To all whom it may concern:

Be it known that I, ALBERT C. SAVIDGE, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented a new and useful Multiple-Drill Attachment, of which the following is a specification.

It is the object of my invention to provide a multiple spindle attachment which can be applied to an ordinary drill press to get the effect of a multiple drill or to an ordinary lathe to get the effect of a turret lathe, and which permits any drill or other one of the group of tools to be swung into position for operation—preferably in alignment with the main axis of the drill press or lathe—and the several tools to be operated at the same or different speeds.

The accompanying drawings illustrate my invention in its preferred form: Fig. 1 is an axial section through my multiple spindle attachment, on the line 1—1 of Fig. 2; and Fig. 2 is a plan of such attachment, with parts broken away on various planes to show the internal construction.

The frame comprises an upper part 10, which is stationary, and a lower part 11, which may be slid circumferentially on the upper part 10 and held in any desired one of several positions—three, as shown—with respect thereto, as by a latch 12 carried by the upper part and co-operating with lugs 13 on the lower part. A circular plate 14 is mounted in internal circular grooves 15 at the meeting edges of the upper and lower parts 10 and 11, so as to provide a positioning guide for said two parts near their periphery; and is held rigid with respect to the lower frame part 11, as by interlocking lugs 16 on such cross plate and lower part. A central bolt 17 passing axially through the cross plate 14 holds the two frame parts 10 and 11 together; and surrounding this bolt is a tubular shaft 18, which is co-axial with the frame parts 10 and 11 so that when one part is moved with relation to the other it turns around the axis of the shaft 18 and the edge of the cross plate 14 slides in the circular groove 15 in the edge of the upper frame part 10.

A driving shaft 20 is mounted eccentrically in the upper frame part 10, in suitable bearings carried by such frame part and by a lower bearing support 21 suitably fastened within such frame part; this shaft in the preferred arrangement shown is parallel to the axial shaft 18. The driving shaft 20 is provided with any suitable attaching stem 22 for attachment to a drill press head or lathe center; the attaching stem 22 is preferably detachable from the shaft 20, so as to permit different attaching stems to be used to suit different drill press heads or lathe centers.

A plurality of shafts 25, 26, and 27 are mounted in the lower frame part 11 and the cross plate 14, and in the preferred arrangement shown are all parallel to the axial shaft 18. Each of these shafts is at the same distance from the axial shaft 18 as is the main driving shaft 20, so that by moving the two frame parts relatively about the axial shaft 18 any of the shafts 25, 26, and 27 may be brought into position for operation—preferably in alignment with the main driving shaft 20. There are the same number of sets of lugs 13 as there are shafts 25, 26, and 27, and these lugs and the spring 19 are arranged to lock the frame parts with any desired one of such shafts in alignment with the shaft 20.

The shafts 13 and 20 are connected by suitable intermeshing gears 30. The shafts 25, 26, and 27 are connected to the shaft 18 by sets of intermeshing gears 31, 32, and 33. The gear ratios of the sets of gears 30, 31, 32, and 33 may be anything desired, and may be the same or different, according to the speeds desired of the shafts 25, 26, and 27. In the preferred arrangement shown, it is desirable that the sum of the pitch diameters of the gears of each set shall be constant, if there are only two gears in a set, so that alignment is obtained between the driving shaft 20 and that one of the shafts 25, 26, and 27 which is working.

Each of the shafts 25, 26, and 27 projects through the bottom of the lower frame part 11, and is provided with some sort of an adaptor 35 for receiving the desired tool, such as a drill or a tap, or a tool chuck. These adaptors are preferably detachable from the shaft, so that different adaptors may be used to suit the desired tool or tool chuck.

In operation, the attaching stem 22 is placed in a drill press head or mounted in a lathe, so that as the drill press or lathe is
operated the shaft 20 is driven. The upper frame part 10 is prevented from turning by a lateral projection 36 co-operating with any suitable stationary part of the drill press or lathe, or held by the operator. The lower frame part 11 is turned to bring the desired one of the shafts 25, 26, and 27 into operating position, preferably in alignment with the shaft 20; and is held in such position by the latch 12 and the proper set of lugs 13. The rotation of the shaft 20 produces rotation of all the shafts 18, 25, 26, and 27, by reason of the gearing. The desired tools or tool chucks are mounted in the adaptors 35 for the various shafts 25, 26, and 27, for producing the desired operations on the work. The drill press head or the lathe tail stock is now manipulated in the usual manner to produce the proper operation by the tool which is carried by the then working shaft, in alignment with the driving shaft 20. When this operation is completed the latch 12 is released and the lower frame part 12 is shifted to bring another of the shafts 25, 26, and 27 into operating position, for the next desired operation; and so on until the operations are completed. The various operations may all be done without stopping the drill press or lathe between them.

I claim as my invention:

1. A multiple spindle attachment, comprising a shaft, a main driving and supporting shaft offset from the first shaft and geared thereto, a frame circumferentially adjustable about the axis of said first shaft, and a plurality of shafts carried by said frame and all geared to said first shaft, the distance between each of said frame-carried shafts and said first shaft being the same as the distance from said main driving and supporting shaft to said first shaft so that by the adjustment of said frame about the axis of said first shaft any of said frame-carried shafts may be brought into alignment with said driving shaft, said driving and supporting shaft being arranged to carry the remaining parts and to detachably receive a driving stem for co-operation with a shaft of a desired associated machine.

2. A multiple spindle attachment, comprising two frame parts which are relatively rotatably adjustable, a shaft mounted in said frame parts co-axial with the axis of rotatable adjustment between them, a main driving and supporting shaft mounted in one of said frame parts parallel to and offset from the first shaft, a plurality of shafts mounted in the other of said frame parts parallel to said first shaft and each offset therefrom but having the distance such as to make said driving and supporting shaft offset from said first shaft, and gearing between said first shaft and each of the other shafts, said main driving and supporting shaft carrying the remaining parts and being arranged for detachable co-operation with and support by a shaft of the desired associated machine.

3. A multiple spindle attachment, comprising two relatively rotatable frame parts, a pivot bolt by which said frame parts are attached together along their axis of relative rotation, a hollow shaft surrounding said bolt, a driving shaft carried by one of said frame parts and offset from and geared to said hollow shaft, a plurality of driven shafts carried by the other of said frame parts and permanently geared to said hollow shaft, each of the shafts carried by the second frame part being offset from said hollow shaft by the same distance that said driving shaft is offset therefrom, and all of the other shafts being parallel to said hollow shaft and means for holding the two frame parts against relative rotation with the driving shaft in alignment with any of the shafts carried by the other frame part.

4. A multiple spindle attachment, comprising two relatively rotatable frame parts, a pivot bolt by which said frame parts are attached together along their axis of relative rotation, a hollow shaft surrounding said bolt, a driving shaft carried by one of said frame parts and offset from and geared to said hollow shaft, a plurality of driven shafts carried by the other of said frame parts and geared to said hollow shaft, each of the shafts carried by the second frame part being offset from said hollow shaft by the same distance that said driving shaft is offset therefrom, and all of the other shafts being parallel to said hollow shaft, and means for holding the two frame parts against relative rotation with the driving shaft in alignment with any of the shafts carried by the other frame part.

5. A multiple spindle attachment, comprising a shaft, a main driving and supporting shaft offset from the first shaft and geared thereto, said main driving and supporting shaft being arranged for detachable co-operation with a shaft of the desired associated machine to support the entire attachment thereby, a frame circumferentially adjustable about the axis of said first shaft, and a plurality of shafts carried by said frame and all permanently geared to said first shaft.

6. A multiple spindle attachment, comprising a shaft, a main driving and supporting shaft offset from the first shaft and geared thereto, said main driving and supporting shaft carrying the remaining parts and being arranged for detachable co-operation with a shaft of the desired associated machine to support the entire attachment thereby, a frame circumferentially adjust-
able about the axis of said first shaft, and a plurality of shafts carried by said frame and all geared to said first shaft.

7. A multiple spindle attachment comprising two relatively rotatable frame parts, a pivot bolt by which said frame parts are attached together along their axis of relative rotation, a hollow shaft surrounding said bolt, a driving shaft carried by one of said frame parts and offset from and geared to said hollow shaft, and means for holding the two frame parts against relative rotation with any of the shafts carried by the other frame part in position for operation.

8. A multiple spindle attachment comprising two relatively rotatable frame parts, a pivot bolt by which said frame parts are attached together along their axis of relative rotation, a hollow shaft surrounding said bolt, a driving shaft carried by one of said frame parts and offset from and geared to said hollow shaft, and means for holding the two frame parts against relative rotation with any of the shafts carried by the other frame part in position for operation.

9. A multiple spindle attachment comprising a shaft, a rotatably adjustable frame, a plurality of shafts mounted in said frame, a plurality of gears on said first shaft, and a plurality of gear trains between said first shaft and the respective frame-carried shafts, each of the gears on said first shaft being in one of said gear trains.

10. A multiple spindle attachment comprising a main driving shaft and a counter-shaft geared together and having their axes relatively fixed and out of alinement with each other, a rotatably adjustable frame, a plurality of shafts mounted in said frame, a plurality of gears on said countershaft, and a plurality of separate gear trains between said countershaft and the respective frame-carried shafts, each of the gears on said countershaft being in one of said gear trains.

11. A multiple spindle attachment as described in claim 9, with the addition that all the shafts are parallel.

12. A multiple spindle attachment as described in claim 9, with the addition that all the shafts are parallel and the axes of rotation of said frame and said first shaft are co-incident.

In witness whereof, I have hereunto set my hand at Indianapolis, Indiana, this 24th day of July, A. D. one thousand nine hundred and eighteen.

ALBERT C. SAVIGDE.