comprising a pair of wedges moving in a direction at an angle with respect to the direction of movement of a tool-holder, one of said wedges alternately acting as a lock and the other as a driving means for the holder.

6. An intermittent driving mechanism for machine-tools, comprising a pair of wedges moving in a direction at an angle with respect to the direction of movement of a tool-holder, one of said wedges alternately acting as a lock and the other as driving means for the holder, and means for operating said wedges.

7. An intermittent driving mechanism for machine-tools, comprising means for operating a tool-holder, of a pair of wedges operating between said means and tool-holder and moving in a direction at an angle with respect to the direction of the movement of the tool-holder, one of said wedges alternately acting as a lock and the other of said wedges alternately acting as a drive for the tool-holder during the operation thereof.

8. An intermittent driving mechanism for machine-tools, comprising means for operating a tool-holder, of a pair of wedges operating between said means and tool-holder and moving in a direction at an angle with respect to the direction of the movement of the tool-holder, one of said wedges alternately acting as a lock and the other of said wedges alternately acting as a drive for the tool-holder during the operation thereof, and means for operating the said wedges.

9. An intermittent driving mechanism for machine-tools, comprising a pair of eccentrics, driving-blocks inclosing said eccentrics and operated thereby, and slide members for
5 guiding the said blocks.

10. An intermittent driving mechanism for machine-tools, comprising a pair of eccentrics arranged at an angle of one hundred and eighty degrees with respect to each other,
10 slide members for transmitting the movement of the eccentrics to the tool, a pair of wedges operating at an angle with respect to the direction of the movement of the tool and interposed between the said members and a
15 tool-holder, one of said wedges alternately acting as a lock and the other of said wedges alternately acting as a driving means for the tool, and compression-springs for moving the wedges.

20 11. An intermittent driving mechanism for machine-tools, comprising a pair of eccentrics arranged at an angle of one hundred and eighty degrees with respect to each other, slide members for transmitting the move-
25 ment of the eccentrics to the tool, a pair of wedges operating at an angle with respect to the direction of the movement of the tool and interposed between the said members and the tool-holder, one of said wedges alternately
30 acting as a lock and the other of said wedges alternately acting as a driving means for the tool, compression-springs for moving the wedges, and operating means for the said springs.

35 12. An intermittent driving mechanism for machine-tools, comprising a pair of wedges moving in a direction at an angle with respect to the direction of movement of a tool-holder, one of said wedges alternately acting as a
40 lock and the other as a driving means for the holder, springs for moving the wedges, and operating means for the springs.

45 13. An intermittent driving mechanism for machine-tools, comprising a pair of wedges moving at an angle with respect to the direction of the movement of the tool and acting as a lock and drive for the tool.

14. An intermittent driving mechanism

for machine-tools, comprising a pair of wedges moving in a direction at an angle with respect
50 to the direction of movement of the tool and one of said wedges alternately acting as a lock and the other of said wedges alternately acting as a drive for the tool.

15. An intermittent driving mechanism
55 for machine-tools, comprising a pair of wedges operating at an angle with respect to the direction of the movement of the tool and each of said wedges alternately acting as a lock and drive for the tool during the intermittent op-
60 eration thereof.

16. An intermittent driving mechanism for machine-tools, comprising a pair of wedges moving at an angle with respect to the direction of the movement of the tool and acting
65 as a lock and drive for the tool-holder and adapted to automatically withdraw the tool-holder after it has been moved forward, and a tool-holder associating with the said wedges.

17. An intermittent driving mechanism
70 for machine-tools, comprising a pair of wedges moving in a direction at an angle with respect to the direction of movement of the tool and one of said wedges alternately acting as a lock and the other of said wedges alternately
75 acting as a drive for the tool-holder and adapted to automatically withdraw the tool-holder after it has been moved forward, and a tool-holder associating with the said wedges.

18. An intermittent driving mechanism
80 for machine-tools, comprising a pair of wedges operating at an angle with respect to the direction of the movement of the tool and each of said wedges alternately acting as a lock and drive for the tool-holder during the inter-
85 mittent operation thereof and adapted to automatically withdraw the tool-holder after it has been moved forward, and a tool-holder associating with the said wedges.

In testimony whereof I have hereunto set
90 my hand in presence of two subscribing witnesses.

HUGO JOHN.

Witnesses:

ERNST EBERHARDT,
OSKAR SACHS.