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FEED GEARS

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Fig. 1.

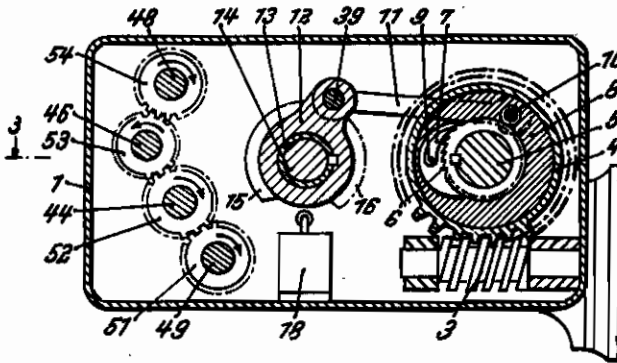


Fig. 4.

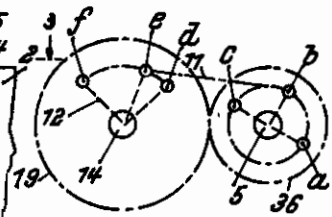


Fig. 2.

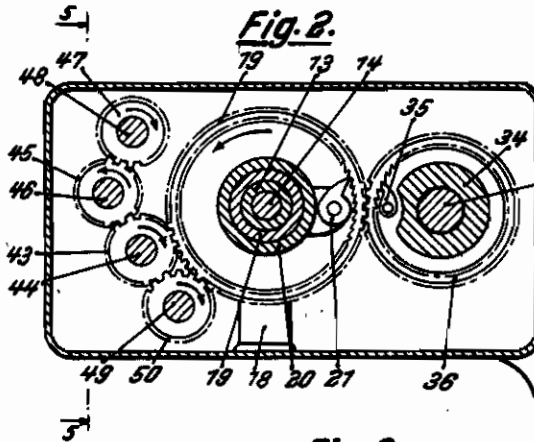


Fig. 5.

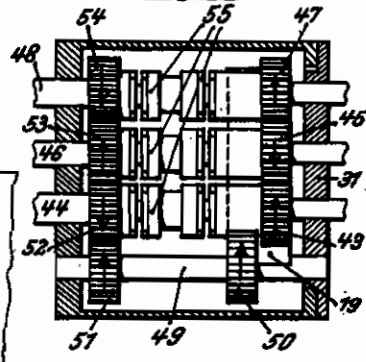
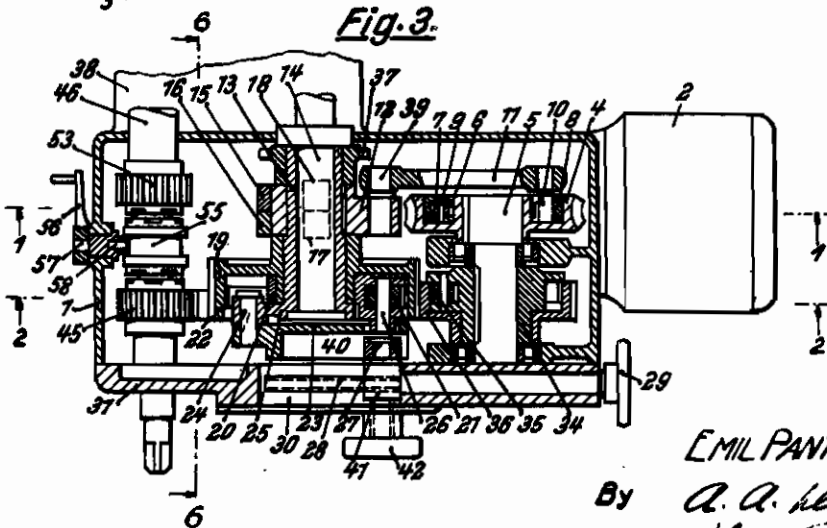


Fig. 3.



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My invention relates to improvements in feed gears for the feed motion and the high speed adjustment of the slide of planing machines or the like. Object of these improvements is a feed gear which is simple and cheap and which can easily be attached to the planing machine. The invention consists in the arrangement of means for transmitting the one direction of rotation of the motor for the feed motion of the slides and in the arrangement of means for transmitting the other direction of rotation of the motor for the high speed adjustment of the slides.

Other objects of the improvements will appear from the following description.

The accompanying drawings show one example of how to execute the invention, and this example will clearly explain the idea of the invention.

In said drawings,

Fig. 1 is a vertical section through the gear box on the line 1—1 of Fig. 3,

Fig. 2 is a section on line 2—2 of Fig. 3,

Fig. 3 is a horizontal section on line 3—3 of Fig. 1,

Fig. 4 shows—schematically—the end positions of the crank gear, and

Fig. 5 is a section on line 5—5 of Fig. 2.

The electric motor 2 is attached to the gear box 1 which is fastened to the cross rail 30 of the planing machine and said electric motor by means of worm 3 drives the worm wheel 4 which is firmly connected with the feed rod 5. Inside the worm wheel 4 there are on a hub the feed teeth 6 into which a feed pawl 7 can catch. A crank pin 10 is screwed into the pawl-carrier 8 on which the pawl bolt 9 is supported; said crank pin 10 will swing to and fro the crank arm 12 by means of the crank shaft 11 and by means of the pin 39.

This crank arm 12 is firmly attached to the bush 13 which turns round the fixed pin 14, and which by means of the crank shaft is made to swing to and fro. Two cams 15, 16 are connected with the crank 12, and these cams act upon two endswitches 17, 18 for the electric motor 2, said switches being arranged within the lower part of the gear box 1.

The following transmission of the gear motion from the bush 13 is effected in the well known manner.

The bush 13, see Fig. 3, carries the loose or moveable feed wheel 19 and a loose pawl ring 20 runs on its inside hub. The feed pawl 21 on this pawl ring 20 catches into the inside teeth 22 of the feed wheel 19. The oscillating movement of the bush 13 is transmitted by means of a lever

23 to the pawl ring 20; one end of the lever 23 is connected by means of a joint pin 24 with the oscillating arm 25 of the bush 13, whereas the pawl pin 26 of the pawl ring 20 catches into the other end of said lever 23. An immovable pin 27 catches into a notch 40 of the lever 23 which can swing round said pin 27. The position of the pin 27 can be altered in the slot 30 of the box cover 31 by the screw 28 and nut 41 by means of the hand wheel 29. The pin 27 is fastened by means of the nut 42. The more pin 27 approaches the pawl pin 26, the smaller will be the movement of this latter and hence the way of the pawl 21. By a small adjustment of the pin 27, made whilst the machine is running, the way of the pawl pin 26 and of the pawl 21 can therefore be modified in this well known manner, and this means that the length of the feed of the saddles is changeable.

The rotation of the feed wheel 19 is, in the well known manner, transmitted to the spindles of the saddles which slide on the cross rail of the planing machine.

As will be seen from Fig. 5 the wheel 43 on the spindle 44 catches into the feed wheel 19 and (see Figure 2) shaft or spindle 46 is driven by wheel 45 and shaft or spindle 49 is driven by wheel 47.

In the lower part of the gear box 1 there is a shaft 49 to which the wheels 50 and 51 are fastened. The wheel 50 likewise catches into the feed wheel 19 the teeth of which are twice as broad as those of the wheels 43 and 50 which however do not catch into each other.

From the wheel 51 the shafts 44 and 48 can be driven by means of the wheels 52, 53 and 54 (see Fig. 1.)

On each shaft there is a clutch 55 which a lever 56 can shift by means of a bolt 58 eccentrically arranged in connection with the lever-shaft 57. The direction of rotation of the wheels 52, 45 and 54 is the reverse of that of the wheels 43, 53, 47; by moving the clutches the feed rods 44, 46 and 48 will therefore, as the case may be, rotate to the right, rotate to the left or stop.

Another pawl carrier 34 is firmly connected with the feed shaft 5 for the purpose of a quick adjustment; said pawl carrier 34 drives the intermediate wheel 36 by means of a high speed pawl 35 (see Fig. 2). This intermediate wheel catches directly into the feed wheel 19.

The feed motion is as follows:

When the motor 2 runs to the right side, the shaft 5 will turn counter-clockwise and will thereby carry along, by means of feed pawl 7, pawl-carrier 6 and crank pin 10 the crank shaft 11

which will then make the bush 13 swing as much as is necessary for the feed motion. As is known and customary, the feed motion is effected at the end of each return stroke of the planing machine and the return motion of the crank shaft 11 and of the other feed gear is effected at the end of each cutting stroke. This return stroke of the feed gear in connection with a chain wheel or sprocket 37 can be made use of in the well known manner for lifting the tool. (See Fig. 3) Referring to Fig. 4 we suppose that *a* is the position of the crank pin 10 before the table starts its return stroke. Then, again in the well known manner, the feed motion is started by means of an operating switch on the bed of the planing machine, after the return stroke is finished; then the crank pin 10 is moved by means of motor 2 from *a* over *b* to *c* which means that the feed motion is carried out, the crank arm 12 swinging from point *d* or *e* to *f*. At this point the motor is switched off by means of the end switch 18 acted upon by the cam 15. At the end of the cutting stroke the motor is switched on again by the operating switch and will run in the same direction until crank pin 10 has gone from *c* back to *a*. Here the motor is switched off again by the end switch 17 acted upon by the cam 18.

The motor always running in the same direction therefore turns the feed shaft 5 with each

motion and with each tool lift, by 180 degrees. During this feed motion the intermediate wheel 36 of the high speed adjustment can move independently of the feed shaft, since the high speed pawl 35 is out of gear.

The high speed adjustment is started by means of a push button. The motor will then run in a direction opposite to that it had during the feed motion and this means that the feed shaft 5 will run clockwise. Thereupon the pawl carrier 34 by means of the high speed pawl 35 will move the intermediate wheel 36 and thereby the feed wheel 19 which will turn in the same direction as during the feed motion.

With this direction of rotation of the feed shaft, that means when the feed shaft turns in said direction, the feed pawl 7 does not catch so that during the quick motion the feed mechanism is thrown out of gear.

It is however not absolutely necessary to arrange a crank gear between pawl carrier 8 and bush 13; a reciprocating fork may for inst. be rigidly connected with the bush 13, and in the slot of said reciprocating fork a fitted block (carried by pin 10) is moved. Moreover a freewheel clutch can be used instead of the high speed pawl.

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