

## CHAPTER 22

# Cams, Cam Actions and Machine Actions

### CAM ACTIONS

**S**TANDING AT the rear of the machine and counting from the right, the cams have the following actions:

Cam No. 1 is the first elevator cam. This cam operates through the first elevator lever upon the first elevator slide. The cam, which is of a very peculiar shape, operates to place the first elevator slide in five successive positions. First, the normal position, where it holds the first elevator jaw in position to receive the line of matrices when sent from the assembling elevator; second, when the first elevator jaw is lowered to a point opposite the mold; third, after a slight upward movement to cause the alignment of the matrices; fourth, the raising of the slide so that the matrices and spacebands can be transferred to the intermediate channel; and last, bringing the slide to normal position at which time the first elevator jaw is ready to receive the line of matrices.

Cam No. 2 is the distributor shifter cam which operates the distributor shifter lever and through it the distributor shifter slide, transferring the line of matrices from the second elevator at its highest position to the distributor box.

Cam No. 3 is the mold turning cam. It operates the mold disk through two toothed segments, commonly called the long and short segments, to turn the mold disk at the proper time. The short segment turns the mold disk one-quarter of a turn from the ejecting position to the casting position. The long segment turns the mold disk three-quarters of a turn from the casting position back to the ejecting position.

Cam No. 4 is the vise closing cam. This cam has two actions. The first operates the vise closing mechanism through the wedge, and the stroke is continued to assist in the first justification. The same operation is repeated on the second stroke for the final justification of the line.

Cam No. 5 is the justification cam which operates the justification lever. The action of the cam presses down the justification lever. The motion upward, caused by a powerful spring and effecting the justification, is permitted by the shape of the justification, or No. 5, cam.

Cam No. 6 is the second elevator cam which operates the second elevator lever. The second elevator transfers the matrices from the intermediate channel to the highest position, where the matrices can be transferred to the distributor box. The second elevator is raised by the cam and goes down by gravity, being started by the operation of the second elevator starting spring.

Cam No. 7 is the pump cam. This cam operates the pot pump plunger through the rod and the pot pump lever. The roll of the pot pump lever is continuously urged downward by the pot pump spring and the shape of the cam allows the spring, during a certain portion of the revolution of the main cam shaft, to pump metal into the mold and against the matrices. After this pumping action has taken place the cam raises the pot pump lever and through it the pot pump plunger.

Cam No. 8 is the pot cam. This cam acts on the pot lever to move the pot forward against the mold and matrices at the time the slug is cast. The shape of this cam moves the pot forward first against the mold and matrices, making the face alignment. The pot is then withdrawn slightly for alignment and justification. The next movement presses the pot against the mold and matrices with great force and at this time the pump plunger descends, casting the slug. The cam does not act directly upon the pot, but on the pot lever. Between the pot and the lever there is a spring which acts as a safety device in case anything interferes with the proper movements of the pot.

Cam No. 9 is the mold cam and driving gear. The periphery of this gear is circular and has 132 teeth in it. In the side of the gear there is a groove. This grooved part of the gear acts to advance the mold slide, carrying the mold disk to a position where the lugs of the matrices register with the grooves in the mold for the alignment of the matrices. After the slug has been cast, it returns the mold disk to allow it to revolve and then moves the mold disk forward again at the time the slug is ejected. Mounted on this gear there is a lug which withdraws the pot from the mold after casting. There is also mounted on it a pawl, called the ejector pawl, which operates the lever for ejecting the slug from the mold. This one casting, therefore, causes four operations.

Cam No. 10 is the line delivery and elevator transfer cam. This actuates the lever which transfers the matrix line from the first elevator jaw into the inter-

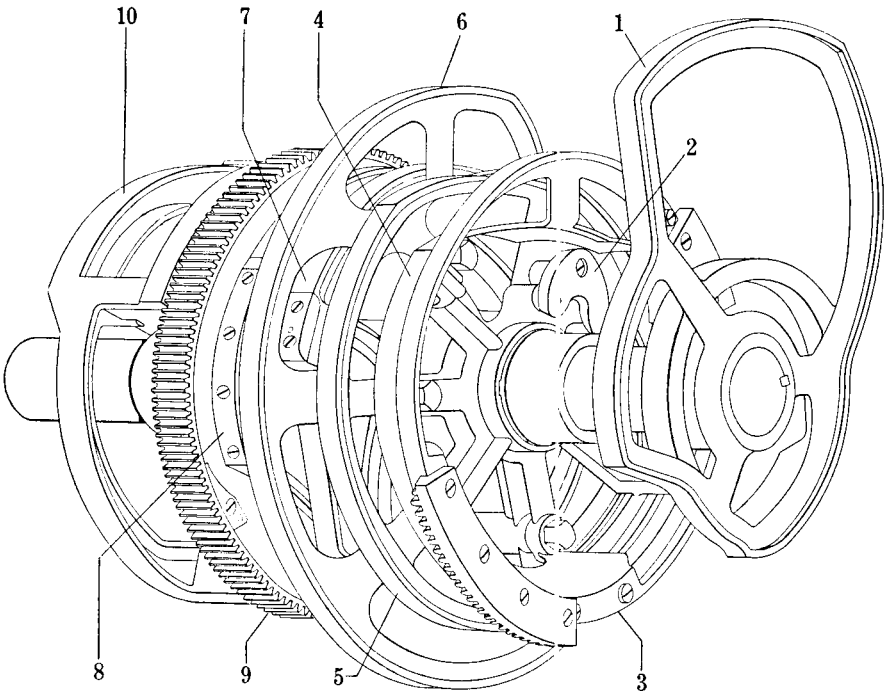


FIG. 1-22. Cams assembled on the cam shaft. The cams are numbered, beginning from the right toward the left, as viewed from the rear of the machine. 1 is the first elevator cam, 2 the distributor shifter cam, 3 the mold turning cam, 4 the vise closing cam, 5 the justification cam, 6 the second elevator cam, 7 the pot pump cam, 8 the pot cam, 9 the mold cam and driving gear, 10 the delivery and elevator transfer cam.

mediate channel. It actuates the lever which returns the spacebands to their box. A lug on the cam carries the ejector lever back. This cam also acts to release the safety hook which locks the second elevator in position. In addition it carries the stopping pawl and the safety pawl, the first of which stops the shaft after it has made one revolution, the safety acting when some of the proper motions of the levers have not taken place.

## MACHINE ACTIONS

The operator assembles a line of matrices in the assembling elevator and the elevator is then raised by hand, lifting the line to a position between the fingers of the line delivery slide. A vertical wire pin in the right rear part of the assembling elevator releases the line delivery slide by the tripping of a latch. The line delivery carriage, being pulled over by the starting spring, carries the line of matrices to the first elevator, thereby automatically starting the main cam shaft. The following actions then take place:

1. The first elevator descends to present a line of matrices in front of the mold. During this action the first justification lever descends and the knife wiper is carried downward with the first elevator.

2. The left-hand vise jaw is closed, making the distance between the vise jaws the proper length after the line descends between them.

3. During the first and second actions the mold disk turns one-quarter of a revolution to the left, carrying the mold from the vertical or ejecting position to the horizontal or casting position.

4. The mold slide, carrying the mold disk, moves forward toward the matrices, leaving a space between the vise jaws and the matrices, and the face of the mold.

5. The vise closing lever rises, allowing the vise jaw wedge spring to raise the wedge, moving the left-hand vise jaw inward to make the proper distance between the vise jaws for the line of matrices after the line is justified.

6. The justification levers rise, causing the justification bar to rise in an inclined position and push the spacebands upward through the line at the same time, spreading the line until the friction of the spacebands stops the action of the justification spring. This is the first justification. During the second to the sixth actions, the line delivery slide returns, ready to receive the next line from the assembling elevator.

7. The justification levers descend, relieving the spacebands from the upward pressure.

8. The vise closing lever descends, relaxing the vise jaw, and slightly relieving the matrix line from the pressure, to allow the vertical alignment of the matrices.

9. The first elevator rises, lifting the matrices so that their lower ears bear against the aligning shoulders in the mold for vertical alignment.

10. The metal pot advances and pushes the mold forward against the line of matrices, pressing them back against the jaw, to complete the alignment face-wise of the line of matrices.

11. The metal pot recedes, relieving the matrix line from the pressure of the mold preparatory to final justification.

12. The vise closing lever rises, allowing the wedge spring to raise the wedge to its proper height and moving the vise jaw inward to the exact length of the line.

13. The justification and vise closing levers rise simultaneously, causing the justification block to rise horizontally and push the spacebands upward through the line of matrices to complete the justification.

14. The metal pot closes against the mold, forcing the mold against the aligned and justified matrices, making the "lockup."

15. The pump lever and plunger descends; the plunger forces metal through the mouthpiece into the mold from the metal pot to form the slug, after which the plunger rises again.

16. The upward pressure on the first elevator, due to the ninth action, is relieved, releasing the matrix ears from the strain. The justification lever and vise closing lever descend, releasing the pressure on the line, and the metal pot and the mold slide carrying the mold then move backward, drawing the face of the slug out of the matrices.

17. The mold slide stops and the pot continues to retreat, separating the mouth of the pot from the base of the slug.

18. The mold disk revolves three-quarters of a revolution, carrying the base of the slug past the back knife, thereby trimming the slug to the right height, and presenting the slug in a vertical position in front of the trimming knives in a position to be ejected. During this action the first elevator rises and actuates the slug lever; the matrix line is raised to align with the intermediate channel.

19. The elevator transfer slide now moves the matrix line onto the second elevator bar. The transfer slide moves back to allow the second elevator to lift the matrices out of the intermediate channel, leaving the spacebands. The transfer slide and the spaceband lever now approach, pushing the spacebands under the spaceband lever pawl. The transfer slide and the spaceband lever then return to their normal positions, the spacebands being returned to the spaceband box by the spaceband lever pawl.

20. The mold slide moves forward, advancing the mold disk locking pins into the locking blocks on the vise frame to locate the mold accurately for ejecting and trimming the slug. The ejector blade advances and drives the slug out of the mold, between the trimming knives and into the galley at the front of the machine in proper sequence with slugs previously delivered.

21. The first elevator is returned to its normal position and is then ready to receive the next line. During this action the second elevator is carrying the transferred line to the distributor box. The distributor shifter is moved outward by its cam, in order to be in a position to shift the line into the distributor box.

22. The distributor shifter moves inward, pushing the line of matrices into the distributor box. At this time the mold slide and ejector are returned to their normal positions.

The machine has now completed a full revolution.

## MAINTENANCE

The contact surfaces of the cams should be kept clean. If gum is allowed to accumulate it will interfere with the free turning of the justification lever cam rolls and may cause flat spots to be worn on them.

The cams should be cleaned occasionally and an easy and safe way to do this is to use a flat stick of wood with a rag wrapped around its end. Soak the rag with kerosene and hold it against the cam surfaces as they revolve. After the cams have been cleaned, wipe off with a dry rag. Use of the stick will prevent danger of getting the fingers caught. The use of machine oil on the cams as a lubricant is not recommended.

A felt wiper which is fastened to the side of the mold turning gear cover, is for the purpose of lubricating the hardened shoes on the mold turning bevel pinion, and should carry a small amount of oil.