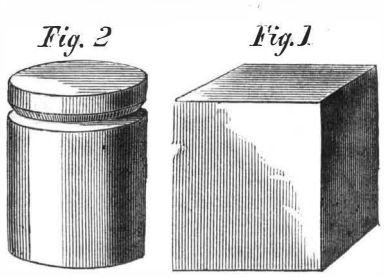
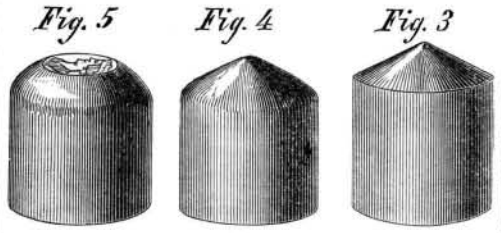
vertically through its center attached to the upper part of the screw, and above the press are two heavily weighted fly-arms which constantly tend to force down the screw. To the lower end of the screw, and with its face downwards, the matrix is firmly fixed by a workman, who stands in the recess sunk in the floor to the depth convenient for bringing his eyes and his hands to a level with the bed of the press. The puncheon block is deposited next it with its face turned upwards on the solid cast-iron bed of the press, and immediately and fairly below the matrix. All being ready, several strong-armed workmen seize the fly-arms and walking round with them raise the screw and matrix until the latter is several inches above the puncheon block. On a sudden they release their hold, and the weighted arms revolving with a speed and force which would be fatal to any person standing in their way, drive down the matrix until it impinges with a dull, heavy thud upon the puncheon block. Again the workmen stand to their fly-arms and raise the screw of the press. The effect of the blow is then seen in the depressed apex of the cone-topped die which received its impact, and in the transference to itself thereby of a partial copy in relief of the intaglio-engraved matrix. The compression of the particles of steel composing the puncheon by the stress of the blow, mechanically hardens the puncheon, and before its impression can be completed by a repetition of the act, it must be again annealed. This is effected in the same way as before, the puncheon is returned to the press, and the matrix, now detached from the screw, is placed loosely on the top of it, though, for an obvious reason, in such a way as that the engraving on the matrix and the partly finished impression on the puncheon shall exactly match or fit each other. A blank block of steel is then affixed firmly by aid of set screws to the place before tenanted by the matrix, and may be said to represent a hammer, for it will presently descend with great force upon the matrix. The fly-arms are turned backward by the workmen, the press screw is raised, the arms released, and, gathering momentum as they revolve, the hammer block is made to fall heavily on the matrix. The effect of the second blow will, perhaps, be to make the transfer of the engravings as complete on the puncheon as is that of a seal pressed by the hand upon molten sealing-wax, or it may be, if the steel is very obstinate, that another annealing and another blow may be required to effect that object eventually, at least the puncheon will be found upon examination to have imbibed an exact and faithful copy in relief of the engraver's work on the matrix to the finest line and most minute point of detail. The duty of this latter is now done, at all events for the present, and it is placed in the engraver's closet. Far otherwise is it with the puncheon, for its mission is about to commence. It is therefore hardened and tempered, polished it cannot be, on account of its raised surface, and then returned to the press. Such are the processes pursued in the making of matrices and puncheons in reference both to coining and medal-striking for obverse and reverse, although, from the bold impressions usual on medals, many more annealings and strikings of the puncheons are necessary than of those used for coin. Confining our attention for the sake of brevity to the florin, let it now be presumed that puncheons for its obverse and re-



verse have been successfully prepared, it remains to be shown how they are put into useful requisition, and how they are made the parents of rapidly-multiplying families of coining dies, Florin bars of cast-steel are about 10 feet long, $1\frac{3}{4}$ inches broad and $1\frac{1}{4}$ inches thick; upon these the mint blacksmith is the first operator. One at a time they are conveyed to the forge, and cut, while hot, into short pieces of $1\frac{3}{8}$ inches in length, and in this form, therefore, resemble Fig. 1. These square or rectangular blocks he next proceeds to hammer into a cylindrical form, as shown in Fig. 2. He then cuts off in a slanting direction one end of each of the die blocks, and shapes them, by way of preparation, for the lathe, and thus they take the appearance depicted in Fig. 3. Thus he



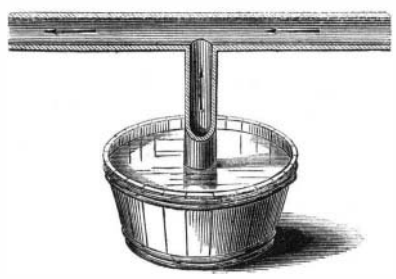
proceeds with die block after die block until he has accumulated a large quantity and diminished materially the length of the bar off which they have been cut. Owing to the severe hammering to which they have been subjected, they are at this stage very hard, and it becomes necessary to anneal them. This is effected by burying them in iron pots containing animal charcoal, and submitting the whole for many hours to the heat of coke furnaces. Subsequently, the blocks are allowed to cool gradually among the ashes and cinders of the furnaces, and are then ready for the turning-room and the lathe; here they are topped, as it is termed—that is to say the conical end of each is turned bright and prepared for its impression. After this operation they assume the appearance indicated by Fig. 4, and are removed to the die multiplying press, which is similar in form and arrangement to that already described.

[To be continued.]

OIL ENTERING A STEAM CYLINDER AGAINST PRESSURE.

In the Detroit Locomotive Works there was at one time a vertical high pressure steam engine (since altered to low pressure) which had an oil cup on the cylinder head. By opening this cup, during either the up stroke or down stroke of the piston, oil would flow in, although the steam gage indicated some 18 or 20 pounds pressure. This was somewhat remarkable. Oil would naturally flow in on the up stroke of the piston, because the exhaust would then be open, and the pressure less than that of the atmosphere; but how was it that steam did not blow out on the down stroke instead of the oil running into the cylinder?

By watching the operation closely we discovered



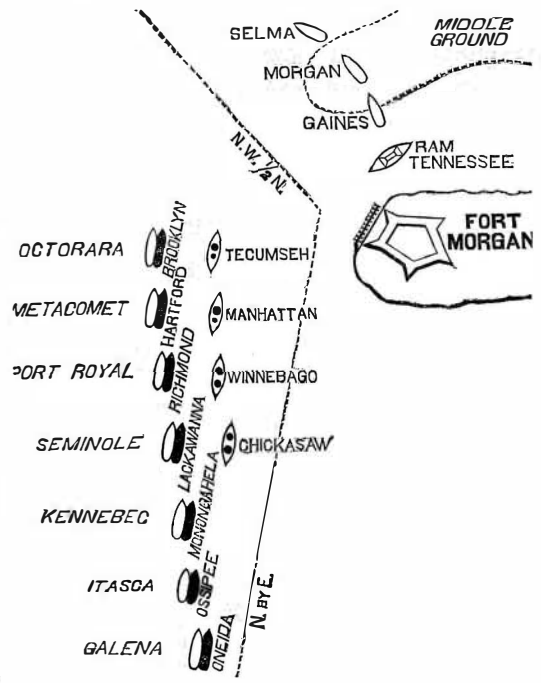
that the oil was drawn in during the first portion only of the stroke, that when the stroke was nearly completed the action was reversed and the oil was blown outward. Seeking for an explanation for this singular circumstance, we observed that the pipe from the oil cup entered the cylinder through the head, and directly over the steam port. We suppose that the oil was drawn in by the friction of the steam in its passage through the port.

A simple case of this kind of action is illustrated in the annexed cut. The two pipes communicate with each other, and the lower end of the vertical one is placed in a tub of water. Now, if a current of water, steam, or other fluid is forced rapidly through the horizontal pipe, it will carry along by friction the upper particles of any fluid filling the vertical pipe. The pressure of the air will force up other portions of the fluid in the vertical pipe to take the place of those removed, and these will in their turn be carried along. Thus an upward current will be created in the vertical tube. Steam pumps have been constructed on this principle. We suppose that this was the action in the case of the oil cup at Detroit.

An account of some experiments made in Newark by a practical engineer, were published in the *American Engineer*, a short-lived mechanical journal, printed in this city a few years ago. These experiments consisted in attaching a steam gage to the steam port, between the cylinder head and the slide valve. When the engine was at work taking steam the gage did not indicate any pressure, showing that the current passed by it entirely, the same as in the case of the oil cup. This case shows the importance of placing indicators in a position not to be influenced by the currents of steam, as they enter or leave the cylinder.

COMMODORE FARRAGUT'S REPORT OF THE ACTION IN MOBILE BAY.

From the report of the brave and skillful Commodore Farragut to the Secretary of the Navy (as published in the *Army and Navy Journal*), we extract a few paragraphs. We are also indebted to the same journal for the diagram which shows the second order of sailing of the fleet:—



"Having passed the forts and dispersed the enemy's gunboats, I had ordered most of the vessels to anchor, when I perceived the ram *Tennessee* standing up for this ship; this was at 45 minutes past 8. I was not long in comprehending his intentions to be the destruction of the flagship. The monitors and such of the wooden vessels as I thought best adapted for the purpose, were immediately ordered to attack the ram, not only with their guns but bows on at full speed. And then began one of the fiercest naval combats on record. The *Monongahela*, Commander Strong, was the first vessel that struck her, and in doing so carried away his own iron prow, together with the cut-water, without apparently doing his adversary much injury. The *Lackawanna*, Captain Marchand, was the next vessel to strike her, which she did at full speed, but though her stem was cut and crushed to the plank ends for the distance of three feet above the water's edge to five feet below, the only perceptible effect on the ram was to give her a heavy lift. The *Hartford* was the third vessel which struck her, but as the *Tennessee* quickly shifted her helm, the blow was a glancing one, and as she rasped along our side we poured our whole port broadside of 9-inch solid shot within ten feet of her casemate. The monitors worked slowly, but delivered their fire as opportunity offered. The *Chickasaw* succeeded in getting under her stern, and a 15-inch shot from the *Manhattan* broke through her iron plating and heavy wooden backing, though the missile itself did not enter the vessel.

"Immediately after the collision with the flagship, I directed Captain Drayton to bear down for the ram again. He was doing so at full speed when, unfortunately, the *Lackawanna* ran into the *Hartford* just forward of the mizzenmast, cutting her down to within two feet of the water's edge. We soon got clear again, however, and were fast approaching our adversary when she struck her colors and ran up the white flag. She was at this time sore beset: the *Chickasaw* was pounding away at her stern, the *Ossi-*