Jan. 9, 1962 O. VON ZELEWSKY 3,016,245

CARRIER FOR MACHINE TOOLS, ESPECIALLY LATHE DOG

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Fig.1

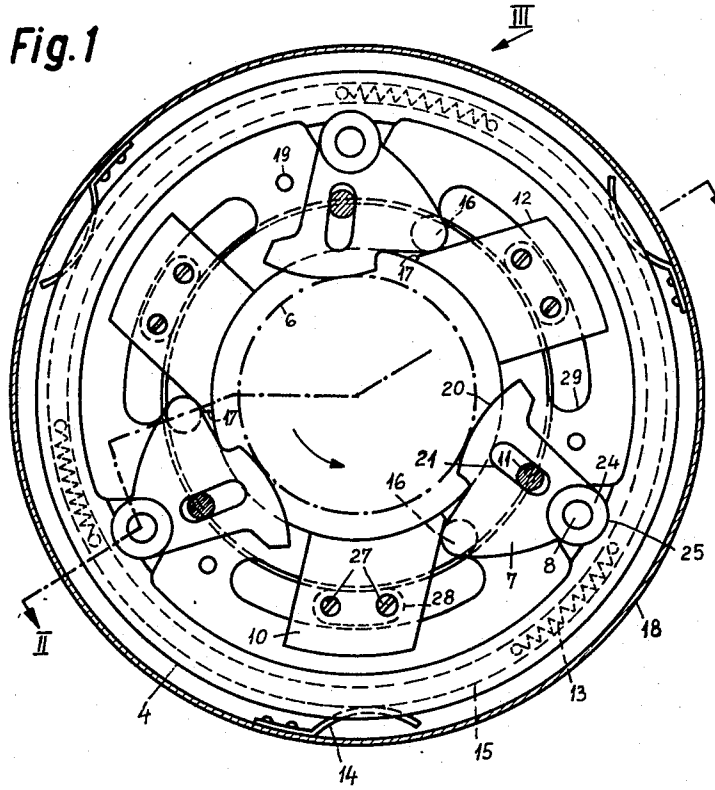
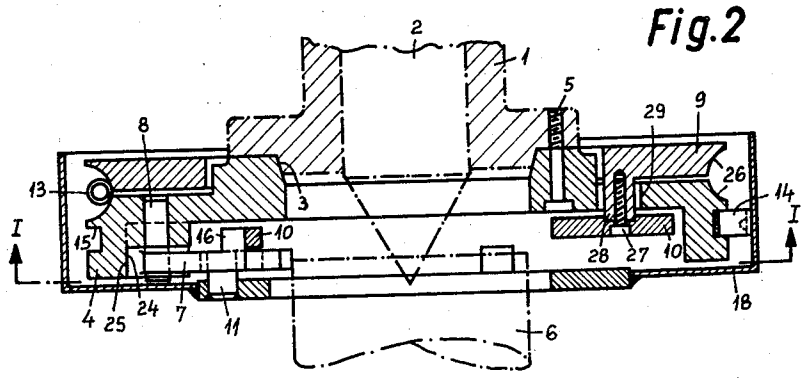


Fig.2



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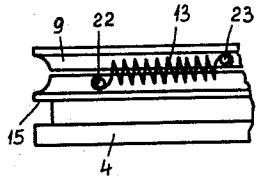
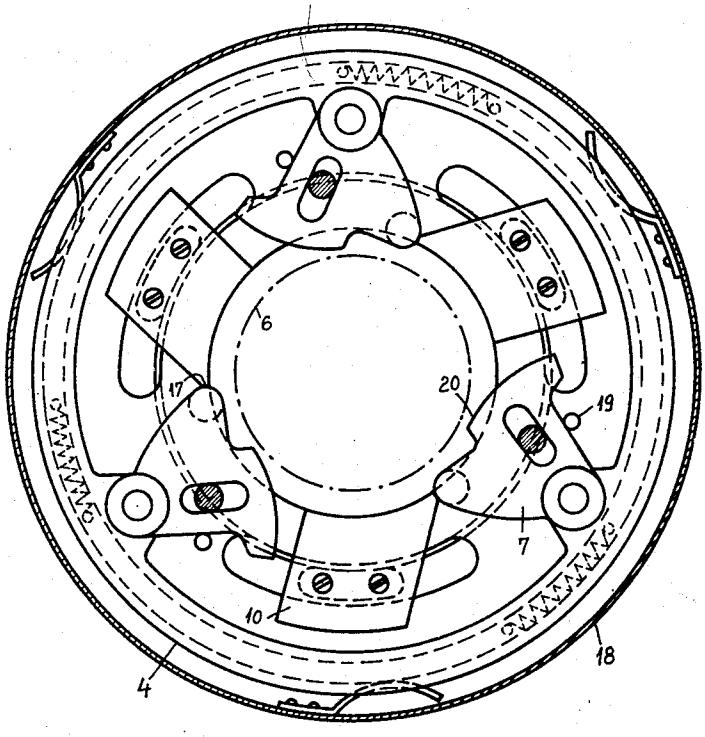


Fig. 3

Fig. 4



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Fig. 5

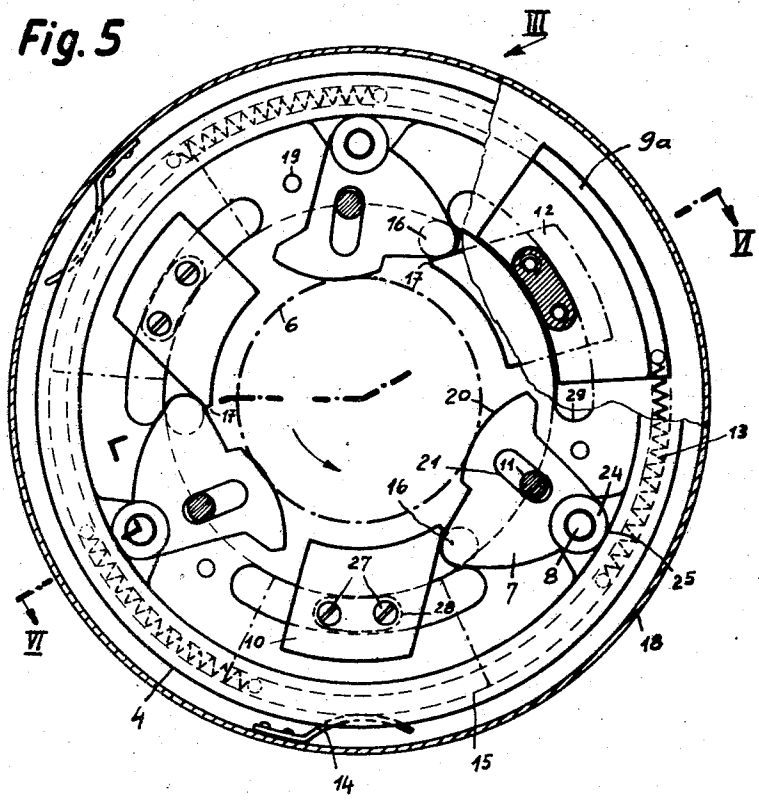
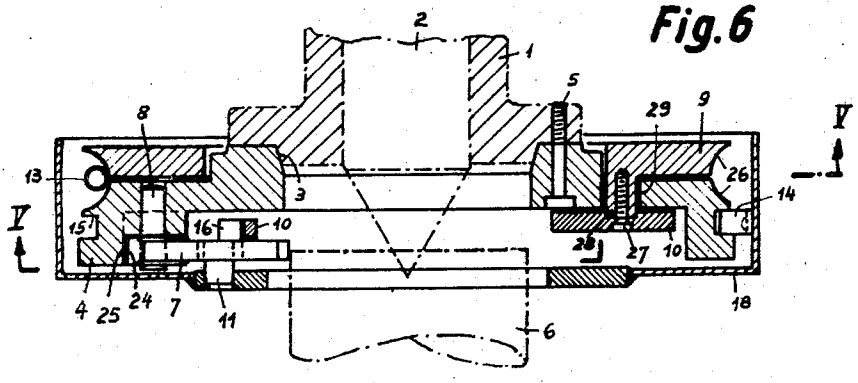


Fig. 6



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3,016,245

CARRIER FOR MACHINE TOOLS, ESPECIALLY LATHE DOG

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5 Claims. (Cl. 279—106)

The present invention relates to a coupling member or carrier for machine tools, especially lathes with a supporting body connected to the machine spindle and carrying at least two cam levers pivotally supported thereby.

Various structures of such coupling members or carriers are known which, however, have the drawback that when braking the spindle, the cam levers will be lifted off from the work piece whereby the latter may be released. In such an instance the safety of operation is greatly endangered.

It is, therefore, an object of the present invention to provide a coupling device or carrier of the above mentioned type which will overcome the drawbacks outlined above.

It is another object of this invention to provide a coupling device or carrier of the above mentioned general type, which will comprise means adapted when the work piece is braked to produce an increased work piece holding effect.

These and other objects and advantages of the invention will appear more clearly from the following specification in connection with the accompanying drawings, in which:

FIG. 1 is an elevational view of a device according to the present invention in its holding or coupling position, FIG. 1 representing a section taken along the line I—I of FIG. 2.

FIG. 2 is a section along the line II—II of FIG. 1.

FIG. 3 illustrates a detail of the carrier or coupling device of FIG. 1, FIG. 3 being seen in the direction of the arrow III in FIG. 1.

FIG. 4 shows the device of FIG. 1 in loading position.

FIG. 5 is an elevational view of a second embodiment of a device according to the present invention, representing a section taken along the line V—V of FIG. 6.

FIG. 6 is a section along the line VI—VI of FIG. 5.

General arrangement

The carrier or coupling device of the invention is characterized primarily in that at least one fly member is provided which is displaceable relative to the supporting body and is provided with surfaces resting against cam levers in such a way that in response to a movement of the fly member relative to the supporting member in the direction of rotation of the carrier, the cam levers will exert a clamping effect upon the work piece, whereas in response to the movement of the fly member in opposite direction, i.e. in a direction counter to the direction of rotation of the carrier, the fly member will lift itself off from the cam levers to thereby cause a release of the work piece.

Structural arrangement

Referring now to the drawings in detail, it will be seen from FIG. 2 that the front end of the working spindle **1** is provided with a live center **2** mounted in the spindle **1**. In the specific example shown in the drawing, the conical spindle nose **3** has mounted thereon a flanged ring **4** which is connected to spindle **1** by means of screws **5**. The work piece **6** indicated by dot-dash lines is centered by means of center **2** and a head stock center (not shown in the drawing) and is properly held between said two centers.

The flanged ring **4** carries three bolts **8** on which are

pivotally mounted three cam levers **7**. The number of the cam levers **7** is, of course, not limited to three but may also be two or more than three. The play on bolt **8** is so selected that the cam levers **7** will have their hubs **24** rest in recesses **25** of the flanged ring **4** so that the clamping pressure exerted by the work piece will not be absorbed by bolts **8** but by the flanged ring **4**. The cam levers **7** are provided with clamping surfaces **20** which are pressed against the surface of the work piece **6** and take the work piece along. An actuating ring **18** extends around the flanged ring **4** and is resiliently centered thereon by means of leaf springs **14** and is axially held in grooves **15** of the flanged ring **4** by means of said springs **14**. The actuating ring **18** has connected thereto pivots **11** which engage slots **21** of the cam levers **7**. By turning the actuating ring **18** with regard to the flanged ring **4**, the cam levers **7** are turned into clamping or releasing position with regard to the work piece **6** depending on whether the ring **18** is turned in one or the other direction.

The device furthermore comprises a fly ring **9** which is connected to the flanged ring **4** by means of tension springs **13**. The tension springs **13** are connected to the flanged ring **4** by means of bolt **22**, and are furthermore connected to the fly ring **9** by means of bolts **23**. The springs **13** are located in trough-shaped recesses **26** of the elements **9** and **4**, said springs **13** centering ring **9** and holding the same under preload.

The cam levers **7** are provided with pivots **16** for cooperation with cams **10**. Cams **10** are by means of screws **27** firmly connected to extensions **28** which latter are mounted on fly ring **9**. Extensions **28** extend through slots **29** in the flanged ring **4**.

Each of the cams **10** is provided with a locking surface **12** which at the forward inner end of the respective cam joins with a catch or stop surface **17** which is substantially radial to the workpiece.

Flanged ring **4** is furthermore provided with abutments **19** limiting the turning or tilting movement of the respective cam lever **7**.

Operation

The device according to the present invention operates in the following manner. FIG. 1 may represent the starting position of the elements of the carrier or coupling member according to the invention. If it is now desired to introduce a work piece into the device, the carrier is first to be opened while at a standstill or to be brought into its loading position. By manually turning the actuating ring **18** in counter-clockwise direction, the cam levers **7** will by means of the pivots **11** be turned in clockwise direction until the pivots **16** engage the catch surfaces **17** and thus will hold the device in opened or loading position as shown in FIG. 4. In this end position, also the cam levers **7** will engage the abutment **19**. During this turning movement of the actuating ring **18**, the pivots **16** ride down surfaces **12** of the cams **10** and the fly ring **9** moves relative to the stationary flanged ring **4** in clockwise direction.

After the work piece **6** has been introduced into the carrier, or has been mounted between the two centers, ring **18** is manually turned in clockwise direction until the pivots **16** slide out of the catch or stop surfaces **17**. The tightening surfaces **12** of cam **10** will then come into contact with the pivots **16**. The tension spring **13** will now bring about that cams **10** and fly ring **9** will be turned in counter-clockwise direction relative to the stationary flanged ring **4**, whereby the cam levers **7** will be turned in counter-clockwise direction and will press their clamping surfaces **20** against the work piece **60**.

If the working spindle rotates in counter-clockwise direction (FIG. 1), the following working phases will be obtained:

(1) When starting from a stop or when increasing the speed, acceleration forces in clockwise direction will be

obtained in the actuating ring 18 and centrifugal forces will occur in the cam levers which act upon the cam levers 7 in such a way that the latter will be pressed to a greater extent against the work piece.

(2) When machining the work piece 6, chip-removing forces will occur which likewise will act upon cam levers 7 so that the work piece will be more firmly clamped.

(3) When braking the working spindle, the actuating ring 18 will, due to the forces of retardation, tend to turn the cam levers 7 in clockwise direction and thereby to release said clamping levers from the work piece 6. The fly ring 9 is likewise subjected to forces of retardation so that the clamping surfaces 12 of cams 10 press against pivots 16 and thereby impart upon clamping levers 7 a turning movement in counterclockwise direction or, differently expressed, will prevent a turning movement in clockwise direction.

The forces exerted by the fly ring 9 are greater than those of the actuating ring. It is for this reason that, when braking the device according to the invention, the cam levers 7 will likewise press at an increased rate against the work piece and will hold the same. In this connection it is to be noted that the angles of the surfaces 12 is such that the line of action of the force each surface exerts on its pertaining pivot 16 is to the clockwise side of the pertaining bolt 8 so as to develop a counter-clockwise torque on the respective clamping lever. The mass of the fly ring 9 is greater than the actuating ring 18 and the said counter-clockwise torque on the clamping levers due to the fly ring is thus dominant.

The last mentioned effect is of particular importance in connection with carriers as set forth. It will in particular be employable for heavy machine tools in which the braking forces reach a considerable magnitude. The safety of operation of the device according to the invention prior to, during and after the machining will be considerably greater than with heretofore known devices of the general type involved.

The actuating ring adapted to be used for manually actuating the device according to the invention extends around all other parts of the carrier or coupling device whereby the danger of accident is considerably reduced inasmuch as no protruding members are provided.

If desired, the cutouts 29 may also be of increased dimensions so that, for instance, there would be obtained a ring with spokes.

Instead of a fly ring 9 as shown in FIGURES 1 to 4, also a plurality of fly members 9*a* may be provided as shown in another embodiment according to FIGURES 5 and 6, which may respectively act upon one cam lever. Furthermore, the shape of the fly ring or fly member may also be different from that shown in the drawings. In the two embodiments shown by way of example in the accompanying drawings, the fly members 9 and 9*a* respectively are displaceable in circumferential direction relative to the supporting body 4.

It is an important feature of the carrier or coupling device according to the invention that at least one fly member is provided which will stay in contact with the fly levers that when braking the latter, a turning movement will result which turning movement brings about a further clamping effect upon the work piece.

It is, of course, to be understood that the present invention is, by no means, limited to the particular construction shown in the drawings but also comprises any modifications within the scope of the appended claims.

What I claim is:

1. A carrier for use in connection with machine tools, especially lathes, having a machine spindle, which comprises: a supporting member adapted to be connected to the machine spindle of a machine tool for rotation therewith, a plurality of cam lever means pivotally connected to said supporting member for pivoting in a first direction and in a second direction, said cam lever means being provided with surface means for clamping and releasing a work piece therebetween depending on the pivot movement of said cam lever means in said first direction or said second direction, manual actuating means for moving said cam lever means in said pivotal movements, fly member means supported by and displaceable relative to said supporting member, and means connected to said fly member means and provided with surface areas respectively for engagement with said cam lever means, said fly member means being movable relative to said supporting member in the direction of rotation of said carrier when connected to the machine spindle for pivoting said cam lever means in the work piece clamping direction of the latter and also being movable in opposite direction for releasing said cam lever means to thereby permit the latter to pivot in work piece releasing direction, said fly member means being adapted in response to deceleration of said supporting member to move in the direction of rotation of said carrier.

2. A carrier for use in connection with machine tools, especially lathes, having a machine spindle, which comprises: a supporting member adapted to be connected to the machine spindle of a machine tool for rotation therewith, a plurality of cam lever means pivotally connected to said supporting member for pivoting in a first direction and in a second direction, said cam lever means being provided with surface means for clamping and releasing a work piece therebetween depending on the pivot movement of said cam lever means in said first direction or said second direction, manual actuating means for moving said cam lever means in said pivotal movements, fly member means supported by and displaceable relative to said supporting member, spring means resiliently interconnecting said supporting member and said fly member means, and means connected to said fly member means and provided with surface areas respectively for engagement with said cam lever means, said fly member means being movable relative to said supporting member in the direction of rotation of said carrier when connected to the machine spindle in response to deceleration of said supporting member for urging said cam lever means in the work piece clamping direction of the latter and also being movable in opposite direction for releasing said cam lever means to thereby permit the latter to pivot in work piece releasing direction.

3. A carrier for use in connection with machine tools, especially lathes, having a machine spindle, which comprises: a supporting member adapted to be connected to the machine spindle of a machine tool for rotation therewith, a plurality of cam lever means pivotally connected to said supporting member for pivoting in a first direction and in a second direction, said cam lever means being provided with surface means for clamping and releasing a work piece therebetween depending on the pivot movement of said cam lever means in said first direction or said second direction, manual actuating means for moving said cam lever means in said pivotal movements, fly member means supported by and displaceable relative to said supporting member, spring means resiliently interconnecting said supporting member and said fly member means, means connected to said fly member means and provided with surface areas respectively for engagement with said cam lever means, said fly member means being rotatable in the direction of rotation of said spindle for urging said cam lever means in the work piece clamping direction of the latter said fly member having a substantial mass and being responsive to deceleration of said supporting member for over running said supporting member and thus urging said cam levers in clamping direction.

4. An arrangement according to claim 3, in which said manual actuating means forms a housing surrounding said supporting member, said fly member means and said cam lever means.

5. A device for supporting and rotating a work piece in a machine tool such as a lathe comprising: a supporting member adapted for being fixedly secured to the spin-

dle of the machine tool for rotation therewith, a plurality of clamping levers pivoted to said supporting member and extending inwardly toward the axis of rotation of the spindle for engaging the surface of a work piece mounted on said axis, the inner ends of said clamping levers being movable relative to the surface of the work piece in the same direction as the said surface moves when the spindle is rotating for releasing the work piece and being movable in the opposite direction relative to the said surface for clamping the work piece whereby working forces exerted by tools on the work piece will tend to increase the clamping action of said levers while the inertia of the work piece when the spindle is slowed down will tend to release said levers, and means carried by said supporting member for preventing the said loosening of the clamping

levers due to the work piece tending to over run the spindle, and comprising a fly member in the form of an annular ring of substantial mass mounted on said supporting member for rotation relative thereto, and means carried by said fly member engageable with said clamping levers and operable during the slowing down of said spindle to exert a force on each of said clamping levers counteracting the force exerted thereon by the tendency of the work piece to over run the spindle.

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