Nov. 10, 1959 A. A. STUDLER 2,911,765

REFACING MACHINE

Filed July 20, 1953 5 Sheets-Sheet 1

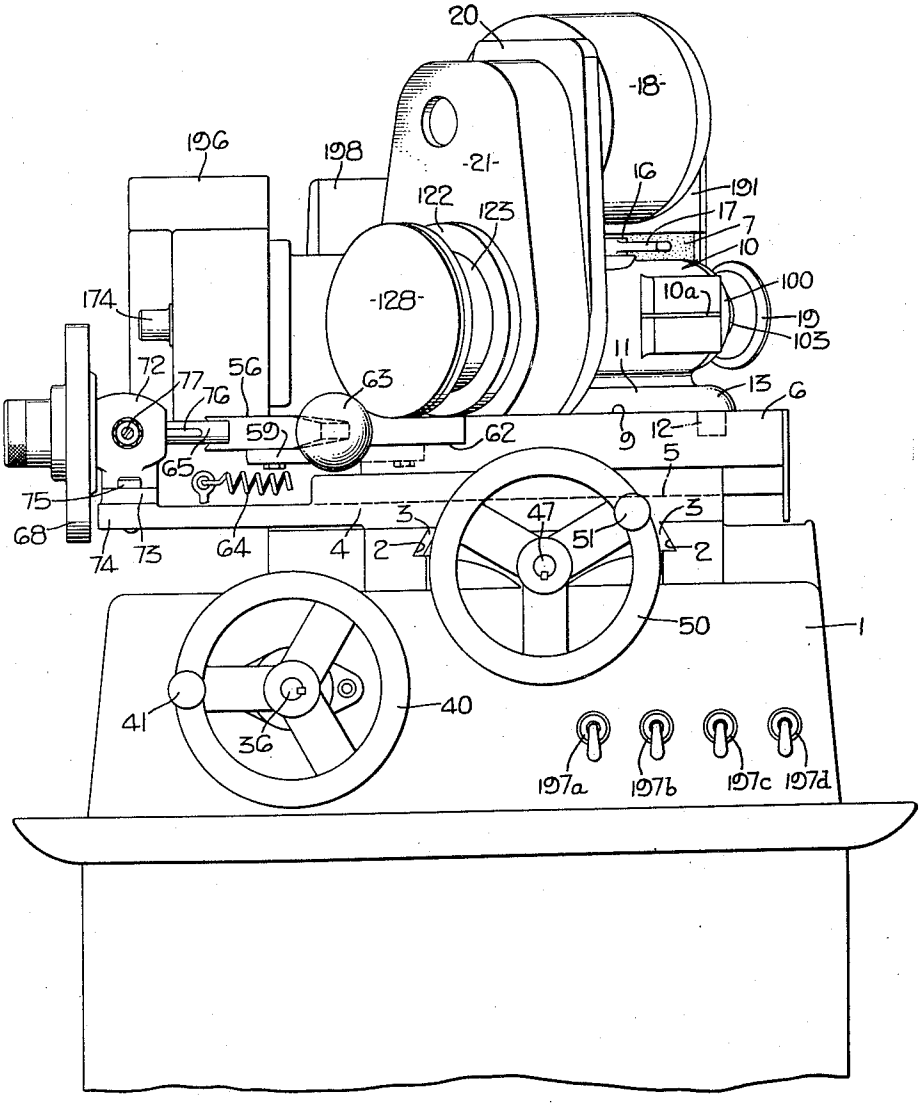


FIG. 1.

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REFACING MACHINE

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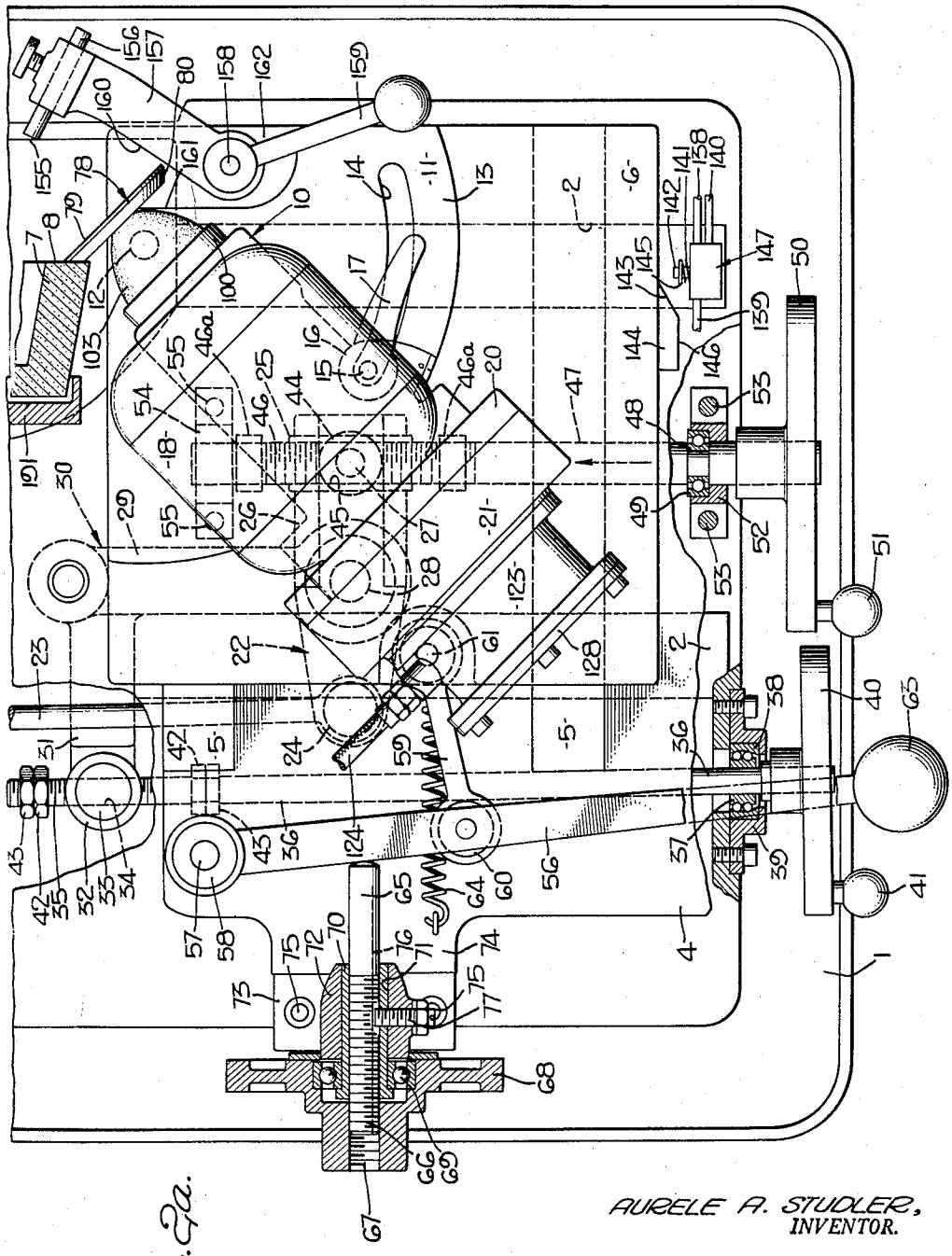


FIG. 2a.

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Nov. 10, 1959 A. A. STUDLER 2,911,765

REFACING MACHINE

Filed July 20, 1953 5 Sheets-Sheet 3

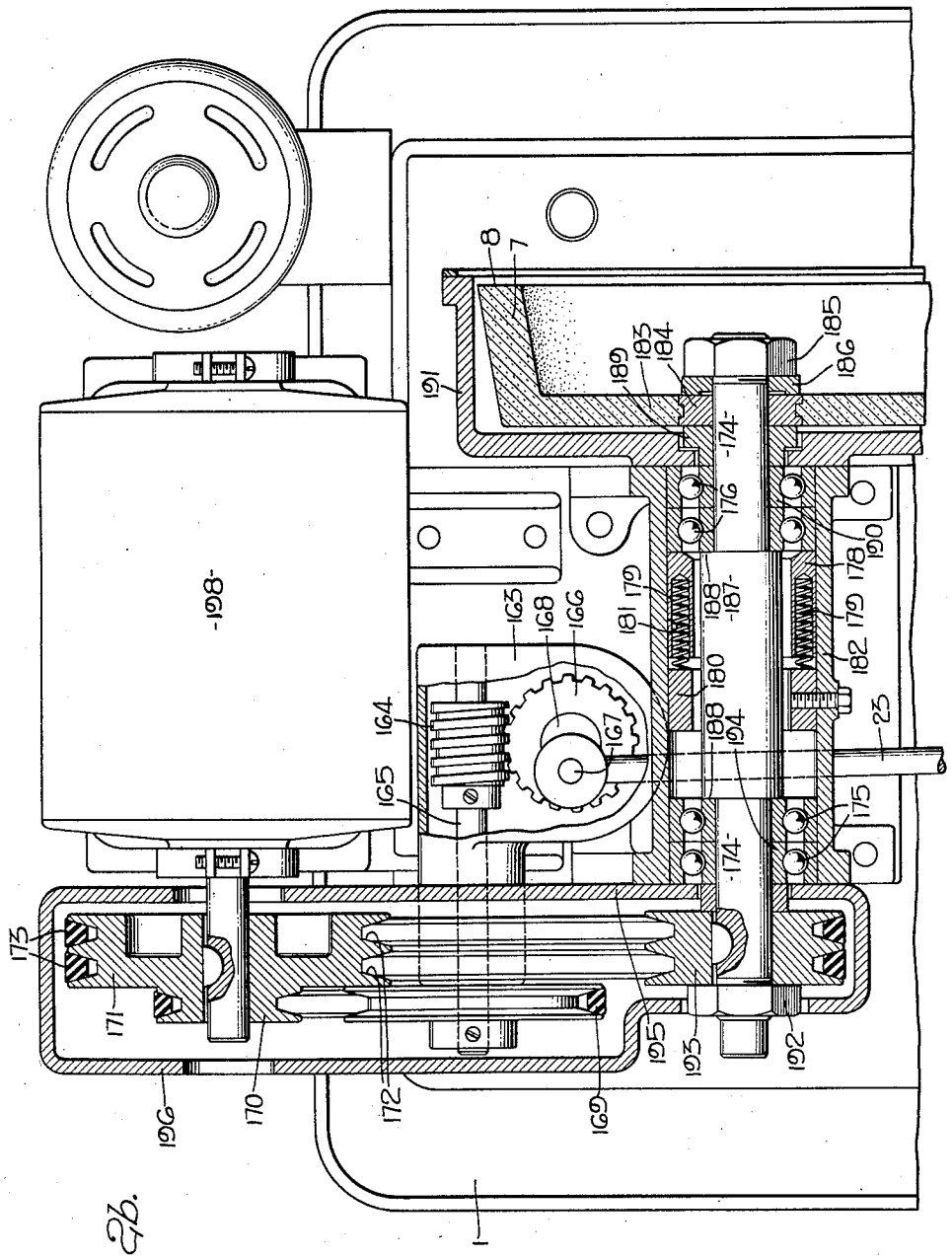


FIG. 9b.

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REFACING MACHINE

Filed July 20, 1953 5 Sheets-Sheet 4

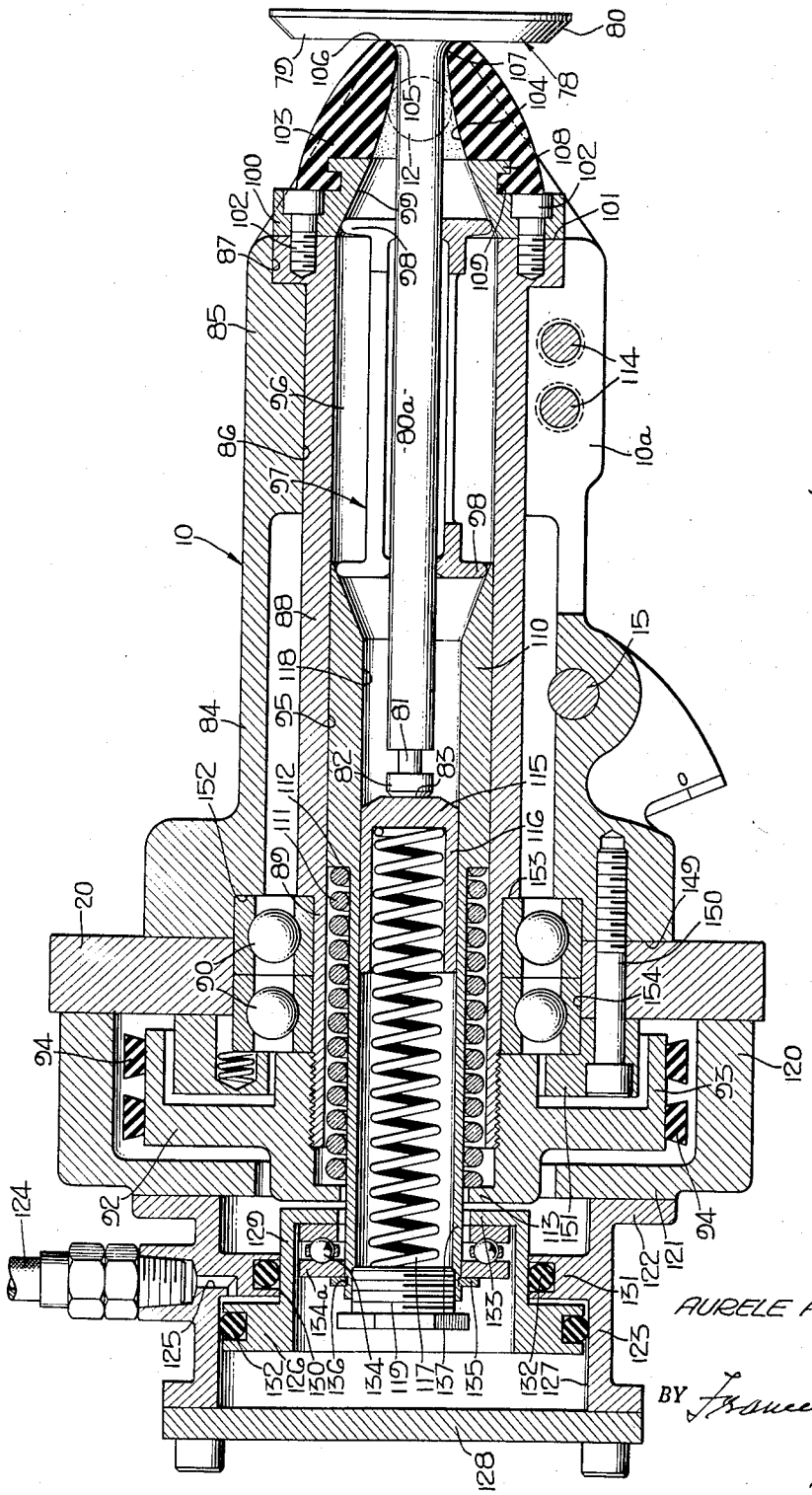


FIG. 3.

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REFACING MACHINE

Filed July 20, 1953 5 Sheets-Sheet 5

FIG. 4a.

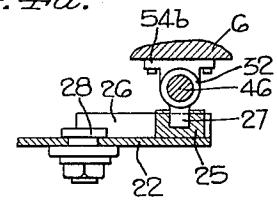


FIG. 4.

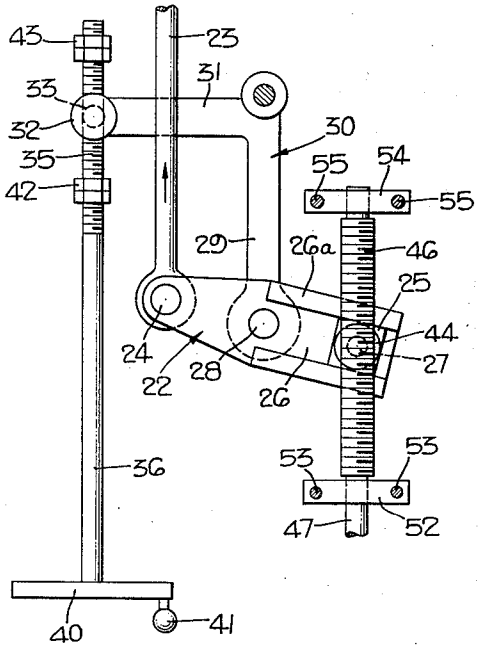


FIG. 5.

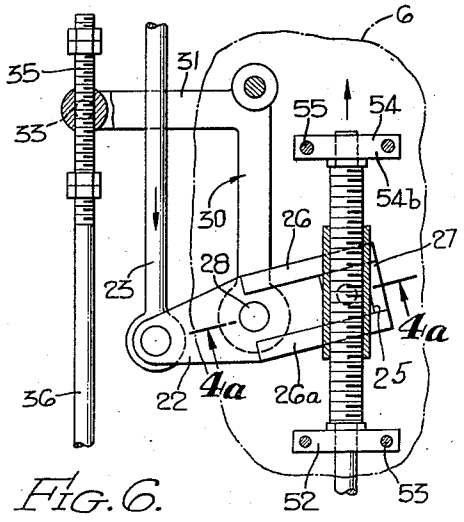


FIG. 6.

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United States Patent Office 2,911,765 Patented Nov. 10, 1959

2,911,765

REFACING MACHINE

Aurele A. Studler, Glendale, Calif.; Clara B. Studler, executrix of said Aurele A. Studler, deceased

Application July 20, 1953, Serial No. 369,060

22 Claims. (Cl. 51—123)

This invention relates to refacing of machine parts, and while the invention is applicable in the construction of machines for refacing any kind of a machine part, it is particularly useful for refacing the seat faces of valves of the poppet type employed extensively in the industrial arts and most extensively in engines of all kinds.

In conducting such a refacing operation it is common practice to employ a rotary grinding wheel having an abrasive face against which the face to be refaced is held, and while so held the part being refaced is caused to travel to and fro across the abrading face of the grinder wheel. In doing this it also is the practice to give the machine part a travel that will cause it to lap over the edges of the abrasive face. This makes for uniform wear on the abrasive face, and increases the period of usefulness of the grinder wheel after each time that the face of the wheel has been redressed.

And as the faces of machine parts that must be refaced vary considerably in width it is necessary to provide means in such mechanisms for quickly setting it to alter the length of travel that is imparted to the face being refaced.

And it is also frequently required to change at will the location of the zone of travel of the part being ground, on the abrasive face.

Another object of the invention is to provide a chuck of improved construction that will facilitate the automatic ejection of a machine piece that has just been refaced, from the chuck, and leaving the chuck in its open position ready to receive the next article that is to be refaced.

Another object of the invention is to provide means associated with the chuck for effectively sealing the chuck against the entrance of any detritus produced incidentally to the operation. This is most advantageous because in the refacing of some articles such as valves, each valve must be held precisely in position and rotated with precision about its own axis in the refacing operation.

Further objects of the invention will be evident from a careful reading of the specification and accompanying drawing disclosing this invention.

In the drawing:

Figure 1 is an end view of a refacing machine embodying this invention.

Figures 2*a* and 2*b* are companion views that should be examined together. They show the machine in plan with some parts shown in horizontal section. Figure 2*a* shows the chuck holding a poppet type valve the disc of which is held against the abrasive face of a rotary grinder; it also illustrates the means for enabling the carriage for the chuck that carries the machine part to be moved at will to apply the surface being refaced to the abrasive face of the grinder, and in dotted lines illustrates means for controlling the amount of travel of the surface being refaced; also the means for shifting the location of the travel.

Figure 3 is a longitudinal section taken in a horizontal plane through the chuck that holds the part being refaced and particularly illustrates the means for effecting the automatic ejection of a machine piece that has been refaced, brought into action by the movement of the carriage that withdraws the part being refaced from the abrasive surface. This view also illustrates a gasket that is provided at the forward end or mouth of the chuck that effectively closes the mouth against the entrance of detritus into the interior of the chuck.

Figure 4 is a more or less detailed view illustrating the means employed for controlling fluid flow to the mechanism for effecting the ejection of the machine part from the chuck, that is brought into action by the movement of the carriage that withdraws the machine part from the abrasive surface.

Figure 4*a* is a vertical section taken on the line 4*a*—4*a* of Figure 6, passing through a rocker arm, and further illustrating details of its connection to a block-form saddle with which the rocker arm has a sliding relation. Figure 4*a* further illustrates the connection between this block and an adjusting screw with its sleeve and the connection of this sleeve to the chuck carriage.

Figure 5 is a detail plan view illustrating parts that cooperate to enable the length of travel of the surface being refaced, on the abrasive face, and also enabling altering the length of the travel on the abrasive face. In this view pins and bolts are shown in section in the plane of the section, which is just below the under face of the carriage to which they attach the parts that are shown in this view. This view shows the parts in the relation they have at the back or rearward limit of the travel.

Figure 6 is a view similar to Figure 5 and shows the same parts but indicates them located in the opposite extreme position from that from which they are shown in Figure 5. In this view the portion of the plate of the carriage is indicated in a dotted line.

Referring particularly to the parts and especially to Figures 1, 2*a*, and 2*b*, the machine illustrated includes a base frame **1**, the upper portion whereof is formed into a guide through the medium of two dove tail guide channels **2** in which slide the key portions **3** for the base slide or sub-carriage **4**.

The sub-carriage **4** is provided with transverse guide ways **5** for guiding an upper carriage **6** transversely to the direction in which the guide grooves **2** guide the sub-carriage **4**.

As indicated in Figure 2*a* a rotary grinder preferably has a conical rim **7** with a plane transverse face **8** which also is in a plane perpendicular to the axis of rotation of this grinder, and this face **8** is in a plane parallel to the guiding direction resulting from the use of the guide channels **2**. In other words, when a valve head is held in the chuck and the guiding of the upper carriage **6** occurs along the guide channels **2**, the head being ground will move by a movement of translation along a line parallel to the plane in which the abrasive face **8** lies.

Mounted on the flat upper face **9** of the cariage **6** is a chuck **10** which is shown in detail section in Figure 3. On the front under face of the base **11** that rests on the face **9**, the pintle **12** is provided resting in a socket into which it fits. This pintle enables the chuck **10** to be swung around the axis of the pintle to alter the angle at which the surface of the machine part is applied to the face **8**. In order to facilitate this a wing shaped extension **13** of the base **11** is provided with an arcuate slot **14**. When the base is swung around the axis of the pintle **12** it can be clamped in any desired oriented position through the adjusting of the clamping bolt **15** that projects up through the slot from the upper face **9**, and this bolt is provided with a clamping nut **16**, having a lever **17** for tightening the same.

Above the location of the chuck **10**, as indicated in

Figure 1, an electric motor **18** is provided, one end of which is attached to the vertical frame plate **20**, and on the rear face of this frame part a housing **21** is provided for boxing in driving means for a tubular chuck spindle, as will be described more fully hereinafter.

It should be understood that the upper carriage **6**, supported as it is on sub-carriage **4** is capable of travelling in two direction. This will now be described.

Referring now particularly to Figures 2*a* and 4 to 6 inclusive, the means for regulating the travel of the upper carriage **6** depends partly upon the movement of the sub-carriage **4** along the guide ways **2**. In order to accomplish this a rock lever **22** is provided rocking about a fulcrum pin **28** and this rock lever is provided with a driving arm that extends in a general transverse direction to the guide ways **2**; this driving arm has a driving pin for enabling the rock lever **22** to shift the valve being ground on the face of the grinder. This rock lever **22** is moved to and fro through the agency of a link **23** connected to the rock lever **22** on a large pivot pin connection **24**. The driving pin referred to above is preferably in the form of a saddle **25** guided to slide longitudinally on the driving arm **26** of the rock-lever and this saddle on its upper side is provided with a pivot pin **27** that connects the saddle to the under side of the sub-carriage **4**.

In practicing the invention the rock-lever **22** is mounted on a pivot or rocking point which is capable of being adjusted laterally with respect to the guides **2** for the carriage **6**; in other words, if this fulcrum pivot for the rocker **22** is moved toward the location of the saddle **25** the movement of the saddle by the driving arm **26** will be reduced, giving a shorter travel to the sub-carriage **4**, and of course, a shorter travel for the surface of the valve head that is being applied to the abrasive face **8**. On the other hand, if the fulcrum pin for the rocker **22** is adjusted in the opposite direction the length of travel or stroke of the surface being applied to the abrasive face **8** will be increased. The fulcrum pin referred to is preferably in the form of a pin or pintle **28** carried on the end of an arm **29** of a bell-crank lever **30**; the other arm **31** of which is provided with means for effecting the two adjustments of the fulcrum pin just referred to. In order to accomplish this and at the same time provide greater, relatively large wearing surfaces the end of the arm **31** is formed with two forks co-extensive with each other and which are provided with aligning sleeves such as the sleeve **32** and the bores of these sleeves carry a pivot-block **33** having a transverse threaded bore **34** to receive a threaded neck **35** on an adjusting stem **36** which stem extends out to the side of the frame **1**, where it passes through a bearing sleeve **37** mounted in a roller bearing **38** set in a suitable bearing casing **39**. Beyond this point the stem **36** is provided with a hand wheel **40** with a suitable handle **41** for rotating the stem **36** through small increments to move the arm **31** toward the operator or away from him.

Referring to Figures *4a*, 5 and 6, it will be observed that at about the middle of the adjusting screw **46**, as shown in Figure 6, a bracket **54***a* is provided having the same general form as the bearing brackets **52** and **54** shown in Figure 6, but this bracket carries the threaded sleeve **33** as an integral part. This bracket **54***a* is like the two bearing brackets, and carries two integral lugs **54***b*, that are attached by bolts **53***a* to the underface of the carriage **6**; the threaded sleeve **33**, actually is a sleeve-form nut running on the adjusting screw **46**.

Below the sleeve **33**, this machine piece is provided with a downwardly projecting pin **27** fitting neatly into a drilled socket in a saddle or pivot-block **25**. Stop collars **46***a* limit travel of block **25**.

The screw **46** is carried on an extension or rod **47**, the outer end of which is carried in a thrust collar **48** carried in a ball bearing **49**. And the outer end of the extension of stem **47** carries a hand wheel **50** with a ball form handle **51**.

By rotating the hand wheel **50** shown in Figure 1, it is evident that the threaded sleeve **33** can be moved forward or back on the screw; such a movement will shift the carriage the same amount forward or backward. This, of course, enables the location of the conical face of the head **70** on the abrasive face **8** to be adjusted as may be desired.

When the rocker arm **26** moves to and fro, this rocking movement will be transmitted through the block **25** and pin **27** to the carriage and to the valve carried in its chuck.

In order to provide limiting stops for the amount of adjusting movement that can be made at the threaded neck **35**, nuts **42** with lock-nuts **43** are provided on the same (see Figure 2*a*).

The ball bearing **49** is mounted in a bracket **52** attached by bolts **53** to the undersides of the sub-carriage **4**.

The inner end of the adjusting stem or spindle **47** is mounted rotatably in a bracket **54** similar to the bracket **52** and secured in the same way to the sub-carriage **4** by bolts **55**. By rotating the hand wheel **50** it will be evident that the saddle **25** can be adjusted by small increments of movement forwardly toward the location of the grinder wheel. In this way the limit of travel of the surfaces being refaced can be set on the abrasive face **8**.

In order to enable the carriage **6** to be shifted on its guide ways **5** to move the machine piece being refaced on the abrasive face **8**, or to permit it to be adjusted to the same, a hand lever **56** is provided (see Figure 2*a*) which is pivotally mounted at its inner end on a pivot pin **57** on sub-carriage **4** that provides a ball bearing **58** on the pin. Near its middle portion this lever carries a link **59**, one end of which is attached by a ball bearing **60** similar to the ball bearing **58**, and the link extends over to a similar bearing and pin **61** that secures it to a flat seat face in line with the face **62** shown in Figure 1. By seizing the ball handle **63** and moving towards the right the link **59** will operate as a strut link to push the carriage **6** towards the right and remove the machine piece carried in the chuck from the vicinity of the grinder **7**. A return spring **64** is provided for the carriage **6** which returns the carriage toward the left and normally holds it so that the lever **56** is against the end of an adjustable stop **65**, the mounting for which is shown in horizontal section in Figure 2*a*.

In its construction this adjustable stop includes a stem **65** the end of which carries a screw thread **66** which is received in the threads **67** on the hub of the hand wheel **68**, which hand wheel is mounted on a ball bearing **69** on a bushing **70** and this bushing has a press fit in the bore **71** of the tubular head **72** of a bracket **73**, said bracket being secured on an extension **74** of the sub carriage **4** by suitable fasteners **75**.

The adjusting stem **65** has a longitudinal groove or key way **76** cut in it which receives the tip of a small bolt **77** which functions to keep the stem from turning and also operates as a set screw when tightened up to hold the stem **65** in any position to which it has been adjusted.

Referring now particularly to Figures 2*a* and 3 the machine piece being referred to in the present instance is a poppet type valve **78**, that is, a valve of very common form extensively used, having a disc-form body **79** with a beveled face **80** to co-operate with the valve seat in any situation where the valve is employed. The valve illustrated has the usual stem **80***a* on the axis of the disc. The valve stem illustrated happens to be provided at its inner end with a reduced shank **81** carrying an integral head **82** for the stem, the tip of which is provided with a beveled face **83** which facilitates the introduction of the stem of the valve into the chuck **10**.

The chuck **10** has an outer casing **84** of substantially cylindrical form having a head **85** at its forward end with a bore **86**, and a counterbore **87** carrying a tubular spindle **88** the inner end of which is turned down to form

a neck 89 of reduced diameter that passes through twin ball-bearing 90 behind which the neck 89 carries a long thread to receive the threaded hub 91 of a sheave or pulley 92 of cup-form with a rim 93 to enable the spindle 88 to be rotated by a pair of driving belts 94.

Within the forward end of the bore 95 of the tubular spindle 88 is a chuck chamber 96 in which a clamping collet 97 is held. The collet 97 is preferably of 3-jaw usual split type, each jaw having a head 98 at each end extending through approximately 120 degrees of circumference, and adapted at their inner and outer ends to expand resiliently so as to co-operate with two conical restricting bores such as the conical bore 99 of an annular seat 100 attached on the forward end face 101 of the spindle 88 by machine screws 102.

On the outer end of the seat 100 it is provided with means for detachably carrying a gasket 103 of cushion material such as neoprene, plastic rubber, or other compressible cushion material. This gasket constitutes a tapered nose for the chuck with a forwardly constricted bore 104 the rear end of which makes a fair extension surface with the conical seat 99. The entrance to the bore 104 has a convexly rounded lip 105 that co-operates with a machine piece such as the valve 78 to press the outer end of the lip against the inner face of the disc 79 in an annular sealing zone at 106. In other words, the inner convexity of the lip 105 enables it to fit closely into the usual fillet that blends into the side of the stem 80*a* and the inner face of the valve disc.

Any suitable means may be provided for securing the gasket 103 onto the forward face of the collet seat 100. As illustrated in Figure 3, this means includes a flange 108 on the seat 100, with an annular groove 109 behind it; and the adjacent base portion of the gasket is shaped with a cross-section to fit to the flange 108 and the groove. This form for these parts enables the gasket to be readily removed and replaced by a new one. But the wear on the gasket is slight because it rotates with the machine part such as the valve that rotates in unison with the rotating chuck.

The chuck includes a relatively movable rear seat 110 of tubular form with a conical bore like the conical bore 99 to co-operate with the heads 98. When the valve is held in the chuck 85 the relatively movable seat 110 is pressed forwardly by a relatively strong holding spring 111 the forward end of which thrusts against an annular shoulder 112 formed on the movable seat 110, and the rear end of which thrusts against an inwardly extending flange 113 projecting toward the axis of the chuck at the inner face of the hub 91 of the pulley, 92.

On the under side and at the forward end of the chuck it is split longitudinally, as indicated at 10*a*, and provided with two transverse bolts 114 that can be used to take up wear in the bore 86 and the counter-bore 87.

The inner end of the stem 80*a* when the chuck has been loaded, lies against the forward end of a piston or cap 115 having a long sleeve-form body 116 that receives the forward end of an ejector spring 117. The parts shown in Figure 3 are in the relation that they have when the surface 80 is being pushed to the abrasive face of the grinder.

The piston 115 slides in a central bore 118 in a relatively movable collet seat 110, and the rear end of the spring 117 thrusts against a threaded plug 119 that screws into the rear end of this bore.

Referring to Figure 3, it should be understood that in performing a grinding operation, the head of the valve 79 is held in the machinist's hand and the valve stem 80*a* is thrust into the collet with sufficient force to compress the ejector spring 117. In doing this the inner face of the valve head displaces the rounded lip 105 of the tip of the gasket 103 toward the left. This, of course, develops reactive compression forces in the gasket effecting the development of a circular sealing zone at which the lip 105 of the gasket is pressed forcibly against the inner face of the valve head.

When completing a refacing operation the valve head should be removed from contact wtih the grinder face 8 by moving the upper carriage 6 to the right of the guide ways 5. (See Figure 2*a*.) This prevents any injury being done to the edge of the grinding wheel rim 7 if the valve head were moved off the grinding face 8 by sliding it out of contact by crossing the outer edge of the face 8.

The pulley 92 is carried in an annular casing 120 the rear disc wall 121 of which provides a seat for the flange 122 of a cylinder 123 to the forward end of which fluid, preferably compressed air, is admitted through a hose 124. This admission is effected through a port 125 in front of a piston 126 that can travel in the bore 127 of this cylinder, closed at its rear end by a plate-form head 128.

The middle portion of the piston 126 is formed into a forwardly projecting cylindrical sleeve 129 which slides freely through a guide bore 130 in a transverse wall or head 131 that is integral with the cylindrical wall of the cylinder 123.

The bore 130 and the perimeter of the piston 126 are provided with O-rings 132 of neoprene to seal the same against movement of compressed air past the same.

The rear end of the relatively movable tubular seat 110 for the jaws 97 passes through aligning openings in the rear of the hub 91 and in the forward transverse wall 133 of the body 129 of the piston 126, and within the bore 134 of this body 129 the neck 137 is encompassed by a ball bearing 134*a*, the forward ball-race of which seats against the rear face of the end wall 133, and the rear ball-race seats at its side against a split ring 135 received in an annular slot 136 near the rear tip of the shank 137 of the shouldered movable collet seat 110.

With this organization of parts it will be evident that when compressed air or other fluid is admitted to the forward end of the bore 127 the piston 126 will travel toward the rear and will draw the collet seat 110 with it. This, of course, will release the three jaws 97 that have been gripping the valve stem 80*a* whereupon the ejector spring 117 will force the piston 115 forward until it reaches the inner ends of the jaws 97. In this movement it will have ejected the valve which will be held in the hand of the operator as this takes place. The operator will then replace it with another valve and push its stem back until the inner face of the valve head 79 comes against the tip of the gasket 103. While the operator is holding the valve 78 in this position he permits the spring 64 to move the carriage to the left until the lever 56 comes up against the stop 65. When the carriage 6 moves toward the left in this movement the compressed air in the forward end of the bore 127 will be released. The admission of compressed air and its release is accomplished automatically by the movement of the carriage co-operating with a spring-pressed pneumatic valve 147. (See Figures 2*a* and 4.) Compressed air is admitted to the casing of this pnuematic valve 147 by pipe 138 and passes to and from the cylinder through a pipe 139 that connects to the hose 124, and in exhausting passes through the valve 147 to reach the exhaust pipe 140. The valve 147 is normally held in this exhaust position by a coil spring 141. This spring holds the actuating stem 142 of the valve in its extreme projecting position when the valve is in position to exhaust the air from the bore 127 in front of the piston 126. In this extreme position which is indicated in Figure 2*a*, the tip of the stem 142 is in position to be engaged by a cam face 143 on a cam block 144 on the forward edge of the carriage 6.

The spring 141 is located between the casing of the valve and the collar 145 on the stem. As indicated in Figure 4, when inclined cam face 143 has pushed the

stem in as far as possible, its tip rides on the flat face (uninclined) **146**, and this holds the valve closure **147***a* in the position indicated in Figure 4. The block-form closure is then in the position indicated in Figure 4, so that the compressed air can flow through the valve closure or casing from the pipe **138** and thence into the pipe **139**, but when the carriage **6** is in the position in which it is shown in full lines in Figure 4 the valve closure **147***a* will have been moved by the spring **141** toward the carriage **6** and an inclined passage **148** through it will connect the pipe **139** to the pipe **140** which exhausts the air from the cylinder **123**.

The rear end face **149** of the casing **85** of the chuck **10** is secured against the adjacent face of the frame plate **20** already referred to and to which it is secured by long bolts in the form of machine screws **150** (see Figure 3), the heads of which are counter-sunk into a keeper ring **151**, the inner face of which is counter-sunk to receive the adjacent outer race-way of one of the twin ball-bearings **90**. The face **149** is provided with a counter-bore **152** to receive the outer ball-race of the adjacent twin ball-bearing **90** and the bottom of this counter-bore is in line with a shoulder **153** so as to form a seat for the corresponding inner ball-race.

The frame plate **20**, of course, is provided with an opening or bore **154** of the same diameter as the counterbores in the keeper **151** and the counterbore **152**.

It should be understood that in operating this refacing mechanism the over-travel of the valve head on each stroke, beyond the adjacent edge of the abrasive face tends to prevent wearing the abrasive face out of its true plane, but it will of course, be necessary to dress this face from time to time.

In order to accomplish this I provide a diamond point **155** (Figure 2*a*) on a stem **156** adjustably held on the end of an arm **157** to swing about a stud **158**, and rigid with a handle lever **159** which enables the diamond to be swung up to its dressing position.

When the dressing lever **157** is swung into its dressing position its forward edge **160** impinges upon the forward portion of the vertical face **161**. In this connection, it should be understood that face **162** on which the hub of this lever **157** seats is at a lower level than the upper face of the wing shaped extension **13** referred to above. While in the dressing position, the stem **156** carrying the diamond is adjusted up and tightened so as to touch the abrasive face **8** at the "low-zone" on the abrasive face, and the carriage is then reciprocated by the link **23** to give the diamond travel to and fro completely across the width of the abrasive face.

Referring now to Figure 2*b*, the drive for the link **23** is shown through a broken-away portion of the housing **163**. This driving means includes a worm **164** on a worm-shaft, whose meshing worm-wheel **166** carries crank-pin **167** eccentric to the ball-bearing **168** of the worm-wheel. The worm-shaft carries a rigid belt pulley driven by a drive belt **169** of tapered cross-section, from a small driving pulley **170** cast integrally with a larger pulley **171** with twin grooves **172** the belts **173** of which drive the grinder shaft **174** running in two twin roller-bearings **175** and **176**, the latter of which is a thrust bearing for taking the thrust of the refacing grinder **183** that has the rim **7** and the abrasive face **8** described heretofore.

The thrust bearing **176** is backed up by a thrust ring **178** with drilled spring chambers extending in from its rear end, that house a plurality of coil springs **179**. The rear ends of these springs seat against a collar **180** bolted within the bore **181** of the tubular casing **182** that houses both the twin bearings.

The grinder **183** is carried on the forward end of the shaft **174** to which it may be secured by a conventional lead center **184** clamped up by a nut **185** seating on a washer **186**. The ends of the long drum **187** form seats for the inside ball-races **188**. The lead center **184** seats up against a spacer collar **189** between it and the adjacent inside ball race **190** and located in a clearance counterbore in a guard casing **191** for the grinder.

A nut **192** on the end of the shaft **174** clamps the drive pulley **193** up against a space collar that seats up against the adjacent inside ball race **194** like the spacer **189**, and is located in a clearance opening in the inner headplate **195** in the housing **196** for the belt pulleys and belts already described.

The four electric switches **197***a*, **197***b*, **197***c*, and **197***d*, are for closing circuits for the motors employed including the main motor **198**, the shaft of which carries the double pulley **170**, **171** and the motor **18** that drives the chuck.

Many other embodiments of this invention may be resorted to without departing from the spirit of the invention.

I claim as my invention and desire to secure by Letters Patent:

1. In a valve-refacing mechanism for grinding a conical face on a valve, the combination of a rotary grinder mounted for rotation about an axis, and having an abrasive face located in a plane disposed transversely to said axis, a chuck carriage means for guiding the same to move by a movement of translation, in a plane parallel to the plane, in which the said abrasive face lies, a chuck carried by the carriage for rotatably holding the valve to be refaced, with an element of the said conical face lying substantially parallel to the said abrasive face, means for effecting a lateral movement of said guiding means in a direction to bring the said conical face into contact with said abrasive face, and power-actuated means for imparting a reciprocating movement to said carriage by a movement of translation in which the element of the conical face of the valve adjacent to the abrasive face moves in a direction parallel to the abrasive face to cause the conical face of the valve to travel to and fro on the abrasive face.

2. A valve refacing mechanism according to claim 1, including means controlled at will by the operator of the mechanism for regulating the length of the travel of the valve to and fro on the abrasive face.

3. A valve refacing mechanism according to claim 2, in which the means for regulating the length of the travel of the carriage includes a rock-lever having a fulcrum pin and an arm extending from the fulcrum pin and transversely to the plane of the said abrasive face, a pivot-block adjacent to the carriage, said arm having a sliding connection to said pivot-block operating to enable the arm to move to and fro with respect to the pivot block to effect a reduction or increase in the distance between the fulcrum pin and the block when the said arm carrying the fulcrum pin moves toward or away from the pivot block, thereby enabling the travel imparted to said block by the rocker arm to be increased or reduced; and a pivot pin whose axis is parallel with the axis of the fulcrum pin pivotally mounted in the block; means including a threaded sleeve carrying the said pin; an adjusting screw carrying said sleeve; and means for mounting said screw on the carriage with its axis disposed in a plane extending at right angles to the said abrasive face of the grinder.

4. A valve refacing mechanism according to claim 3, in which the said screw is provided with an actuating shaft leading to the operator's station, with a hand wheel attached to the same for the operator's use.

5. A valve refacing mechanism according to claim 1, including means controlled at will of the operator for shifting the location of the travel of the valve face with respect to the abrasive face.

6. A valve refacing mechanism according to claim 1, including means for yieldingly biasing the guiding means for the carriage to move the valve face into engagement with the said abrasive face, a stop for limiting the movement of the carriage toward the grinder member, and means for altering the effective position of said stop to

control the amount of material that can be removed from the valve face in the grinding operation.

7. A valve refacing mechanism according to claim 1, in which the said means for moving the valve face against the abrasive face includes a lever operatively connected to the guiding means for the carriage for moving the same in a direction to withdraw the valve face from the abrasive face; and a stop in the path of movement of said lever for limiting the movement of the carriage in the direction to bring the valve face into contact with the abrasive face.

8. A valve refacing mechanism according to claim 5, including a spring operatively connected to the carriage for biasing the carriage in the direction to apply the valve face to the abrasive face.

9. A valve refacing mechanism according to claim 1, which includes means for regulating the length of the travel of the carriage, including a rock-lever with a fulcrum pin, said rock-lever having an arm extending transversely to the plane of the said abrasive face, a pivot block on said arm and operatively connected to the carriage to impart to it the traveling movement from said lever; and means controlled at the will of the operator for supporting the said fulcrum pin, and for shifting the same toward or from the said block to regulate the effective lever arm for moving the block and its radius from the fulcrum pin, and thereby to regulate the travel of the valve face across the grinder face.

10. A valve refacing mechanism according to claim 7, in which the means for supporting the fulcrum pin includes another lever on the carriage with a thread connection for actuating the same at the will of the operator for regulating the amount of shifting of the fulcrum pin toward or from the said pivot block.

11. In a mechanism for grinding a conical valve face, the combination of a rotary grinding wheel having a flat abrasive face disposed in a plane extending at right angles to the axis of rotation of the grinding wheel and mounted to rotate in a fixed plane, means for imparting variable travel to the valve to be ground with its conical valve face touching tangentially said flat grinding face, said means comprising a carriage, means for rotatably supporting the valve on the carriage, a relatively fixed guide-member for guiding the carriage to and fro in a direction to cause the conical valve face to travel across the flat abrasive face in a direction parallel to the plane in which the abrasive face lies, means including a lever, having an arm with a fulcrum pin thereon, a rock-lever pivotally mounted on the fulcrum pin, a pivot block guiding the driving arm of the rock-lever, a pivot pin supported at the underside of the carriage, said driving arm slidably connected onto the pivot block, means associated with said first named lever for imparting the travel movement to the carriage to shift the contacting face of the conical head of the valve along the line of tangency by a movement of translation in the same plane as the flat abrasive face of the grinder wheel, and hand controlled means for adjusting the position of the pivot pin under the carriage to alter the location of the travel on the grinding face.

12. A valve refacing mechanism for grinding a valve face, comprising a rotary grinder element mounted for rotation on its axis and having a flat abrasive face disposed transversely to the axis of rotation of the grinder element, means including a carriage with means for supporting the valve with its seating face to be ground, touching, and tangent to, the flat abrasive face, means for guiding the carriage in a direction to shift the valve face across the abrasive face, an actuating lever having a relatively fixed pivotal support and having a driving arm extending transversely to the said guiding direction, a driving connection from said driving arm to said carriage including a power driven part pivotally mounted with respect to the carriage, carried by said driving arm, and capable of relative shifting movement along the driving arm; means for rocking said lever to rock the driving connection and reciprocate the carriage in the said guiding direction to impart travel movement to the said carriage and the valve face, and to shift the valve along its line of contact on the abrasive face; and means operatable at will of the operator to shift the pivotal support for the actuating lever toward or from said driven part carried by the carriage, and thereby controlling the amplitude of travel of the valve face.

13. A valve refacing mechanism according to claim 12, in which the said pivotal support for the actuating lever includes a lever carrying the same, and means controlled at the will of the operator for orienting said last named lever through slight increments of movement to regulate the amplitude of the travel movement of the valve face.

14. A valve refacing mechanism according to claim 13, in which the means for rocking the actuating lever includes a link attached to the same, with means for reciprocating the link; and means operatable at will of the operator for shifting the said driving member on the carriage through slight increments toward and from the abrasive face to regulate the location of the travelling movement of the valve face on the said abrasive face.

15. In a chuck assembly for holding a valve that has a stem, to present the valve's head to a refacing grinder or the like, to perform an operation upon the same, the combination of a carriage, a chuck casing on the carriage, and having a bore within the same with a relatively fixed substantially conical seat at its forward end, said assembly including a collet with jaws biased resiliently toward an open position, carried within the casing for holding the valve stem in the chuck, a relatively movable tubular member with a conical seat located toward the rear end of said bore, a coil spring biasing said movable tubular member toward the forward seat, said jaws having split end collars to come against said seats so as to constrict them and grip the stem of the valve between the same, a pneumatic device including a cylinder for actuating the movable tubular member, with means for admitting compressed air to the cylinder, including a relatively fixed pneumatic valve, a manually operated handle operatively connected to the carriage for moving the same, said carriage having a cam for engaging the relatively fixed pneumatic valve to actuate the same when the carriage is moved to place the valve head out of contact with the abrasive face, thereby admitting compressed air from the said pneumatic valve to the cylinder, for effecting the withdrawal of the shouldered tubular member to remove its inclined seat from contact with the adjacent end of the collet against the force of said spring to release the jaws; and an ejector spring mounted coaxially in the chuck casing with a sleeve-form piston on the forward end of the ejector spring adapted to be moved rearwardly by the insertion of the stem of said valve when the same is inserted through the forward end of the chuck and between the said jaws, said ejector spring operating to eject the said valve after the said jaws have become released.

16. A chuck assembly according to claim 15, including a shouldered tubular member towards the rear carrying the said movable seat at its forward end, and having a shoulder against which the first named spring thrusts, said tubular member having a bore with a sleeve-form piston within the same adapted to be forced back by the end of the stem of a valve when the stem thereof is inserted in the chuck, said shouldered tubular member having a thrust head fixed therein at its rear portion to receive the thrust of the ejector spring when it is compressed by the inward movement of the stem of the said valve, thereby imparting movement to said tubular member, and compressing the first named spring sufficiently to further separate the two seat faces for the ends of the collet, and thereby enabling the jaws to open automatically to receive the stem of another valve.

17. A chuck assembly according to claim 15 including a gasket-seat at the forward end of said casing, and a conical tubular gasket having a nose with a relatively small tip, and composed of resilient cushion material carried by said gasket seat, and having a bore through the same to receive the stem of the valve, the tip of said gasket being pressed tightly against the rear face of the valve head to seal off the bore at the nose of said gasket, and thereby exclude the detritus from the refacing operation upon said valve head from passing into the interior of the chuck.

18. A chuck assembly according to claim 15, in which the nose of the gasket has a tapered tip at its forward end, capable of being jammed against the inner face of the valve head being refaced by the machine, while held in the chuck.

19. In a valve refacing mechanism for holding a valve stem when applying the valve head carried thereby to a refacing grinder wheel, the combination of a chuck-casing having an annular seat with a conical seat face at its forward end, and having an opening therethrough to receive the valve stem when thrust into the same from the front, a collet within the chuck-casing having a split collar at each end with bars connecting the split collars and biasing the collet toward an expanded state to permit the insertion of the stems of the valves that are to be refaced; a tubular spindle rotatably mounted in the chuck casing, a tubular seat member mounted to slide in the bore of the tubular spindle, having a conical seat face at its forward end, a holding coil spring surrounding the seat member with means for taking forward thrusts from said holding spring and transmitting it to said seat member, an ejector spring within the bore of the seat member having a piston-type cap for imparting thrust from the inserted stem to the ejector spring for compressing the same by manual force applied through the head of the valve, a rotary driving member connected to the rear end of the said spindle for rotating the same, means for providing a seat for the rear end of the holding spring, a carriage on which the chuck-casing is mounted; means for supporting and guiding said carriage for effecting contact between the valve head and the grinder wheel, and withdrawing the valve head from the grinder wheel, a fluid-operated power cylinder having a piston connected to the rear end of said seat member, means for maintaining the cylinder and its piston in an inactive state when the carriage is holding the valve head against the grinder wheel, automatic means for supplying fluid under pressure to the cylinder activated by the movement of the carriage when withdrawing the valve head from the grinder wheel, and thereby effecting the withdrawal of the seat member and its conical seat from its adjacent end of the collet, so as to permit the collet to expand and free the stem from its grip, whereupon the ejector spring lengthens to effect the ejection of the valve stem and valve from the collet and the chuck-casing.

20. A valve refacing mechanism according to claim 19, in which the automatic means for controlling the functioning of the fluid operated cylinder includes a relatively thick valve mounted near the path of movement of the carriage, and the mechanism of which normally is in a set position that excludes the operating fluid from the cylinder, and in which cam means on the carriage shifts the said valve mechanism to a second position that releases the operating fluid from the cylinder.

21. A grinding machine fixture for supporting machine parts that have a head to be ground and a stem integral with said head, said fixture having a chuck casing for supporting a collet with jaws for clamping the stem of the part to be ground, said fixture including a gasket with a cuneiform body composed of resilient compressible cushion material having an end of relatively large transverse dimension, said cuneiform body having an opening therethrough coaxial with the collet and also having a tapered tip of relatively small diameter at its forward end with an opening through which the stem of the machine part to be ground is thrust into the collet, the small end of said body having a convex face adapted to be compressed and held in compression when the stem of the machine part is introduced, with the inner face of the head pressed tightly against the tip of the gasket, thereby effecting a circumferential seal in an area surrounding the stem and sealing off the opening through the gasket, thereby preventing the entrance of the detritus occasioned by the grinding operation from passing into the interior of the chuck casing.

22. Means for holding a machine part having a stem and a body with a transverse face adjacent the stem, for the performance of a machine operation upon the machine part, the combination of a collet casing, a collet mounted within the casing and having clamping jaws for clamping the said stem after being introduced through the collet, a gasket mounted on said casing coaxially with said collet and located in front of the collet, said gasket composed of resilient compressible cushion material and having a tapered forward end with an opening through the tip to receive the stem, the tip of said gasket operating to be compressed when the stem of the machine part is introduced through the same and pushed inwardly by the operator's hand, thereby developing compression forces at the said tip establishing an annular sealing zone on said transverse face for excluding detritus from the said machine operation.

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