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# MOLTEN STEEL

By CHARLES F. NETZLER, Engr. 2

"THAT is the new apprentice for the foundry department," I heard someone say behind the thin wall in the employment office. "Better take him right over; he's slated to start tonight on Duff's floor."

In a moment I had left a half dozen envious individuals sitting on the benches in the waiting room, and was walking rapidly with a clerk through the yards, across switch tracks, around great piles of rusty pig iron and steel scrap and between many immensely long shops. We turned the corner of one of the great buildings, pushed through a double door fifty feet beyond, and then I found myself in a long locker room.

The day shift had just come off, and the place teemed with men and resounded with singing, whistling, laughing, shouting back and forth, the chatter of rapid conversation in a half dozen different languages, banging of steel locker doors, and the swish of soapy water slipping into drains. Cloths and towels lay everywhere, and much water had been spilled on the floor. The younger men caused the uproar; the older workmen had lighted pipes and cigarettes and were either dressing by themselves or talking quietly in small groups.

Many of these people were foreigners, some dark while others were fair, but they had certain characteristics in common. These consisted of a broad nose, thick lips, eyes set deeply behind bushy eyebrows, and an indefinable expression of alertness, even when combined with evidence of stupidity.

Having chosen a locker, I changed to my working clothes. I donned my overalls and then we passed into the foundry proper.

I was almost frightened by the size of the building. The great distance to the far end of the shop, one thousand feet, two thousand—I could not tell. We started out in search of Duff, who was the foreman of that "floor." Great bridge cranes trundled back and forth in the dim light overhead, and their warning bells clanged incessantly, like the bells of trolley cars on a busy street. Along one wall stood a long row of molds, from ten to fifteen feet in diameter, looking very much like large flat cisterns except that they were made of steel. Some of these had been poured, and thin wisps of gray smoke rose from them as from the ruins of a recent fire. Smaller molds stood nearer the center of the bay and all about the floor were heaps of black molding sand. The floor itself was of sand. Partly finished molds, clamps, rails, and sulphur barrels were scattered everywhere.

On a platform twenty feet high near the opposite wall of the shop and a hundred yards away, the battery of open-hearth furnaces stood end to end like so many long, narrow fortresses of brick and steel, each one large enough to receive a hundred men in comfort. Most of them were in operation, and intense white light broke forth through every crevice, while long tongues of yellow flame reached out through small square ports.

The night men had begun work and all kept

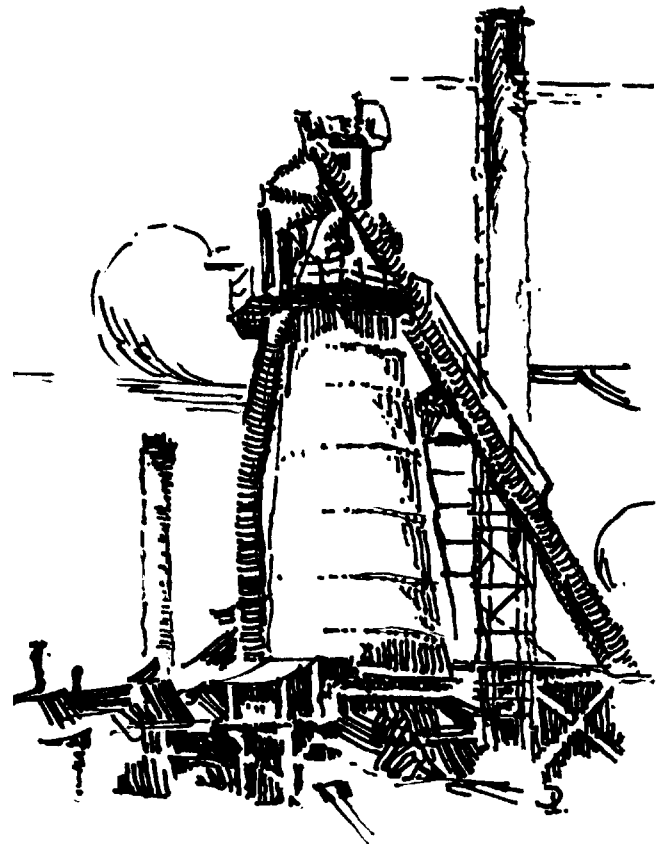
stolidly at their tasks. There was no sign of the levity which we had found in the locker room. Chainmen followed the cranes to fasten and unfasten slings. Laborers cleaned the floor and carried clamps and plates.

We found Duff near a glass box, which he called his office. I was cordially received and he made me feel at ease immediately. He talked to me about my tasks, the men, safety, and the relation to one another of the various departments in the shop. He wore a shapeless cap, an old blue work shirt open at the neck, colorless, baggy trousers, and heavy work shoes.

When he had completed his instructions to me, he called a chainman who was passing along. The man came promptly, and he was informed that I was his partner.

We all went out of the office, and after several hours, three strokes of the bell sounded above the roar and clatter of the place. There was a bustle of preparation, and all the men became attentive. Our crane went to the end of the shop with a pile of flasks, and when we returned, a huge black bucket called a ladle hung from another crane and under the spout, which projected from the nearest furnace. Two weird figures were digging away at the upper end of the spout. A faint red glow appeared, and both men jumped away. A thread of molten metal crawled down the spout. But before it had reached the end, there was a terrific burst of fierce, white light from the fur-

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nace, and a thick stream of liquid fire rushed into the ladle with a resounding gurgle and rumble. A dense cloud of dark-brown smoke rose from the ladle, but was soon dissipated and succeeded by millions of sparks, which fell in graceful arcs to the floor.

The painfully strong light of the steel strained the eyes like the lights in a picture theater, when they are suddenly turned on after a long feature. It smothered the thousand-watt lamps, which were suspended at intervals from the roof. I could see the buttons on the shirt of the crane-man high up in his cage, although he himself had hardly been visible before. He nonchalantly watched the flow of metal, while he extracted a handful of tobacco from a yellow package and inserted it into his mouth. Even the steel roof truss above him was as clear as the blueprint from which it was built.

After five or ten minutes the stream of fire became thinner and more sluggish, and the crane-man, his shirt buttons, and the roof truss gradually retired again into the darkness. The crane-man swung the ladle away from the furnace and hoisted it higher into the air, and the crane groaned and complained under the load of forty or fifty tons. A procession formed and proceeded toward us. First came the ladle with a faint red light hovering over it. Two chainmen followed immediately, and after an interval, the heat pourer came alone. His hat was pulled well down, his goggles on his forehead, and long white leg-

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gings over his trousers. The heat pourer is the man who handles the ladle and pours the metal. He is the central figure, while the ladle is "out on the floor."

The heat pourer signaled the craneman to indicate the mold to be poured, and in a moment the ladle hung above it expectantly. It was a great pot, fifteen feet deep, ten feet in diameter at the top and eight or nine at the bottom. It was built of heavy riveted steel plates, lined with several thicknesses of fire brick, and a coating of fire clay. A seven-foot lever projected horizontally from the bottom of the ladle, and at a tangent to its circumference. By means of a long arm extending over the side of the ladle and a stopper inside, this lever opened and closed the nozzle in the bottom of the ladle and regulated the flow of the metal.

The men surrounded the mold and watched the heat pourer, who climbed to a platform beside it, and proceeded to "spot" the ladle. That is, he turned the ladle to a convenient position and with his arms and a whistle, he signaled the craneman to adjust the ladle, so that the metal might flow into the mold. The whistle was almost articulate. I did not understand the signals, but I almost knew what they meant. "Lower down," the whistle shrieked. "This way a little," it coaxed, and then cautioned, "Hold it."

A ladleman unlocked the lever by loosening a clamp screw with his hammer. The heat pourer pushed the lever down, and a three-inch stream of white-hot metal shot six inches from the nozzle to the gate. A half dozen hollow chimney-like structures, called heads, were built on the roof of the mold. Through these heads, the air and gases escaped, as the mold filled with metal. In order to direct the pouring, the Superintendent and Duff stood high up, looking into the interior of the molds through these heads. The metal inside lighted their faces, and as it rose higher in the mold, they shielded themselves against the heat with their hands. The heat pourer poured until the metal was level with the top of the heads.

In the meantime, each man near the mold had gone about his appointed task. One or two applied torches to vents in the mold and ignited the gas which streamed from them. Others brought sand and water to the top of the mold to freeze. The handymen covered the heads of the molds with charcoal, which ignited and kept the surface of the metal in liquid state. The ladleman removed frozen metal from the rim of the nozzle, thus keeping it clean. Each man completed his comparatively simple task, but together they accounted for a rather complicated series of operations.

Other molds were poured until a stringy drip

of slag from the nozzle told that the ladle was empty. The crew of men broke up, and the ladle was immediately returned to the furnaces, as dead and meaningless as a burned-out electric light bulb.

I was deeply thrilled by the performance, and from then on I determined that some day I would be a heat pourer and handle the huge ladle as smartly as my fellow-worker.

During the following weeks I made steady progress, but also many mistakes. School summoned me back, and when the next summer came, I found myself working with the finished product, which I had been so eager to produce.

However, I found myself more interested in the handling of the finished steel than in its manufacture. Some day, I hope to erect a building or a bridge, which will be made out of the mightiest of metals, namely, steel.

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