May 8, 1962 W. HÄHNEL 3,033,055

ADJUSTABLE ECCENTRIC

Filed July 23, 1958 4 Sheets-Sheet 1

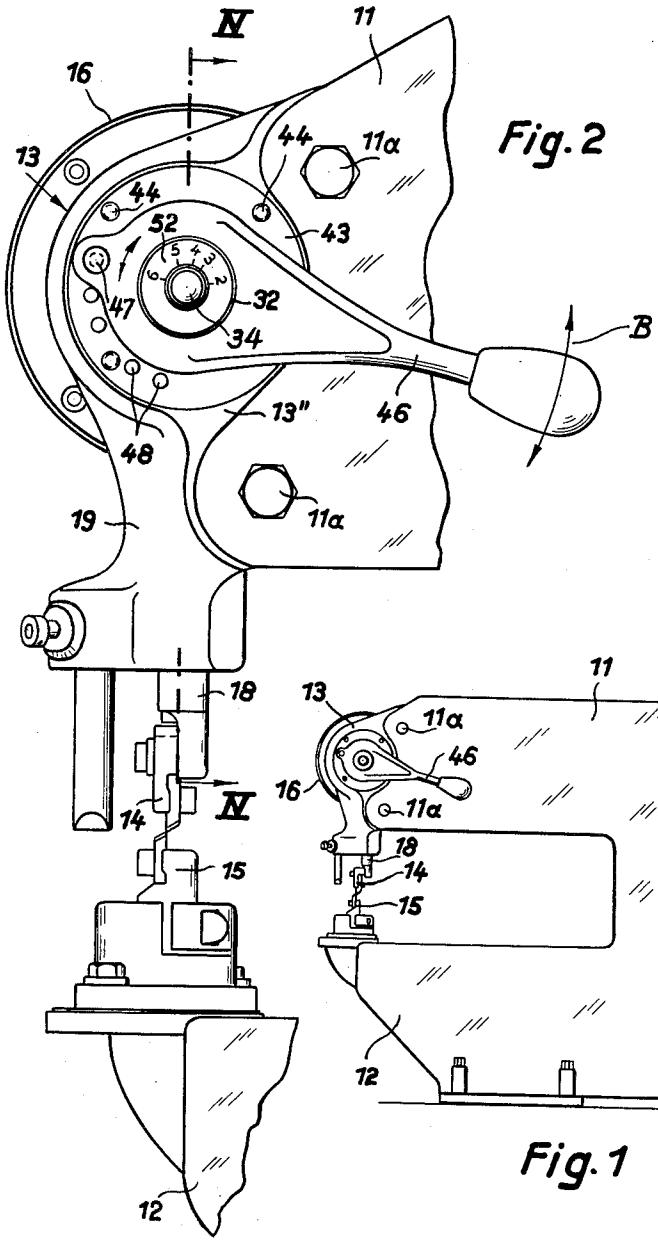


Fig. 2

Fig. 1

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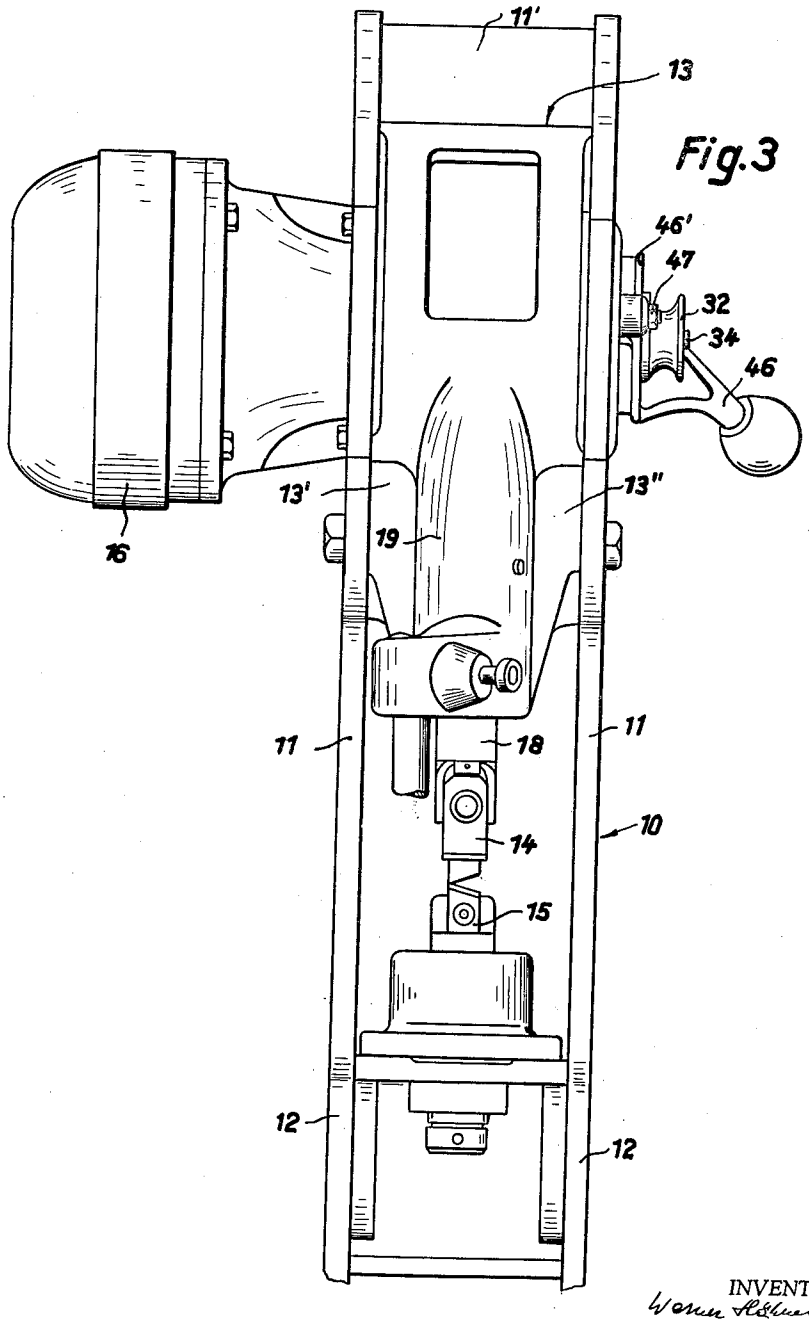


Fig. 3

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ADJUSTABLE ECCENTRIC

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Fig.4

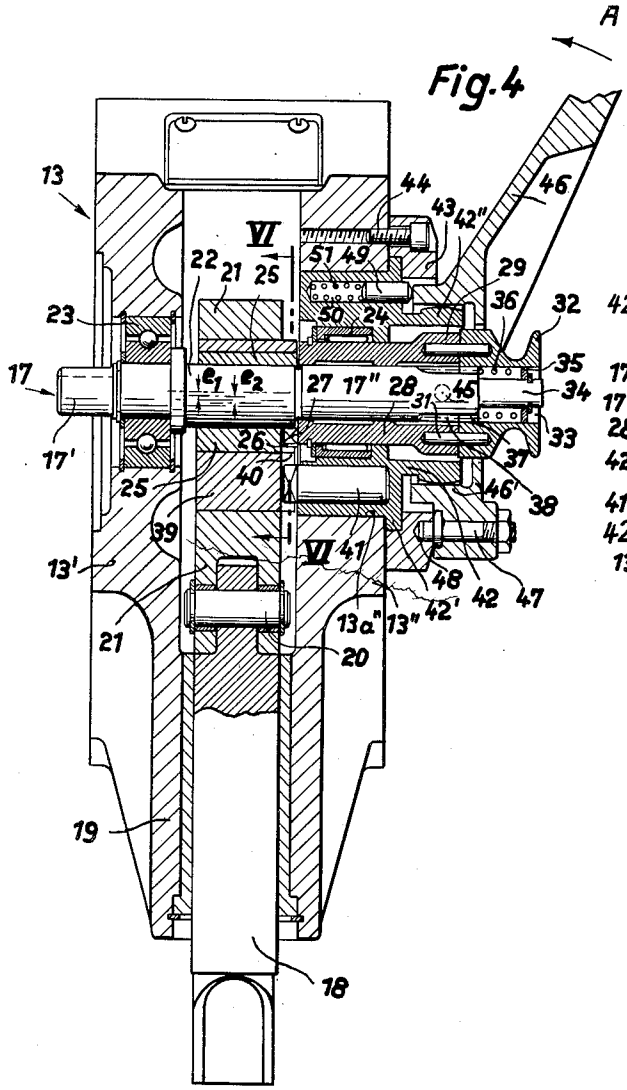
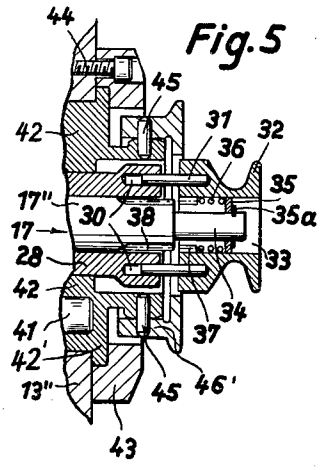


Fig.5



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ADJUSTABLE ECCENTRIC

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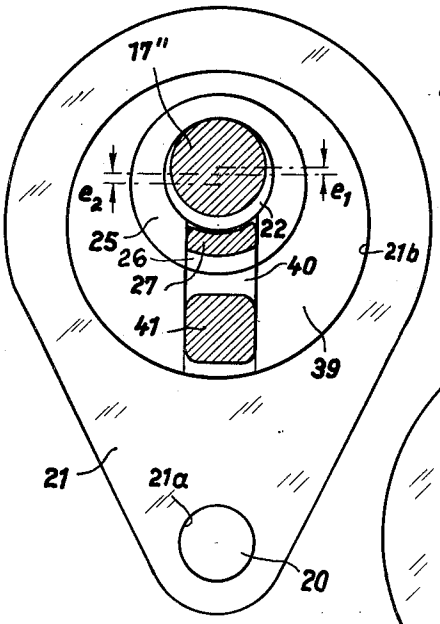


Fig. 6

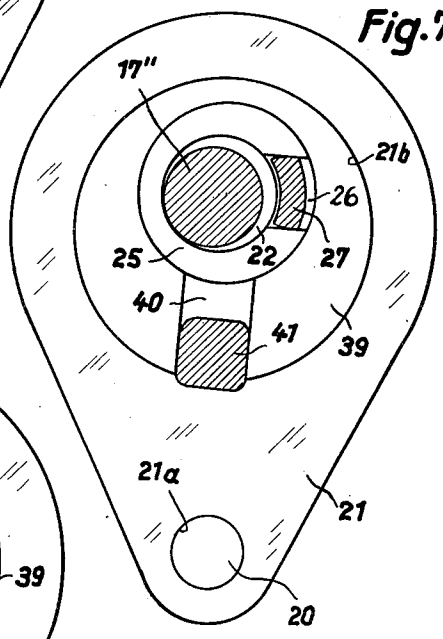


Fig. 7

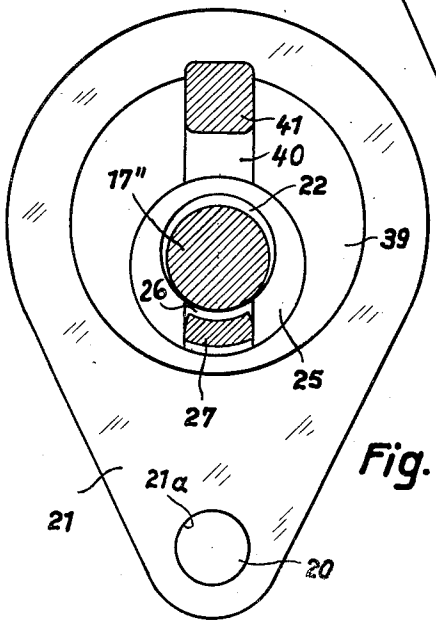


Fig. 8

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United States Patent Office

3,033,055

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3,033,055

ADJUSTABLE ECCENTRIC

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Filed July 23, 1958, Ser. No. 750,535
Claims priority, application Germany July 26, 1957
6 Claims. (Cl. 74—571)

The present invention relates to stamping machines in general, and more particularly to improvements in means for adjusting the length of stroke and the position of the ram in such apparatus.

In certain stamping machines of prior construction, the ram which, as is known, carries the movable die member, is customarily made of two portions which are joined by means of threads to be adjustable in axial direction whereby to change the overall length of the ram if adjustments in the latter's position with respect to the work piece are desired. The disadvantage of such construction is in that in actual use, the connecting threads are subjected to considerable stresses when the ram reciprocates to bring the movable die member into and out of contact with the work piece. Consequently, the threads are destroyed after relatively short periods of use and the entire ram must be replaced. This adds considerably to the maintenance costs of such apparatus.

In a different type of stamping machines, changes in the ram's position with respect to the work piece are made by adjustably mounting the table or work support, i.e. the latter is movable toward and away from the ram and the die member connected therewith. Such construction, too, has a number of serious drawbacks the most important of which is in that the adjusting means are not easily accessible when the stamping is done by utilization of relatively large sheets of metallic or other material.

Attempts were already made to provide for adjustments in the ram's position with respect to the work piece by the utilization of cams or eccentrics which cause the driving shaft, together with the ram and the driving connection therebetween, to be reciprocable in vertical direction. This arrangement necessitates the mounting of driving shaft in overhung position which is undesirable because of considerable stresses to which the shaft is subjected by the reciprocating ram during each stamping operation.

An important object of the present invention is to provide a stamping machine in which the ram and the movable die member are mounted in a manner to fully overcome the above enumerated drawbacks of known machine tools for similar purposes in that the machine operates with a stationary work support, in that the ram is made of a single piece of suitable material, and in that the driving shaft is rigidly supported in the head of the stamping machine.

Another object of the invention is to provide a machine of the above described characteristics in which the adjusting apparatus and the actuating means therefor occupy very little space.

A further object of the instant invention is to provide a stamping machine in which the driving shaft is so mounted that the stresses to which it is subjected are uniformly distributed. Therefore, the dimensions of driving shaft may be considerably below those of shafts in similar apparatus of known construction.

A still further object of my invention is to provide in a stamping machine means for adjusting the ram's stroke and its position with respect to the work piece, which are so installed as to be actuatable from the same side of the apparatus.

The above and many other objects of the invention

are attained by the provision of a stamping machine in which the driving shaft is formed with an eccentric portion between a pair of coaxial portions which latter are supported in the head of the machine, and in which the connecting member or strap for the ram surrounds a pair of eccentric members the inner of which controls the working stroke of the ram and the outer of which controls the ram's position with respect to the work piece. The strap is swingably connected with the ram and, depending on the position of said two eccentric members, causes the ram to perform a longer or shorter stroke while at the same time controlling the latter's position with respect to the work piece.

A further important feature of the improved construction is in that the eccentric portion of the driving shaft, the two eccentric adjusting members, the strap and the ram are positioned in the same plane and that, therefore, the axial length of eccentric members does not exceed the length of said eccentric portion. One coaxial portion of the driving shaft is connected with rotation-imparting driving means, such as an electric motor, the other coaxial portion being concentrically received in a pair of sleeves each of which is coupled with one of the eccentric members to adjust the latter's position when a change in the ram's working stroke or in the ram's position with respect to the work piece is desired. The sleeves are independently connected with suitable actuating means, such as a knob and a lever, the actuating means being preferably disposed at the same side of the head of my improved machine and being so mounted that the operator may independently adjust the ram's stroke while its position with respect to the work piece remains unchanged, and vice versa.

The coaxial portions of driving shaft at both sides of its eccentric portion are received in suitable antifriction bearings at least one of which is installed in a pair of spaced walls forming part of the frame, and more particularly of the head of my machine tool so that any stresses transmitted by the ram to the strap and over the aforementioned eccentrics to the eccentric portions of driving shaft are uniformly distributed to allow the utilization of a driving shaft with dimensions much smaller than in similar stamping machines of known construction.

Additional improvements reside in the provision of spring-biased couplings between the adjusting sleeves and the actuating means therefor, and in the provision of indicating means to facilitate an operator's work when a change in the ram's working stroke or in its position with respect to the work piece is considered necessary.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of a specific embodiment when read in connection with the accompanying drawings, in which:

FIG. 1 is somewhat schematic elevational view of the entire machine tool showing that side of the device from which the improved adjusting means are manipulated;

FIG. 2 is an enlarged detail view of a part of FIG. 1 showing in greater detail the movable die member with operating means therefor and the stationary die member;

FIG. 3 is a front elevational view of the assembly shown in FIG. 2;

FIG. 4 is an enlarged vertical section taken on line IV—IV of FIG. 2, as seen in the direction of arrows;

FIG. 5 is a section illustrating a detail of FIG. 4 with certain parts turned through about 90 degrees from their position shown in FIG. 4;

FIG. 6 is an enlarged section taken on line VI—VI of FIG. 4, as seen in the direction of arrows, the position

of parts therein shown corresponding to that when the ram and the movable die member perform their longest working stroke and when the movable die member is closest to the working piece;

FIG. 7 is a view similar to that of FIG. 6, showing the component parts in position they assume when the ram performs a shorter stroke and with the movable die member in the same position as in FIG. 6; and

FIG. 8 illustrates the parts shown in FIGS. 6 and 7 in a position in which the ram performs its shortest stroke and the movable die member cannot contact the work piece.

Referring now in greater detail to FIG. 1, the stamping machine therein shown comprises a substantially U-shaped frame or casing having an upper horizontal leg **11** and a lower horizontal leg **12**. The latter constitutes a holder for the stationary member **15** of a die couple, the movable member **14** of said couple being removably connected to a connecting rod or ram **18** installed in a head **13** which is fixed to the free end of upper leg **11** by means of bolts **11***a* or in any other suitable manner. The two side walls of the upper leg **11** are connected with each other by a top wall **11'**.

As can be observed in FIG. 3, head **13** comprises a pair of spaced substantially parallel walls **13'**, **13''**, the former having connected thereto an electric motor **16** which imparts motion to movable die member **14**. Motor **16** is coupled with the left-hand end portion **17'** of a main or driving shaft **17**, either directly or over a suitable gearing system (not shown). As before stated, member **14** is fixed to the lower end of the ram **18**, the latter being restricted to vertically reciprocating movements by a guide member **19** forming part of the head **13** (see FIGS. 3 and 4). The upper end of ram **18** is connected to a strap **21** by means of a pivot pin **20**. The latter is received in a bore **21***a* provided at the lower end of strap or connecting member **21**. This member is formed with a second, relatively large bore **21***b* through which passes an eccentrically formed median portion **22** of driving shaft **17** and which, in addition, receives a pair of eccentrics **25**, **39** whose purpose will be described in greater detail hereinafter. Connecting member or strap **21** causes vertically reciprocating movements of ram **18** and of die member **14** when the shaft **17** is rotated, the movement of member **21** being a composite movement consisting of oscillations about pivot pin **20** and of up-and-down movements in rhythm with the rotation of eccentric portion **22** and in dependency on the momentary position of adjusting eccentrics **25**, **39**.

Coaxial portions **17'**, **17''** of driving shaft **17** are supported in respective walls **13'**, **13''**, of head **13** and rotate in respective antifriction bearings **23**, **24**. Eccentric portion **22** of shaft **17** is located between walls **13'**, **13''**. In this manner, all stresses and shocks to which the eccentric portion **22** is subjected are uniformly transmitted to bearings **23**, **24** which, in turn, allows for considerable reduction in the dimensions of said bearings and of shaft **17**.

Eccentric portion **22** is received in the bore of an inner eccentric bushing **25** which latter determines the length of working stroke of ram **18** and of movable die member **14**. Bushing **25** is rotatably about eccentric portion **22** and, as shown in FIG. 4, is formed with a radial groove or recess **26** which extends inwardly from its right-hand end face. Recess **26** receives a projection or key **27** which is provided at, and projects from, the left-hand end face of a hub-adjusting sleeve **28**, the latter being formed with an axial bore to receive the portion **17''** of driving shaft **17**. Bearing **24** is coaxial with and surrounds the peripheral zone of an inner sleeve **28** which latter is formed with an enlarged portion of flange **29**. The end face of flange **29** is provided with axially parallel bores **30** (see FIG. 5) for reception of slidably inserted pins **31** which connect sleeve **28** with, and are preferably non-removably received in, aligned bores of a hub-adjusting handgrip member or knob **32**. Member **32** has an axial bore **33** for reception of a reduced end portion **34** of driving shaft **17**. A part of handgrip member **32** in its bore **33** is provided with axially parallel radially disposed teeth **37** which mesh with external teeth **38** on shaft portion **17''** when the member **32** is in the position of FIG. 4. Handgrip member **32** is constantly urged in the direction toward and into abutment with flange **29** of sleeve **28** by a coil spring **36** which latter abuts against the end faces of internal teeth **37** on the one hand, and against a retaining washer **35** on the other hand. Washer **35** is fixed to shaft portion **34** by means of a split ring **35***a* or the like. Thus, internal teeth **37** in spring-biased handgrip member **32** and external teeth **38** on shaft portion **17''** constitutes two halves of a releasable clutch assembly which normally connects member **32** for rotation with driving shaft **17** and which may be rendered inoperative when the handgrip member **32** is moved to right against the expanding force of resilient element **36**.

If the operator desires to change the working stroke of ram **18**, clutch **37**, **38** is released by moving the handgrip member **32** from its position of FIG. 4 into that shown in FIG. 5. It will be noted that the position of washer **35** and the length of pins **31** are so selected that the pins connect member **32** with flange **29** regardless of whether the clutch **37**, **38** is in operative or inoperative position. Therefore, by rotating handgrip member **32** in the latter's position shown in FIG. 5 either in clockwise or anticlockwise direction, pins **31** cause sleeve **28** to follow such angular movements about shaft **17** whereby the key **27** at the same time rotates the inner eccentric bushing **25** about eccentric portion **22** of the driving shaft. As soon as the proper setting of the ram's stroke is found by the operator, he releases handgrip member **32** which is returned by resilient element **36** into the position of FIG. 4 in which the axially parallel teeth **37**, **38** engage and thus connect member **32** for rotation with shaft **17**.

As may be observed in FIGS. 4 and 6, the stroke of ram **18** is determined by the eccentricity e_1 of shaft portion **22** and the momentary eccentricity e_2 of eccentric bushing **25**. When the stamping machine is in use, bushing **25** rotates with shaft **17** and thus remains stationary with respect to eccentric shaft portion **22**. In other words, the working stroke of ram **18** and of movable die member **14** which is connected therewith may be adjusted by changing the position of eccentric bushing **25** with respect to eccentric portion **22** of driving shaft **17** to change the throw of strap **21**.

FIG. 6 illustrates members **22** and **25** in the position in which they cause ram **18**, over connecting member or strap **21** and pivot **20**, to perform its longest working stroke. It will be observed that eccentricity e_1 of member **22** is added to the eccentricity e_2 of bushing **25**. In FIG. 7, the relative positions of members **22** and **25** are such that the ram **18** performs a somewhat shorter working stroke. In FIG. 8, finally, the positioning of members **22** and **25** causes the shortest stroke of ram **18**. The length of adjusted stroke may be read on indicator means **52** shown in FIG. 2. The indicator means comprises one or more scorings on the exposed end face of shaft portion **34** and a second set of scorings on the exposed end face of handgrip member **32**. The second set of scorings surrounds the scoring or scorings on the exposed end face of shaft portion **34** and enables the operator to immediately determine the angular position of eccentric **25** with respect to eccentric portion **22**.

Cylindrical periphery of inner bushing **25** is rotatably received in an outer eccentric bushing **39**, the latter being formed with a radial recess or groove **40** extending inwardly from its right-hand end face, as is shown in FIG. 4. Groove **40** receives the non-circular projection or head (see FIGS. 6 to 8) of a coupling bolt **41**, the latter being preferably non-removably received in a bore provided in an outer cylindrical member or sleeve **42** which is rotatably received in a cylindrical bore **13***a''* of wall **13''**.

Outer sleeve 42 is coaxial with portions 17', 17'' of driving shaft 17 and coaxially receives the anti-friction bearing 24. Thus, shaft portion 17'', inner sleeve 28, bearing 24 and the outer sleeve 42 are concentric and require very little space in head 13. Cylindrical member or sleeve 42 is held against axial displacements to the right of FIG. 4 by a retaining ring 43 which is fixed to wall 13'' by means of bolts 44. An annular collar 42' on member 42 is received in a complementary annular recess in ring 43 and abuts against the outer face of wall 13'' to prevent movements of sleeve 42 in a direction toward eccentric shaft portion 22. The right-hand central portion 42'' of cylindrical member or adjusting sleeve 42 extends through the bore in annular retaining ring 43 and is formed with a peripheral zone of partly spherical contour. Portion 42'' is received in the bore provided in an annular hub 46' forming part of an actuating and adjusting lever 46, the hub 46' being pivotable about a pair of coaxial and diametrically opposed pivot pins 45 shown in FIG. 5. It will be noted that, in FIG. 5, hub 46' and outer sleeve 42 are turned through about 90 degrees from their position of FIG. 4. Due to the partly spherical configuration of extension 42'', hub 46' may be pivoted or tilted about members 45 when the lever 46 is swung in the direction of arrow A (FIG. 4) in a plane passing through the axis of shaft portions 17', 17''. At the same time, pins 45 connect lever 46 with the outer sleeve 42 so that they may rotate in unison when a locking member or bolt 47 is removed from one of a series of bores or recesses 48 provided in the retaining ring 43, as is shown in FIG. 2. It will be noted that the bolt 47 is disposed in a plane intersecting at right angles the plane of pins 45 and that the recesses or bores 48 are disposed on the periphery of a circle concentric with shaft portion 17'' and cylindrical member 42. A tilting member in the form of a pin 49 is received in a bore 50 provided in the sleeve 42 and is constantly urged in the direction toward hub 46' by a coil spring 51 operating between the end wall in bore 50 and the adjacent end of tilting pin 49. The latter's purpose is to constantly urge hub 46' and hence lever 46 into the position in which the end of locking bolt 47 extends into one of recesses 48. It will be observed that the length of bolt 47, and more particularly of its portion extending from the hub 46', is selected with a view to fully remove the bolt from a recess 48 when the spring-biased lever 46 is tilted about coaxial pins 45 in the direction of arrow A, i.e. in the direction to compress the resilient member 51.

The purpose of members 42 and 46 is to control the position of movable die member 14 with respect to stationary die member 15, and hence with respect to the work piece or blank (not shown), regardless of the length of stroke of ram 18. The adjustment is made by first tilting lever 46 in the direction of arrow A sufficiently to remove bolt 47 from one of bores or recesses 48, and by thereupon rotating the lever in clockwise or anticlockwise direction, as is indicated by the double arrow B in FIG. 2. The direction of lever's rotation depends on whether the operator desires to move the die member 14 toward or away from the work piece. As before stated, sleeve 42, being connected with hub 46' of lever 46 by means of pins 45, also rotates and, over coupling member 41, causes rotation of eccentric bushing 39 about the inner ecectric bushing 25.

In the position of FIG. 6, eccentric member 39 is so adjusted that the movable die member 14 assumes its lowermost position. FIG. 7 shows the eccentric 39 in the same position and FIG. 8 in its uppermost position, i.e. in which the movable die member 14 is removed from contact with the work piece regardless of whether or not the ram 18 performs its working strokes. As soon as the desired adjustment in the position of movable die member 14 is made, the operator releases lever 46 whereby the spring 51 and pin 49 cause bolt 47 to enter a selected recess 48. In this manner, lever 46, outer sleeve 42 and eccentric 39 are prevented from unintentional rotation, for example, due to friction between eccentrics 25 and 39, as the spring 51 constantly urges lever 46 to pivot about pins 45 and thereby retains the bolt 47 in a selected recess 48.

As is best shown in FIG. 4, a particular feature of the novel stroke adjusting means and of the novel means for adjusting the position of movable die member is in that the entire system occupies very little space. This is accomplished by arranging eccentric members 25, 39 in surrounding relationship and by mounting said members substantially in the plane of connecting member 21 and ram 18. Moreover, the length of eccentric bushings 25, 39 does not exceed the length of eccentric shaft portion 22 which also contributes to savings in space and material. Still further, the actuating means for adjusting the positions of eccentrics 25, 39 also occupy very little space as they extend little beyond the outer face of supporting wall 13'', this being due to concentric disposition of sleeves 28 and 42.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characterisics of the generic and specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. In a stamping machine, in combination: a ram having an upper end; means slidably guiding said ram for reciprocating movements in one direction; a driving shaft having an eccentric portion; an inner eccentric mounted in surrounding relationship about said eccentric portion; means for connecting said eccentric to said shaft in different turned positions; an outer eccentric rotatably receiving said inner eccentric; means for holding said outer eccentric against rotation with said inner eccentric, said means being turnable about the axis of said driving shaft for adjustment of the angular position of said outer eccentric, and being arrestable with respect to said ram guiding means for holding said outer eccentric in adjusted angular positions; and connecting means receiving said outer eccentric and rotatable thereabout, said connecting means being swingably fixed to the upper end of said ram.

2. A stamping machine comprising, in combination: a driving shaft having an axis, a pair of coaxial portions and an eccentric portion; an inner eccentric mounted in surrounding relationship about said eccentric portion, having an end face and a recess in said end face; an inner sleeve including a projection extending into said recess for coupling same with said eccentric, said sleeve surrounding one coaxial portion of said shaft; means for adjustably connecting said sleeve with said shaft; an outer eccentric rotatably receiving said inner eccentric, said outer eccentric having an end face and a recess in said end face; an outer sleeve including a projection extending into said last mentioned recess for coupling same with said outer eccentric, said outer sleeve surrounding said inner sleeve and being rotatably mounted; means for turning said outer sleeve and for arresting said outer sleeve in turned positions; connecting means receiving said outer eccentric and rotatable thereabout; a ram having one end swingably connected with said last mentioned means; the machine operating in such manner that, when said shaft rotates with the inner eccentric and with the inner sleeve in said outer eccentric and said outer sleeve, respectively, the connecting means reciprocates said ram whereby the ram performs a stroke of a length determined by the angular position of said inner eccentric with respect to said eccentric portion, the position of said

working stroke depending upon the angular position of said outer eccentric and of said outer sleeve.

3. A stamping machine comprising, in combination: a driving shaft having an axis, a pair of coaxial portions and an eccentric portion; an inner eccentric mounted in surrounding relationship about said eccentric portion, having an end face and a recess in said end face; an inner sleeve including a projection extending into said recess for coupling same with said eccentric, said sleeve surrounding one coaxial portion of said shaft; means for adjustably connecting said sleeve with said shaft and comprising a handgrip member non-rotatably and axially slidably connected with said sleeve for movement between two positions, said handgrip member and said one coaxial portion defining a releasable clutch connecting same for rotation when the handgrip member is in one of said positions and permitting independent rotation of said handgrip member with said sleeve and said eccentric relative to said shaft when the handgrip member is in the other of said positions, and resilient means operating between said one coaxial portion and said handgrip member for constantly urging the latter into said one position; an outer eccentric rotatably receiving said inner eccentric, said outer eccentric having an end face, a recess in said end face; an outer sleeve including a turnable pin extending into said last mentioned recess and being slidable therein for coupling same with said outer eccentric, said outer sleeve surrounding said inner sleeve and being rotatably mounted; means for turning said outer sleeve and for arresting said outer sleeve in turned positions; connecting means receiving said outer eccentric and rotatable thereabout; a ram having one end swingably connected with said last mentioned means; the machine operating in such manner that, when said shaft rotates with the inner eccentric and with the inner sleeve in said outer eccentric and said outer sleeve, respectively, the connecting means reciprocates said ram whereby the ram performs a stroke of a length determined by the angular position of said inner eccentric with respect to said eccentric portion, position of said working stroke depending upon the angular position of said outer eccentric and of said outer sleeve.

4. A machine of the character described which comprises, in combination: a driving shaft having an axis, a pair of coaxial portions, and an eccentric portion between said coaxial portions, one coaxial portion comprising external teeth parallel with the axis of said shaft; an inner eccentric mounted in surrounding relationship about said eccentric portion; an inner sleeve coupled with said eccentric and surrounding said coaxial portion; a handgrip member non-rotatably and axially slidably coupled with said sleeve for movements between two positions, said handgrip member having a bore and internal teeth in said bore meshing with the teeth of said coaxial portion when the handgrip member is in one of said positions and spaced from said last mentioned teeth when the handgrip member is in the other position; resilient means operating between said coaxial portion and said handgrip member for constantly urging the latter into said one position; an outer eccentric rotatably receiving said inner eccentric; an outer sleeve coupled with said outer eccentric, surrounding said inner sleeve, and rotatably mounted; means for turning said outer sleeve and for arresting said outer sleeve in turned positions; connecting means receiving said outer eccentric and rotatable thereabout; a ram having one end swingably connected with said last mentioned means and another end; the machine operating in such manner that, when the shaft rotates with the inner eccentric, with the inner sleeve and with the handgrip member, the connecting means reciprocates said ram whereby the ram performs a stroke of a length determined by the angular position of said inner eccentric with respect to said eccentric portion, said angular position being adjustable by moving said handgrip member into said other position and rotating same together with said inner sleeve and said inner eccentric with respect to said shaft, and the position of said working stroke depending upon the angular position of said outer eccentric and said outer sleeve.

5. A stamping machine comprising, in combination: a driving shaft having a pair of coaxial portions and an eccentric portion therebetween; an inner eccentric mounted in surrounding relationship about said eccentric portion; an inner sleeve coupled with said inner eccentric and surrounding one coaxial portion of said shaft; means for adjustably connecting said sleeve with said shaft; an outer eccentric rotatably receiving said inner eccentric; an outer sleeve having a turnable pin coupled with said outer eccentric and surrounding said inner sleeve, said outer sleeve being rotatably mounted; a retaining member for rotatably holding the outer sleeve against axial movements; an actuating lever member for said outer sleeve; means for so connecting the lever member with said outer sleeve that the lever member is tiltable in a plane passing through the axis of said shaft between two positions; clutch means disposed between said lever member and said retaining member comprising a bolt connected to one of said members at its side facing the other member, the other member having a plurality of recesses disposed on the periphery of a circle concentric with said outer sleeve and one of said recesses receiving said bolt when the lever member is in one of said positions, said bolt being moved away from said recesses when the lever member is in the other position; resilient means for constantly urging the lever member into said one position; connecting means receiving said outer eccentric and rotatable thereabout; a ram having one end swingably connected with said last mentioned means; the machine operating in such manner that, when said shaft rotates with the inner eccentric and with the inner sleeve in said outer eccentric and said outer sleeve, respectively, the connecting means reciprocates the ram whereby the ram performs a stroke of a length determined by the angular position of said inner eccentric and said inner sleeve with respect to the eccentric portion of said shaft, the position of said working stroke depending on the angular position of said outer eccentric and of said outer sleeve, said last mentioned angular position being adjustable by moving the lever member into said other position and rotating same together with said outer sleeve and with said outer eccentric relative to said retaining member.

6. A stamping machine comprising, in combination: a driving shaft having an axis, a pair of coaxial portions and an eccentric portion therebetween an inner eccentric mounted in surrounding relationship about said eccentric portion; an inner sleeve coupled with said inner eccentric and surrounding one coaxial portion of said shaft; means for adjustably connecting said sleeve with said shaft; an outer eccentric rotatably receiving said inner eccentric; an outer sleeve having a turnable pin coupled with said outer eccentric and surrounding said inner sleeve, said outer sleeve being rotatably mounted, said outer sleeve further comprising an end face turned away from said outer eccentric and having a bore in said end face parallel with the axis of said shaft; a retaining member for rotatably holding the outer sleeve against axial movements; an actuating lever member for said outer sleeve; means for so connecting the lever member with said outer sleeve that the lever member is tiltable in a plane passing through the axis of said shaft between two positions; clutch means disposed between said lever member and said retaining member comprising a bolt connected to one of said members at its side facing the other member, the other member having a plurality of recesses disposed on the periphery of a circle concentric with said outer sleeve and one of said recesses receiving said bolt when the lever member is in one of said positions, said bolt being moved away from said recesses when the lever member is in the other position; resilient means in the bore of said outer sleeve; a tilting member in said bore having an end in contact with said lever member for

constantly urging the lever member into said one position under the action of said resilient means; connecting means receiving said outer eccentric and rotatable thereabout; a ram having one end swingably connected with said last mentioned means; the machine operating in such manner that, when said shaft rotates with the inner eccentric and with the inner sleeve in said outer eccentric and said outer sleeve, respectively, the connecting means reciprocates the ram whereby the ram performs a stroke of a length determined by the angular position of said inner eccentric and said inner sleeve with respect to the eccentric portion of said shaft, the position of said working stroke depending on the angular position of said outer eccentric and of said outer sleeve, said last mentioned angular position being adjustable by moving the lever member into said other position and rotating same together with said outer sleeve and with said outer eccentric relative to said retaining member.

References Cited in the file of this patent

UNITED STATES PATENTS

459,597	Stiles	Sept. 15, 1891
1,565,264	Dubi	Dec. 15, 1925
2,006,779	Terrell	July 2, 1935
2,265,222	Benes	Dec. 9, 1941
2,477,587	Doutt	Aug. 2, 1949
2,561,344	Cutler et al.	July 24, 1951
2,592,237	Bradley	Apr. 8, 1952
2,703,032	Grove	Mar. 1, 1955
2,834,223	Sternad	May 13, 1958

FOREIGN PATENTS

470,773	France	Sept. 29, 1914
530,452	France	Oct. 3, 1921
817,685	Germany	Oct. 18, 1951