

W. E. NICKERSON.
GRINDING MACHINE.

APPLICATION FILED NOV. 11, 1907.

971,860.

Patented Oct. 4, 1910.

5 SHEETS—SHEET 1.

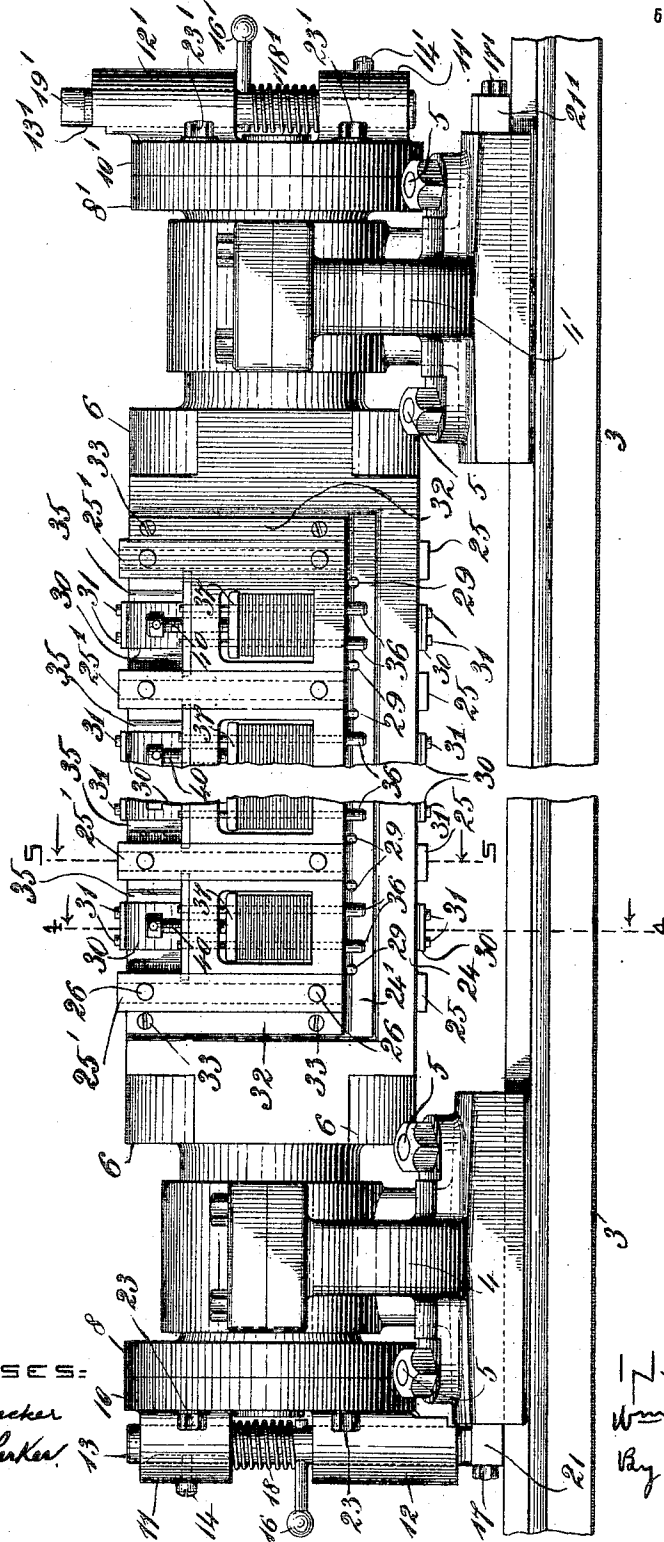


FIG. 1.

WITNESSES:

Joseph Becker
Frank G. Parker

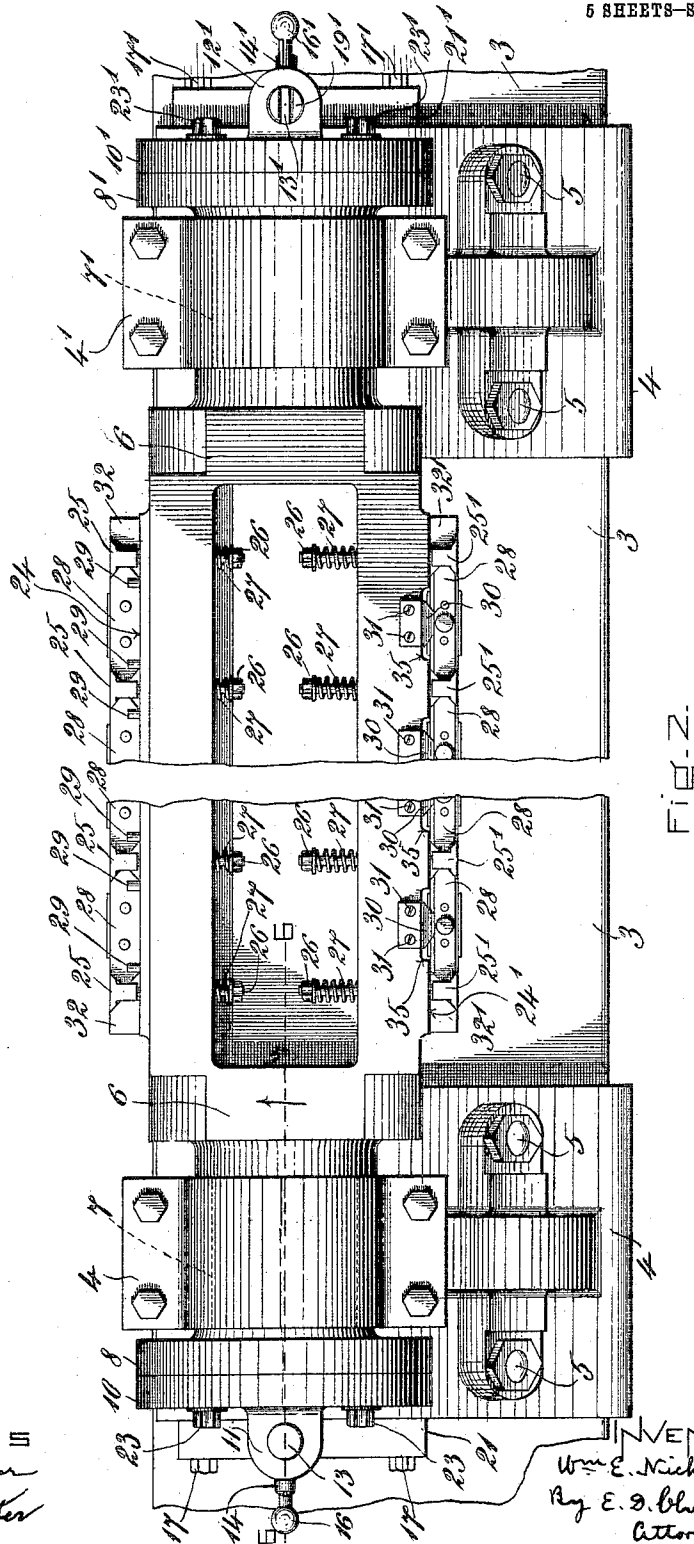
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5 SHEETS—SHEET 3.

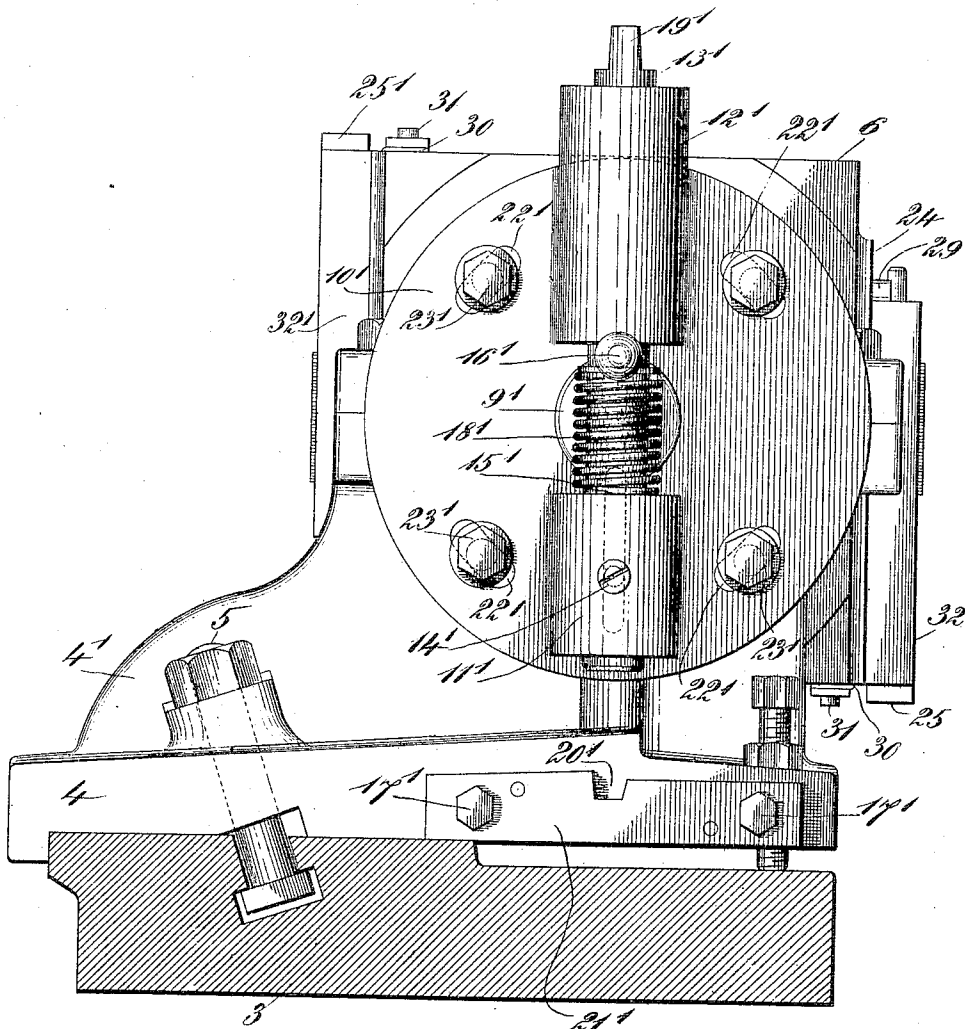


Fig. 3.

WITNESSES=
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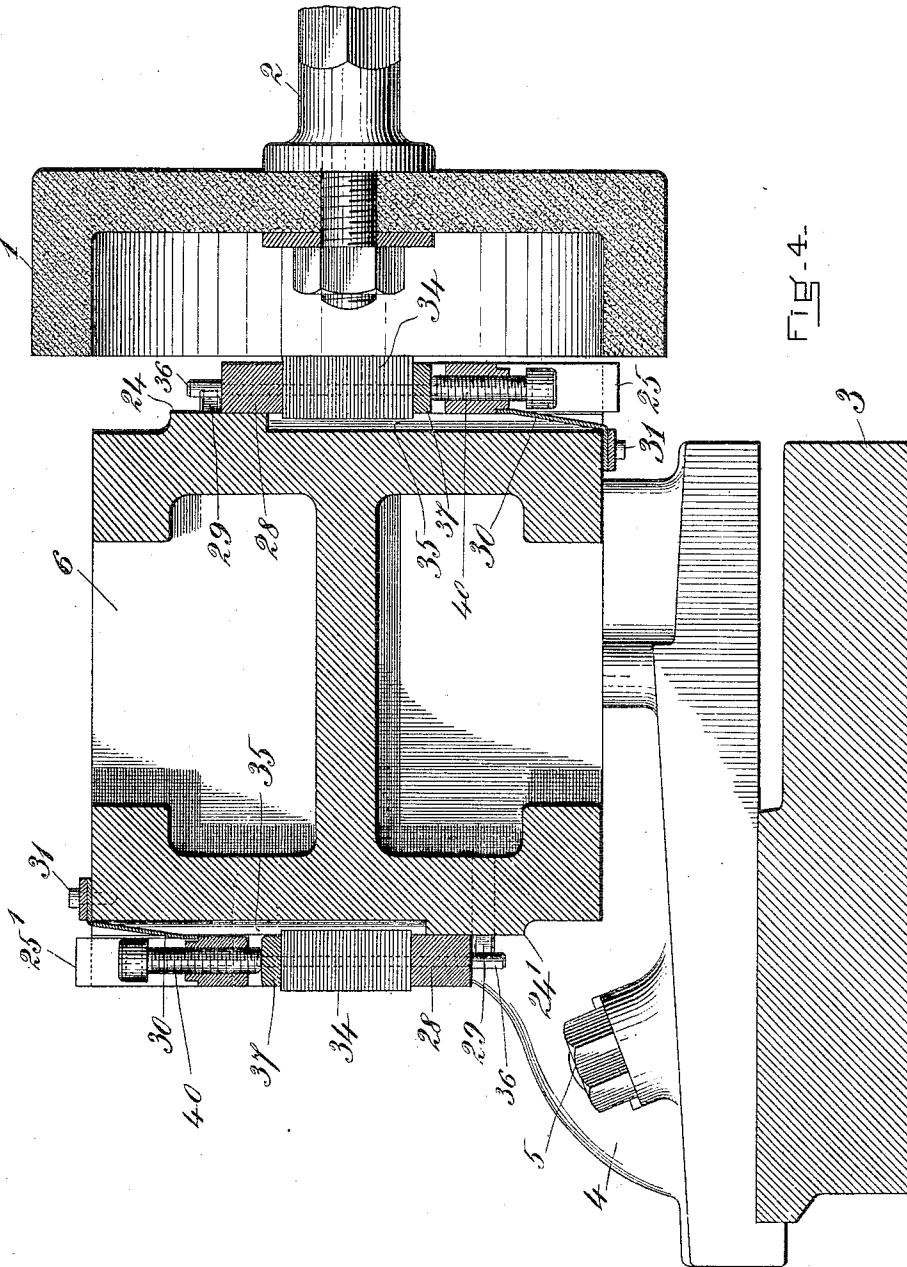
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5 SHEETS—SHEET 4.



WITNESSES:

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5 SHEETS—SHEET 5.

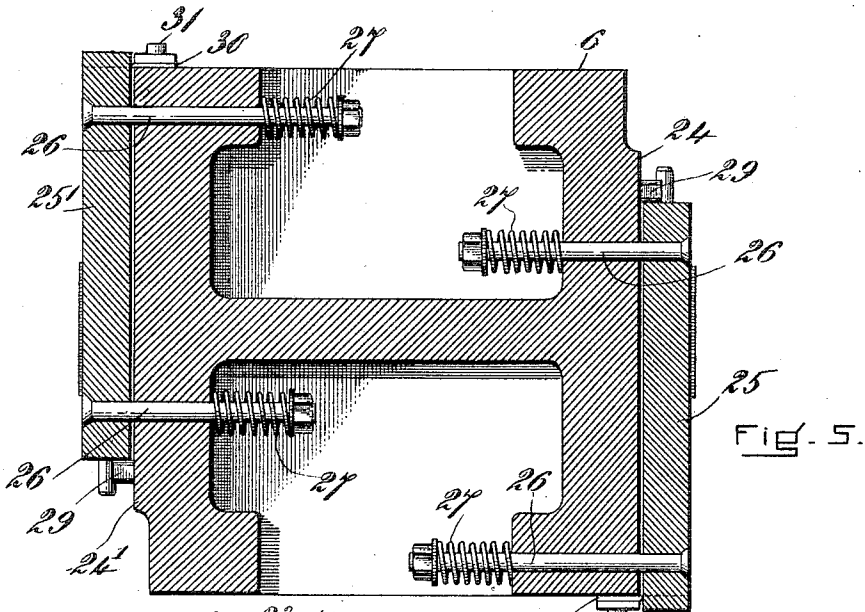


Fig. 5.

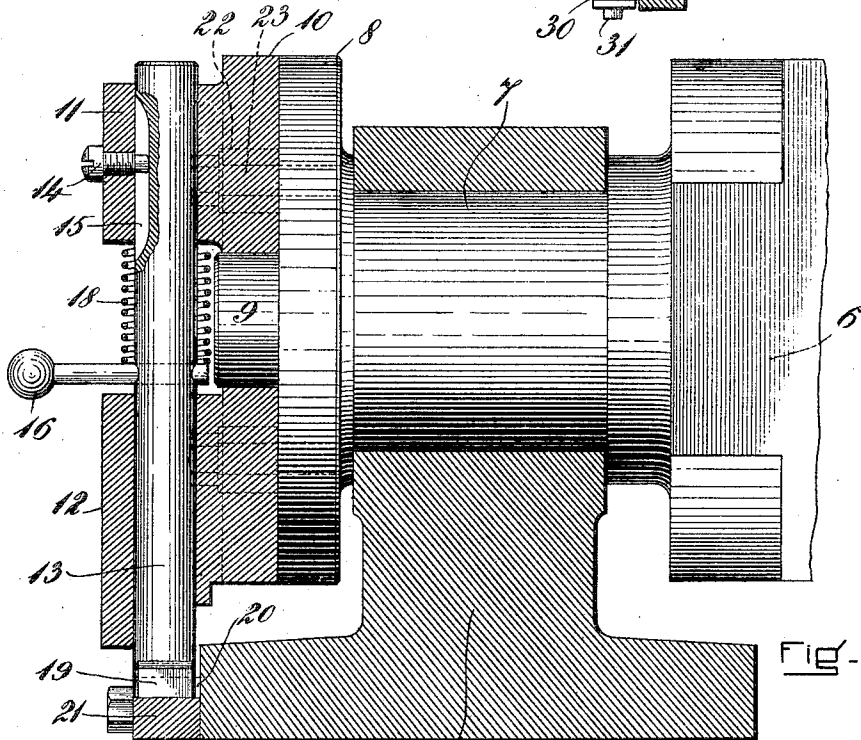


Fig. 6.

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UNITED STATES PATENT OFFICE.

WILLIAM E. NICKERSON, OF CAMBRIDGE, MASSACHUSETTS.

GRINDING-MACHINE.

971,860.

Specification of Letters Patent.

Patented Oct. 4, 1910.

Application filed November 11, 1907. Serial No. 401,623.

To all whom it may concern:

Be it known that I, WILLIAM E. NICKERSON, a citizen of the United States, and a resident of Cambridge, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Grinding-Machines, of which the following is a specification.

This invention relates to means for holding and presenting work to a grinding wheel or like device, being particularly intended to provide for grinding or surfacing one edge, or opposite edges, of small articles clamped in stacks. The invention is independent of the special means that may be used for rotating the grinding wheel; also of the means used for producing the necessary relative displacements of the bed and grinding wheel.

According to my preferred arrangement the bed of the grinding machine, or some part firmly held thereon, is provided with one or more recesses or pockets all of the same standard size and each adapted to receive any one of an equal or greater number of accurately fitting but removable work-holding clamp-frames, in which the articles to be ground are piled and clamped in such manner that the parts to be ground away shall project and be cut off along a surface bearing a definite relation to the said work-holding clamp-frames. Said work-holding clamp-frames and the pockets to receive them are furthermore so constructed that the clamp-frames may easily be reversed in their pockets to permit of grinding opposite edges of the articles clamped therein, and the fact that the clamp-frames are made easily removable permits of loading them and unloading them in any suitable part of the factory by unskilled labor used in sufficient force to keep the machine in continuous operation.

In accordance with another feature of the invention the receiving pockets are arranged in a series, parallel to the line of feed, and preferably on a revoluble stock having its axis of revolution substantially parallel to the line of feed and having means for locking the stock in a certain adjustable angular position, so that the series of pockets may be accurately set to hold the clamp-frames and their work in proper relation to the grinding wheel and so that the pockets may be quickly turned away from said grinding wheel into another position where they will

be more accessible for reloading by an attendant.

The invention further includes the provision of said stock with two or more of such series of pockets on different faces thereof and with separate adjustable locking means adapted to permit of independently adjusting the angular position of each series of pockets with great accuracy. As a result of this arrangement one series of pockets will always be in the position in which it presents its work to the grinding wheel, while another series is held turned away from the grinding wheel in a position in which it can be easily filled by an unskilled attendant with a new set of loaded clamp-frames.

The invention further includes certain details more or less incidental to the features above enumerated, and it will be described in one of its preferred forms, but the description will be limited to the said work holding means and to the parts of the machine that are directly connected therewith; that is to say, the bed of the machine and a grinding wheel, it being understood that means are provided for rotating the wheel and for traversing it back and forth with relation to the bed in the direction parallel to the bed, as well as means to provide adjustments and other movements usually found in grinding machines.

In the accompanying drawings: Figure 1 is a side view showing the bed with the revoluble stock mounted thereon; Fig. 2 is a plan view of the same parts; Fig. 3 is an end view of the same parts as they would be seen in Fig. 1 looking from the right; Fig. 4 is a vertical transverse section on the line 4-4, Fig. 1, supposed to pass diametrically through the grinding cup; Fig. 5 is a vertical transverse section on the line 5-5, Fig. 1; and Fig. 6 is a vertical section on line 6-6 of Fig. 2.

Only so much of the old machine is shown in the drawing as may be necessary to explain the invention. The old parts comprise a cup wheel 1 (Fig. 4) mounted on a shaft 2, and a bed 3, also the usually provided means (not shown) for adjusting and properly actuating the different parts of the machine.

The bed 3 is provided with two journal bearings 4, 4' (Fig. 1) which are firmly fastened to the bed by bolts 5 and are adapted to support a heavy casting or stock 6, the

two ends of which are turned down to form journals 7, 7'. The outer end of journal 7 (see Fig. 6) is extended to form a plate 8 with central stud 9 upon which is revolvably mounted a head 10. This head 10 is provided with a diametrical bore passing through bearings 11 and 12 in which is mounted a slide bolt 13, which bolt 13 is prevented from rotating in this bearing by means of a screw 14 the reduced end of which fits in a groove 15 cut longitudinally in the bolt 13. Bolt 13 is also provided with a projecting knob or handle 16 and is normally held at one extreme end of its sliding motion by the pressure of a spring 18 exerted against the handle 16. That end of the bolt 13 which is projected outwardly by the spring 18 is flattened to form a tooth 19 adapted to engage with a notch 20 formed in a plate 21 which is firmly fastened to the journal bearing 4 by cap screws 17. The head 10 which carries the slide bolt 13 is provided with arcuate slots 22 (similar to slots 22' Fig. 3) through which pass cap screws 23 which screw into the head 8. This mode of connection provides for angularly adjusting the casting or stock 6 with relation to the bed 3 when the bolt 13 is in locked engagement with the plate 21. The opposite end of the stock is provided with corresponding parts indicated by 8' to 23', in every respect similar to parts 8 to 23 except that the bolt 13' projects substantially in a direction that is opposed to that in which the bolt 13 projects, that is to say, when the bolt 13 is down in engaged position with its plate 21, the other bolt 13' stands in the upward unengaged position as clearly seen in Fig. 1. Bolts 13 and 13' therefore serve to hold the stock 6 in either one of two angular positions each of which is independently adjustable within certain desirable limits.

The casting 6 is provided with two substantially parallel and perfectly trued plane faces 24, 24' Fig. 5, on which are built up the two opposite series of clamp-frame receiving pockets. The side walls of the pockets are formed by dovetail bars 25, 25' having fastened thereon bolts 26 (Fig. 5) which pass through suitable openings in the stock 6 and are provided on their inside ends with springs 27 adapted to hold the bars 25, 25' yieldingly pressed against their respective bearing faces 24, 24'. The removable work-holding clamp frames are indicated by 28 and will be specifically described below. At present it is sufficient to state that these clamp frames 28 are introduced from above when the pockets are in the left hand position of Fig. 4 and are prevented from falling through by pins 29 solidly connected with the stock 6. The two opposite faces of the clamp-frame 28, that respectively come in contact with the plane

faces 24 and 24' of the stock 6 may be called the bearing faces. On examination of Fig. 4 it will be seen that the parts of the work to be ground must project laterally in either direction through these bearing faces and that the faces 24 and 24' of the stock 6 must accordingly be provided with recesses 35 to admit either of said projecting parts of the work. The recesses 35 also serve to provide room for the play of springs 30 which are fastened to the stock 6 by screws 31 and serve to retain and hold the clamp frames 28 in their pockets by engaging a shoulder formed on the upper end of said frames 28, as seen in Fig. 4.

The dovetail form given to the pocket bars 25 and 25' causes them to press against the clamp frames laterally as well as inwardly. Each of these clamp bars 25 and 25' has two inclined pressing faces to press on two adjacent clamp frames 28, so that its action will be symmetrical and balanced. The first and the last of these clamp bars in each of the two series can, of course, act on only one clamp frame, and I therefore provide two end bars 32 firmly fastened to the face 24 of the stock 6 by screws 33 and two similar end bars 32', similarly fastened to the other face 24' of the stock. These bars 32 and 32' have bevels similar to those formed on the frames 28 and serve to balance the pressures on the adjacent bars 25 and 25' which contact with them. Each of the frames 28 is substantially rectangular in shape and has its two longer sides chamfered off symmetrically to form the four bevels seen in Fig. 2, so that the frames may be inserted one way or the other to present either projecting edge of the work to the grinding tool.

It will be understood, of course, that the exact angular position of the head 6 can only be determined after the work is in place and has been ground; that is to say, the work is first mounted approximately in the desired position and ground, and if the ground surface does not appear to be quite as true as desired the head 6 must have its angular position slightly altered, and this is provided for as described above by the angular adjustment of the stock 6 with relation to the retaining slide bolt 13 for the pockets 25, and with relation to slide bolt 13' for the pockets 25'. In either case the adjustment is made for the series of pockets that is being held in the inverted or working position (the right hand series in Fig. 4); and in making these adjustments no attention is paid to the slight changes that are simultaneously produced in the position of the opposite series of pockets, the one at the left in Fig. 4.

By inspection of Fig. 4 it will be obvious that any piece of work 34 intended to have the opposite faces thereof ground either par-

allel or at a slight inclination to each other, may be handled in this machine, since each work-carrying face of the stock 6 is capable of angular adjustment as above described and the clamp frames are reversible on these faces. The machine here shown, however, is specially designed for grinding to a straight edge the opposite edges of the razor blades that are used in the well known Gillette razor. These blades, as will be seen on referring to the original patent contain a central opening and two side openings, and these latter openings are the ones that are preferably used as gages to permit an accurate clamping of the blades in proper relation to the clamp frame, which to this end is provided with two gage pins 36. Each clamp frame is further provided with a clamp plate 37 and a clamp screw 40. The attendant who loads or charges the frames with the blades withdraws the pins 36 entirely and partly unscrews the screw 40 until the opening within the frame is left perfectly clear. He then piles the blades in the opening, forces the gage pins 36 through the side openings above referred to and through the clamp plate 37 and screws down the clamp screw 40. When this is done the median plane of the stack of blades thus formed coincides with the plane determined by the axes of the two gage pins 36, and the clamp frame is ready for insertion in its pocket. When the clamp frame 28 is reversed in its pocket the position of the median plane remains unaltered, so that the oppositely-ground faces are accurately ground at exactly the same distance from this median plane. This point is important because it insures symmetry in the product as it finally leaves the grinding machine.

Assuming the machine to have been properly adjusted as explained above its operation and use is as follows: Clamp frames 28, provided in any desirable and sufficient number, are filled with stacks of blades in any suitable part of the factory by unskilled labor. These charged frames are then brought to the grinding machine and all the pockets 25' in the left-hand series, Fig. 4, are filled with them by an attendant, who then raises the slide bolt 13 and gives the stock 6 an impulse which carries the stock around until it is stopped automatically by the engagement of slide bolt 13'. The projecting edges are then ground off, and during this grinding operation the attendant may fill the second series of pockets 25. He then raises slide bolt 13' and gives the stock a second impulse that carries it around until it is automatically stopped by the engagement of slide bolt 13. This carries the second series of blades into grinding position and brings the first series of blades before the attendant for reversal, so that after the machine has been started, all insertions,

removals and reversals of the clamp frames may be made while the machine is grinding a series of blades. Each series of blades is first inserted, then ground, then reversed, then ground again and finally removed to any suitable part of the factory for unstacking.

What I claim and desire to secure by Letters Patent is:—

1. A grinding machine comprising a grinding device, a work carrier, means for securing different pieces of work to different faces of the carrier and detaching the same therefrom independently of one another, and means for holding the carrier in fixed position to present either of its work-carrying faces to the grinding device.

2. A grinding machine comprising a grinding device, a carrier, and a work holder adapted to expose opposite faces of the work on opposite faces of the holder at the same time, said work holder being reversibly mounted on the carrier.

3. A grinding machine comprising a grinding device, a carrier, a work holder reversible on the carrier, and means for detachably securing the work holder to the carrier.

4. A grinding machine comprising a grinding device, a rotatable carrier provided on opposite faces with removable work holders, and means for locking the carrier in position to present either of its work-carrying faces to the grinding device.

5. A grinding machine comprising a grinding device, a movable carrier having means for detachably securing the work thereto, a locking device to hold the carrier in position to present the work to the grinding device, and means independent of said locking device for adjusting the carrier with relation thereto.

6. A grinding machine comprising a grinding device, a rotatable carrier having means for detachably securing the work to different faces thereof, independent locking devices to lock said carrier in position to present either of its work-carrying faces to the grinding device, and means for adjusting the carrier with respect to each of said locking devices, independently of its adjustment with respect to the other locking device.

7. A grinding machine comprising a grinding device, a rotatable carrier, reversible work holders and means for detachably securing the same to either of the work-carrying faces of the carrier, and means for locking the carrier in position to present either of its work-grinding faces to the grinding device.

8. A grinding machine comprising a grinding device, a carrier, a work holder reversible on the carrier, a locking device to hold the carrier in position to present the

work to the grinding device, and means for adjusting the carrier with respect to the locking device.

9. A grinding machine comprising a grinding device, a carrier having one of its sides provided with a recessed bearing surface, a reversible work holder formed to permit the work to project beyond the opposite faces thereof, and means for detachably clamping the work holder against said bearing surface, with the work projecting into the recess therein.

10. A grinding machine having a movable carrier provided with means for independently positioning and clamping a plurality of articles at different points thereon, and means for locking said carrier in different positions.

11. A grinding machine having a movable carrier provided with means for independently positioning and clamping a plurality of the articles to be ground at different points thereon, means for locking said carrier in different positions, and means for adjusting said carrier with respect to the locking means.

12. A grinding machine comprising a bed, a grinding device, a carrier mounted to rotate on an axis extending lengthwise of said bed and provided with means for detachably securing the work at different longitudinal points thereon, a locking device for the carrier, and means for adjusting the carrier with respect to the locking device.

13. A grinding machine comprising a bed, a grinding device, a carrier mounted to rotate on an axis extending lengthwise of the bed and provided on opposite faces with means for detachably securing the work thereto, independent locking devices located at the ends of the carrier and adapted respectively to lock the same in position to present one or the other of its work-carrying surfaces to the grinding device, and means for angularly adjusting the carrier with respect to each locking device.

14. In a grinding machine, the combination with a bed and a grinding wheel, of means for holding the work on the bed in proper relation to be ground, said means comprising a removable work holding clamp frame in which the work is rigidly clamped and means, mounted on the said machine bed, adapted to receive and accurately hold the said removable work-holding clamp frame.

15. In a grinding machine, the combination with a bed and a grinding wheel, of means for holding the work on the bed in proper relation to be ground, said means comprising a removable work-holding clamp-frame in which the work is rigidly clamped and means, mounted on the machine bed, adapted to receive and accurately hold the said removable work-holding clamp frame, said holding means comprising a flat face

and dove-tailed clamp bars yieldingly held against said flat face.

16. In a grinding machine, the combination with a bed and a grinding wheel, of means for holding the work on the bed in proper relation to be ground, said means comprising removable work holding clamp frames of standard size, and a series of sockets formed in said bed and adapted to receive and hold said removable work holding clamping frames.

17. In a grinding machine, the combination with a bed and a grinding wheel of means for holding the work on the bed in proper relation to be ground, said means comprising removable work-holding clamp-frames of standard size, and a stock revolvably mounted on the said bed and having a series of pockets adapted to receive and hold said removable work-holding clamp-frames also means for locking said stock in angular position to properly present the work to the said grinding wheel.

18. In a grinding machine, the combination with a bed and a grinding wheel, of means for holding the work on the bed in proper relation to be ground, said means comprising removable work-holding clamp-frames of standard size, and a stock revolvably mounted on the said bed and having a series of pockets adapted to receive and hold said removable work holding clamp frames, also means for locking said stock in angular position to properly present the work to the said grinding wheel and means for adjusting the angular relation of the stock to the said locking means.

19. In a grinding machine, the combination with a bed and a grinding wheel, of means for holding the work on the bed in proper relation to be ground, said means comprising removable work holding clamp-frames of standard shape and size, a stock revolvably mounted on the said bed and having two opposite series of pockets adapted to receive and hold said removable work holding clamp frames, also means for locking said stock in two different angular positions to properly present the work to the said grinding wheel.

20. In a grinding machine, the combination with a bed and a grinding wheel, of means for holding the work on the bed in proper relation to be ground, said means comprising removable work-holding clamp-frames of standard shape and size, a stock revolvably mounted on the said bed and having two opposite series of pockets adapted to receive and hold said removable work-holding clamp-frames, also means for locking said stock in two different angular positions to properly present the work to the said grinding wheel, and means for independently adjusting the angular relation of the stock to either of said locking means.

21. The combination with a grinding machine having a work support and grinding means adapted to grind a determined surface on work held in a certain relation on the said support; of work holding means comprising a removable work-holding clamp-frame adapted to fit and be held in a recess formed in said work support, said recess and clamp-frame being furthermore so formed that the said frame may be held in said recess in reversed position to permit of grinding opposite edges of the same object clamped in said frame.

22. The combination with a grinding machine having a work support and grinding means adapted to grind a determined surface on work held in a certain relation on the said support; of work-holding means comprising a removable work-holding clamp-frame adapted to fit and be held in a recess formed in said work support, said clamp-frame being provided with clamping means and with gaging means, the latter being adapted to determine the position of the work in the said clamp-frame in a direction perpendicular to the direction of the clamping stress.

23. The combination with a grinding machine having a work support and grinding means adapted to grind a determined surface on work held in a certain relation on the said support; of work-holding means comprising a removable work-holding clamp-frame adapted to fit and be held in a recess formed in said work support, said clamp-frame being provided with clamping means and with gaging means, the latter being adapted to determine the position of the work in the said clamp-frame in a direction perpendicular to the direction of the clamping stress, said gaging means consisting in two pins adapted to pass through two holes formed in the work.

24. A machine for preliminarily truing opposite edges of razor blade blanks, comprising the combination with a work support and a grinding wheel and means for relatively adjusting and moving these two parts for the purpose of grinding a surface having a certain determinable position with relation to said work-support; of a removable work-holding clamp-frame of standard size and shape adapted to fit and be held in a pocket formed in said work support, said clamp-frame being provided with two gage pins adapted to pass through two holes formed in said razor blade blanks to properly locate said blade with relation to the said determined surface to be ground, and clamping means acting in the direction parallel to the said gage pins.

25. A machine for preliminarily truing opposite edges of razor blade blanks comprising the combination with a work support and a grinding wheel and means for rel-

atively adjusting and moving these two parts for the purpose of grinding a surface having a certain determinable position with relation to said work support; of a removable work-holding clamp-frame of standard size and shape adapted to fit and be held in a pocket formed in said work support, said pocket having a bottom wall parallel to said certain ground surface and inwardly projecting, yieldingly pressed side walls adapted to press the said work-holding clamp-frame firmly against the bottom wall.

26. A machine for preliminarily truing opposite edges of razor blade blanks, comprising the combination with a work support and a grinding wheel and means for relatively adjusting and moving these two parts for the purpose of grinding a surface having a certain determinable position with relation to said work support; of a removable work-holding clamp-frame of standard size and shape adapted to fit and be held in a pocket formed in said work support, said pocket having a bottom wall parallel to said certain ground surface and inwardly projecting, yieldingly pressed side walls adapted to press the said work-holding clamp-frame firmly against said bottom wall, said bottom wall being furthermore recessed to admit the inwardly projecting parts of the blades clamped in said work-holding clamp-frame.

27. A machine for preliminarily truing opposite edges of razor blade blanks, comprising the combination with a work support and a grinding wheel and means for relatively adjusting and moving these two parts for the purpose of grinding a surface having a certain determinable position with relation to said work support; of a removable work-holding clamp-frame of standard size and shape adapted to fit and be held in a pocket formed in said work support, said pocket having a bottom wall parallel to said certain ground surface and inwardly projecting, yieldingly pressed side walls adapted to press the said work-holding clamp-frame firmly against said bottom wall, said bottom wall being furthermore recessed to admit the inwardly projecting parts of the blade clamped in said work-holding clamp-frame, and a spring also mounted in said recess in proper position to catch and hold the said frame in the said pocket.

28. A machine for preliminarily truing opposite edges of razor blade blanks, comprising the combination with a work-support and a grinding wheel and means for relatively adjusting and moving these two parts for the purpose of grinding a surface having a certain determinable position with relation to said work support; of a removable work-holding clamp-frame of standard size and shape adapted to fit and be held in a pocket formed in said support, said pocket

having a bottom wall parallel to said certain
ground surface and inwardly projecting,
yieldingly pressed side walls adapted to
press the said work-holding clamp-frame
5 firmly against said bottom wall, said bottom
wall being furthermore recessed to admit the
inwardly projecting parts of the blade
clamped in said work-holding clamp-frame
and a spring also mounted in said recess in
10 proper position to catch and hold the said
frame in the said pocket against motion in

one direction parallel to the side walls, and
stop pins to hold it against motion in the
opposite direction parallel to the said side
walls.

In testimony whereof, I have hereunto
subscribed my name this 8th day of Novem-
ber, 1907.

WILLIAM E. NICKERSON.

Witnesses:

OLIVER MITCHELL,
JOSEPH T. BRENNAN.