June 5, 1934. H. TORMYN ET AL 1,961,404

MACHINE TO COUNTERSINK TWENTY HOLES IN A WHEEL HUB SHELL FOR LONG SPOKES

Filed July 29, 1932 4 Sheets-Sheet 1

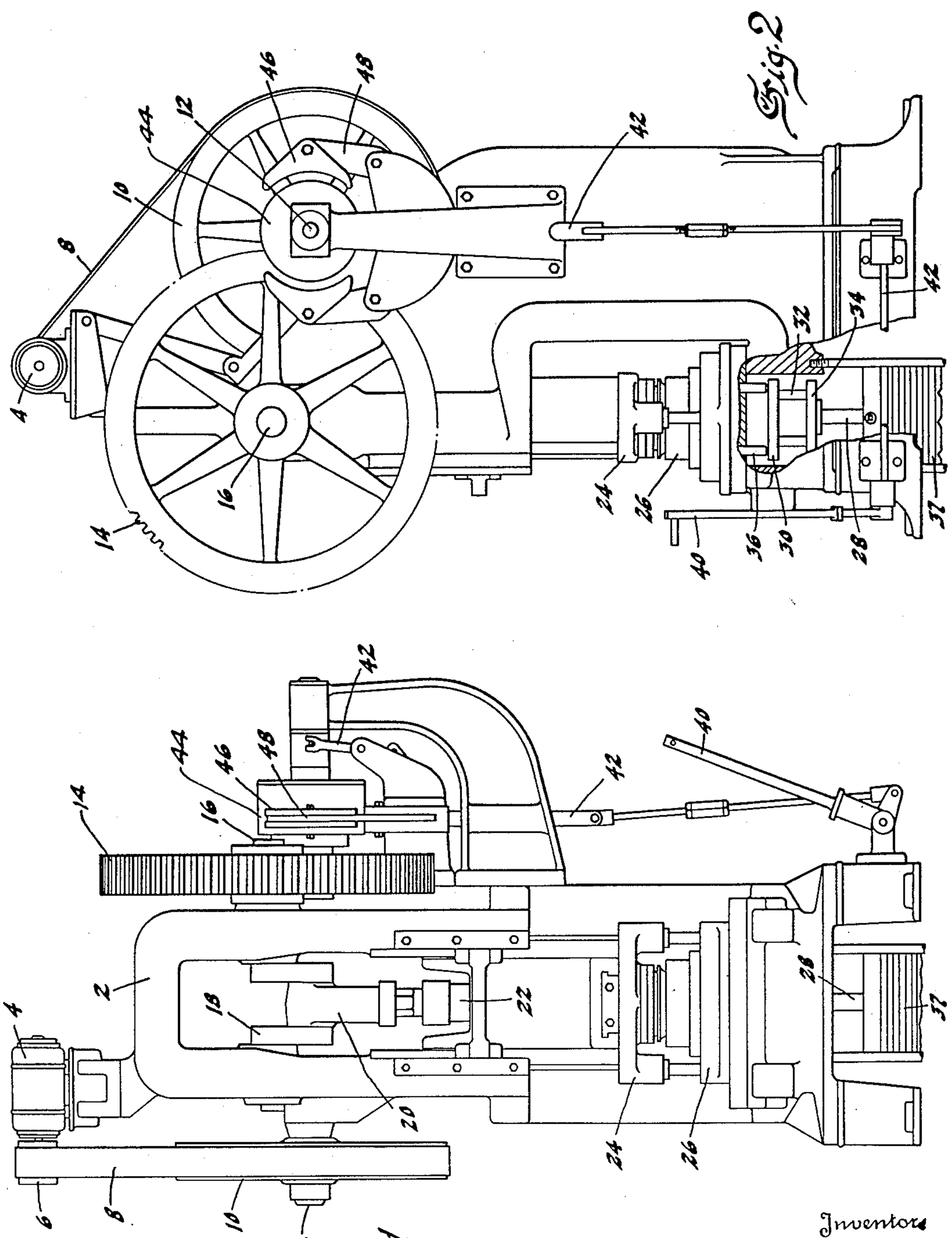

Fig. 1

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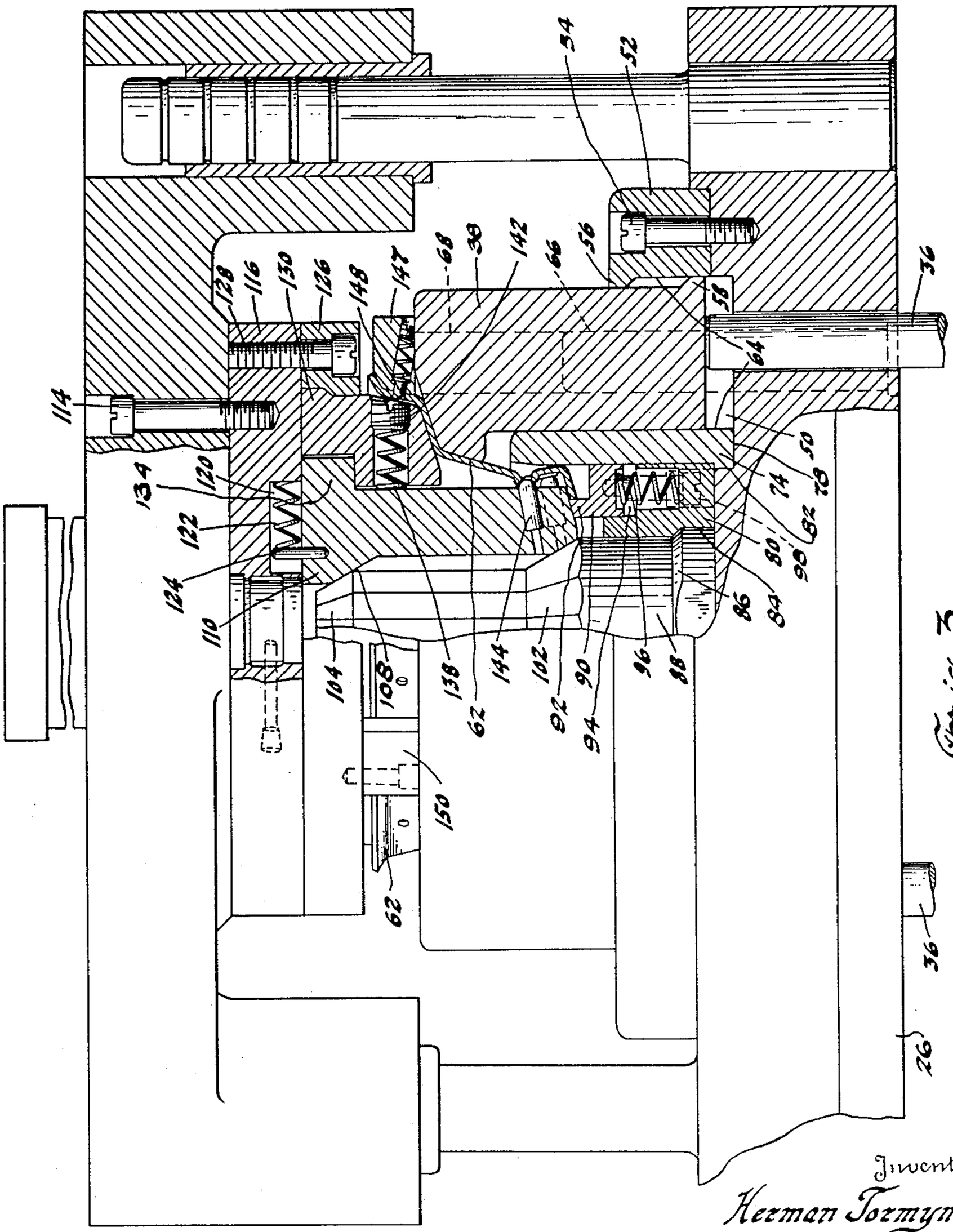

Fig. 3

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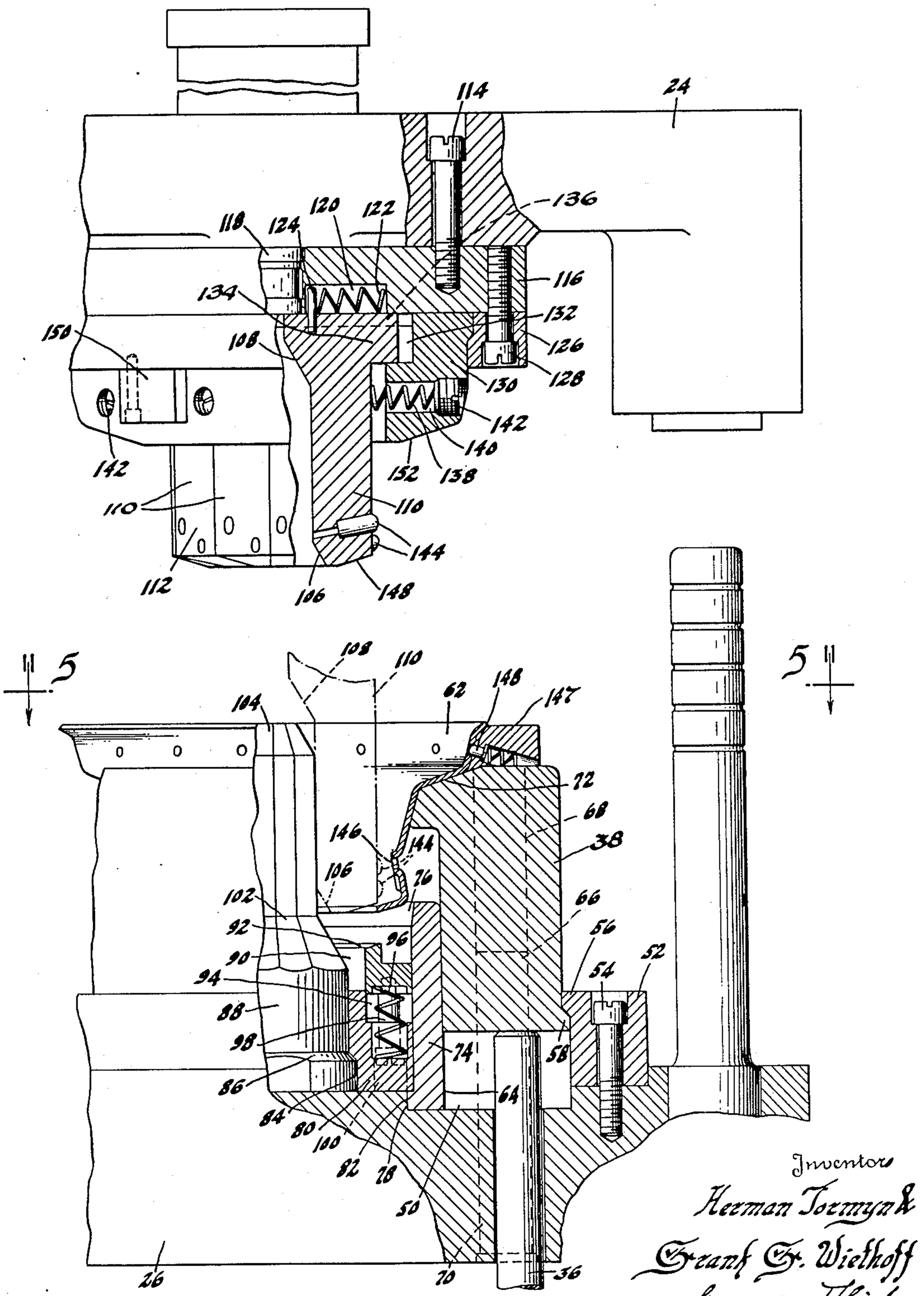

Fig. 4

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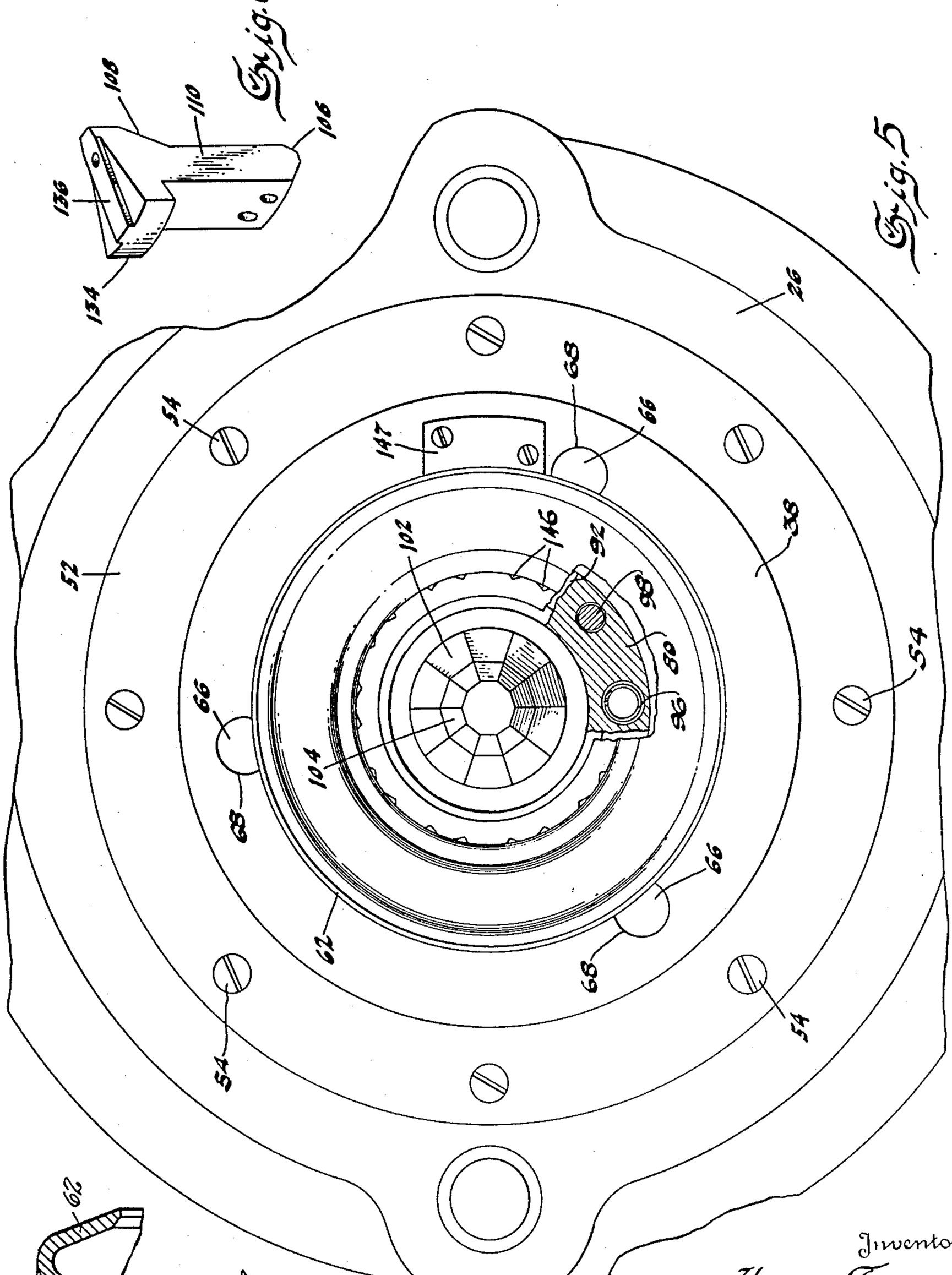

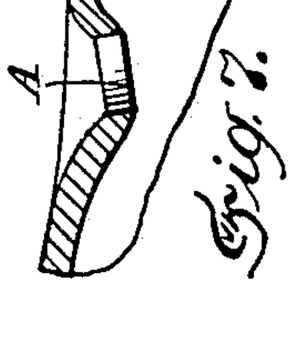

Fig. 7.

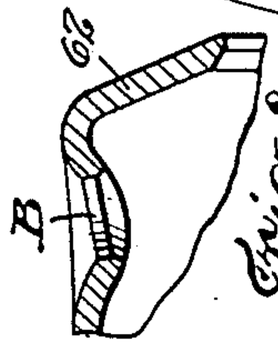

Fig. 8.

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1,961,404

UNITED STATES PATENT OFFICE

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MACHINE TO COUNTERSINK TWENTY HOLES IN A WHEEL HUB SHELL FOR LONG SPOKES

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Application July 29, 1932, Serial No. 625,994

10 Claims. (Cl. 153—21)

This invention relates to machines for the manufacture of wire wheels and has particular reference to a machine or die for countersinking the long spoke openings in the wheel hub.

A machine for forming the spoke openings in the hub shell for the long spokes is described and claimed in copending application Serial No. 625,993, filed July 29, 1932. The machine of the present invention has for its object the countersinking of the openings formed by the machine of the application referred to. In applying the spokes to the hub of the wire wheel it is necessary that the openings be countersunk at the interior of the hub and the object of the present invention is to construct a die which will perform the countersinking operation.

The machine generally comprises upper and lower die shoes mounted in a conventional press. The lower die shoe includes a holder element for the wheel hub slidably mounted on the shoe, a centering attachment concentrically mounted relative to the hub holder and a backing ring for the hub rigidly to hold the hub when the countersinking punches are operated. A cam is mounted centrally of the die shoe to expand the segments of an expandible head inside the hub when the head descends on to the lower die shoe. The segments have countersinking punches mounted therein and when the hub is expanded the punches strike the openings to form a countersink.

On the drawings:

Figure 1 is a front view of a press having the die of the invention applied thereto.

Figure 2 is a side view of Figure 1.

Figure 3 is an enlarged detail view partly in section showing the position of the parts when the top die has descended on the die shoe and when the punches are countersinking the openings in the hub shell.

Figure 4 is a view corresponding to Figure 3 but showing the top die and die shoe separated and with one of the segments in dotted line position after it has left the cam surfaces of the central cam.

Figure 5 is a view taken substantially on the line 5—5 of Figure 4.

Figure 6 is a perspective view of one of the segments of the expandible head.

Figure 7 is a section through a part of the hub showing a spoke opening before countersinking.

Figure 8 is a section similar to Figure 7 but showing one of the openings substantially as it appears after countersinking.

Referring to the drawings, the numeral 2 indicates the machine or press of the invention as a whole. The press comprises the upright frame at the upper portion of which an electric motor 4 is mounted. The motor has the driving pulley 6 which drives a belt 8 which in turn drives a flywheel 10 rigidly mounted on the axle 12 which extends across the frame of the machine and at the opposite side has a small gear wheel (not shown) mounted thereon which meshes with and drives the large gear 14 rigidly mounted on the shaft 16 having a crank 18 intermediate its ends. The crank 18 has attached thereto the connecting rod 20 which operates the crosshead 22 suitably attached to the top shoe 24 of the die. The lower die shoe is indicated at 26 and a part thereof is resiliently mounted on the pressure pins 36 resting on a plate 30. Suitable pins 32 connect the plate 30 with the plate 34 secured to a piston rod 28 connected to a piston operating in a cylinder 37 to form an air cushion. The pins 36 abut at their lower ends against the plate 30 and at the upper ends against the bottom of the slide holder 38 (Figures 3 and 4). This structure gives a resilient mounting to the slide holder.

A handle 40 operating a linkage system 42 operates a suitable clutch (not shown) which causes the small gear on the end of the shaft 12 to be engaged with the shaft and to rotate the gear 14. After one operation of the punch a suitable throw-out mechanism will throw the clutch out of engagement with the gear. This mechanism is not shown but is conventional and well known in the art. A suitable brake drum is shown at 44 having brake shoes 46 operated from a suitable linkage 48.

The parts so far described are conventional and are well known in the art of presses.

Referring to Figures 3 and 4 it will be seen that the lower shoe 26 has an annular groove 50 therein at the outer periphery of which the retaining ring 52 is secured by means of the machine bolts 54. The ring 52 has the inwardly projecting annular flange 56 which cooperates with a similar flange 58 on the slidable holder 38 for the wheel hub 62. The holder 38 is adapted to slide on the surfaces at 64 and is held from rotation by means of the plungers 66 sliding in openings 68 in the holder 38 and rigidly mounted as at 70 in the die shoe 26. The pressure pins 36 strike against the bottom of the holder 38 and constantly urge it toward the position shown in Figure 4. The upper portion of the holder 38 is shaped as shown at 72

to correspond to the shape of the wheel hub 62.

A backing ring 74 is centrally mounted on the die shoe 26 immediately inside the slidable holder 38. The backing ring is tapered at its upper portion as shown at 76 and at its bottom is positioned as at 78 at the inner periphery of the groove 50.

A central ring-like member 80 is mounted on the die shoe 26 concentrically with the backing ring 74 and the holder 38 and is secured to the die shoe in any suitable way such as by machine bolts. The ring 80 extends over a flange 82 on the backing ring 74 rigidly to hold the ring in position and at its inner periphery has an under-cut portion 84 which extends over a flange 86 on the head of the cam 88 rigidly to hold the cam in position centrally of the die shoe 26.

A locating ring 90 having the locating flange 92 with an inclined surface at its upper portion is slidably mounted in a recess 94 formed between the backing ring 74 and an annular rabbet on the ring 80. The locator ring 90 is spring-pressed away from the ring 80 by means of a plurality of coil springs 96 positioned between the rings 80 and 90 and resting in recesses formed in both members. Guide bolts 98 are screwed into the locator ring 92 and have their heads resting against a shoulder on the ring 80. The ring 80 has the openings 100 therein to allow the heads to slide. Preferably three springs 96 and three guide bolts 98, each 120° apart, are used.

The cam 88 has the inclined cam portions 102 and 104 which act on the inclined portions 106 and 108 formed on each of the ten segments 110 of an expandible head 112 secured to the top die 24.

The head 24 has secured thereto by means of the machine bolts 114 a plate 116 having the opening 118 at its center and ten radially disposed recesses 120. In each recess there is mounted a spring 122 one end of which bears against the outer end of the recess while the inner end acts on a pin 124. One pin 124 is secured at the top of each segment 110. There are as many recesses 120, springs 122 and pins 124 as there are segments 110.

A retaining ring 126 secured to the plate 116 by means of machine screws 128 holds a mounting ring 130 having an annular shoulder 132 on which the projections 134 of the segments 110 are slidable. The segments likewise have a rib 136 at their upper portion which slide in a corresponding groove on the under-face of the plate 116.

A second series of ten coil springs 138 is mounted in recesses 140 formed in the mounting ring 130 and held in place by means of the blocks 142. The two sets of springs 122 and 138 constantly urge the segments 110 inwardly. The segments expand outwardly as determined by the cam faces 102 and 104 and the shoulder at 132 provides ample space to allow the segments to expand the full distance demanded by the cam 88.

At the lower end of each segment 110 the countersinking punches 144 are mounted. These punches 144 fit into the spoke openings 146 at the narrow portion of the wheel hub, or the lower portion as shown in Figures 3 and 4, to expand the inner side of openings or form the countersinks when the parts are in the position shown in Figure 3.

The operation of the press and dies is as follows: The parts are substantially in position as shown in Figure 4 when the operator places a wheel hub shell 62 on the holder 38. The flange has previously had the openings for the short and long spokes of the wheel formed therein and is properly positioned on the holder by means of the locator 147 by causing the spring-pressed pin 148 to fit into one of the springs for the short spokes definitely to position the hub. The operator now moves the handle 40 to cause the plunger to descend once, the mechanism being so arranged that the clutch will be thrown out after the plunger has once operated. The downward movement of the top die 24 will cause it to move from the position shown in Figure 4 to that shown in Figure 3. In the downward movement when the surfaces 106 and 108 of the segments 110 strike the cam faces at 102 and 104, the expandible head 106 will expand, the segments 110 moving from the position of Figure 4 to that of Figure 3. After the surfaces 106 and 108 leave the cam surfaces 102 and 104 the segments will dwell until they reach the lowermost position of their movement. The spacer blocks shown at 150 (Figure 3) strike the upper portion of the holder 38 at the same time that the surface 152 on the lower portion of the mounting ring 130 strikes the corresponding part of the wheel hub so that the blocks 150 will now force the holder 60 down against the upward force on the pressure pins 36 and cause it to move along with the head 112 and the top die 24. Before the punches 144 strike the spoke openings the opening in the small end of the hub will strike the flange 92 on the positioning ring 90 accurately to position the hub with reference to the punches. The small end of the hub will likewise enter the backing ring 74 to furnish a solid backing for the operation of the punches. The continued downward movement will cause the cams 102 and 104 to force the segments 110 and the punches 144 into the openings 146 in the hub to form the countersinks. The locating ring 90 will be forced downward against the pressure of the springs 96 as shown in Figure 3, and the inclined surface thereof will cooperate with the inclined surface 148 on the bottom end of the segments accurately to guide the segments to the spoke holes. After the punches have formed the countersinks the top die 24 will rise, the segments 110 dwelling backward and finally moving over the cam surfaces 102, 104 causing the springs 122 and 138 to push the segments inwardly or toward the position shown in Figure 4. The plungers 36 will push the holder 38 upward until the flanges 56 and 58 contact, while the springs 96 will push the locating ring 90 upward to the position shown in Figure 4. When the top plate 24 has reached the upper limit of its movement the wheel hub 62 may be withdrawn and a new one put in its place and the operation of countersinking recommenced.

In Figure 7 the letter A indicates one of the openings in the hub before the countersinking operation has taken place and in Figure 8 the letter B indicates one of the holes after it has been countersunk by the machine of the application.

We claim:

1. In a machine of the class described, a die shoe, a reciprocable wheel hub holder mounted on said die shoe, means to guide said holder in said shoe, a locator on said holder definitely to position said hub, said hub having

a plurality of spoke openings, means on said shoe to center said hub, a cam on said die shoe, a top die reciprocable relative to said die shoe, an expandible head on said top die, said head composed of a plurality of movable parts, punches on each of said parts, said movable parts striking the cam on the downward movement of the top die to cause the movable parts to expand and the punches to countersink the openings in the wheel hub.

2. In a machine of the class described, a die shoe, a reciprocable wheel hub holder mounted on said die shoe, means to guide said holder on said shoe, a locator on said holder definitely to position said hub, said hub having a plurality of spoke openings, a cam on said die shoe, a top die reciprocable relative to said die shoe, an expandible head on said top die, said head composed of a plurality of movable parts, punches on each of said parts, said movable parts striking the cam on the downward movement of the top die to cause the movable parts to expand and the punches to countersink the openings in the wheel hub.

3. In a machine of the class described, a die shoe, a reciprocable wheel hub holder mounted on said die shoe, means to guide said holder on said shoe, means on said shoe to center said hub, said hub having a plurality of spoke openings, a cam on said die shoe, a top die reciprocable relative to said die shoe, an expandible head on said top die, said head composed of a plurality of movable parts, punches on each of said parts, said movable parts striking the cam on the downward movement of the top die to cause the movable parts to expand and the punches to countersink the openings in the wheel hub.

4. In a machine of the class described, a die shoe, a reciprocable wheel hub holder mounted on said die shoe, means to guide said holder on said shoe, a locator on said holder definitely to position said hub, said hub having a plurality of spoke openings, a cam on said die shoe, a top die reciprocable relative to said die shoe, an expandible head on said top die, said head composed of a plurality of movable parts, punches on each of said parts, said movable parts striking the cam on the downward movement of the top die to cause the movable parts to expand and the punches to countersink the openings in the wheel hub, and means on the top die to force the holder downward when the cam is expanding the head so that the head, wheel hub and holder will move together at the same speed.

5. In a machine of the class described, a die shoe, a reciprocable wheel hub holder mounted on said die shoe, means to guide said holder on said shoe, a locator on said holder definitely to position said hub, said hub having a plurality of spoke openings, a cam on said die shoe, a top die reciprocable relative to said die shoe, an expandible head on said top die, said head composed of a plurality of movable parts, punches on each of said parts, said movable parts striking the cam on the downward movement of the top die to cause the movable parts to expand and the punches to countersink the openings in the wheel hub, and means mounted on the die shoe to form a backing for the wheel hub when the punches are countersinking the openings.

6. In a machine of the class described, a die shoe, a holder resiliently mounted in the die shoe and adapted to receive and hold a wheel hub, said hub having a plurality of spoke openings, stationary means to back the wheel hub on the outer side, a cam on the die shoe, a top die reciprocable relative to the die shoe and holder, an expandible head on the top die, said cam being received in said head to expand the same inside the hub when the top die is reciprocated, a plurality of punches on said head, the expansion of said head causing the punches to move toward the hub to countersink the spoke openings.

7. In a machine of the class described, a die shoe, a holder resiliently mounted in the die shoe and adapted to receive and hold a wheel hub, said hub having a plurality of spoke openings, a stationary member adapted to back the wheel hub when the holder is moved, a cam on the die shoe, a top die reciprocable relative to the die shoe and holder, an expandible head on the top die, said cam being received in said head to expand the same inside the hub when the top die is reciprocated, a plurality of punches on said head, the expansion of said head causing the punches to move toward the hub to countersink the spoke openings.

8. In a machine of the class described, a die shoe, a holder reciprocably mounted in the die shoe and adapted to receive and hold a wheel hub, said hub having a plurality of spoke openings, a stationary backing ring mounted on the die shoe, and adapted to back the wheel hub when the holder is moved, a cam on the die shoe, a top die reciprocable relative to the die shoe and holder, an expandible head on the top die, said cam being received in said head to expand the same inside the hub when the top die is reciprocated, a plurality of punches on said head, the expansion of said head causing the punches to move toward the hub to countersink the spoke openings.

9. In a machine of the class described, a die shoe, a reciprocable holder mounted in the die shoe and adapted to receive and hold a wheel hub, said hub having a plurality of spoke openings, means mounted concentrically with the die shoe and adapted to be received in the hub to position the same, means to back the wheel hub on the outer side thereof, a cam on the die shoe, a top die reciprocable relative to the die shoe and the holder, an expandible head on the top die, said cam being received in said head to expand the same inside the hub when the top die is reciprocated, a plurality of punches on said head, the expansion of said head causing the punches to move toward the hub to countersink the spoke openings.

10. In a machine of the class described, a die shoe, a backing ring rigidly mounted on the die shoe, a holder slidably engaging the backing ring and slidably mounted on the die shoe, said die shoe adapted to receive and hold a wheel hub, said hub having a plurality of spoke openings, a positioning ring slidably mounted in the backing ring and adapted to extend into the hub accurately to position the wheel hub, a cam on the die shoe, an expandible head reciprocable relative to the die shoe, a plurality of punches on said head, and means to cause the head to be reciprocated over the cam to cause the head to expand inside the hub to cause the punches to countersink the spoke openings, the movement of said top die causing the holder to slide over the backing ring and causing the hub to be received over the positioning ring to position the hub for the action of the punches.

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