

General view of Youngstown Sheet & Tube Co.'s plate mill, showing turnovers at left and center.

Novel Plate Turnover for Tandem Mill

Any Plate Within Limits of Mill Capacity Can Be Lifted from Inspection Table, Turned Over and Returned to the Table, in Same Space Originally Occupied With One Set of Cradles.

The new Youngstown sheet and tube plate mill is one of the most up-to-date of its kind and chief among its many distinctive features may be counted the plate turnovers which were designed and patented by William Forsstrom, chief engineer, of this concern. This installation is the first of its kind and experience has proved it to be capable of satisfactorily executing the duties for which it was designed. With this machine any plate within the limits of the mill capacity can be lifted from the inspection table, turned over and returned to the table in the same space that it originally occupied, all of this being accomplished in one operation and with one set of cradles. This contrasts very favorably with the old type of turnover which utilized one set of arms to lift the piece and a second set to lower it to the table in an overturned position and a transfer to bring the plate back to its original position, making three distinct mechanisms.

Great care was also taken to insure the accessibility of all parts, which is an important factor in operating and repairing efficiency. All parts of the turnover are above the table girders eliminating the necessity of dismantling the table regardless of the extent of the repair work being done.

The mechanism can best be described as a series of five turning cradles or forks, located between the table rollers and mounted on rack beams which are actuated by pinions mounted on a common driving shaft. This shaft is driven through a gear drive by a 40 hp. motor.

The forks are "V" shaped and are pivoted at the closed end which constitutes the bottom of the fork. At the open end or top of the fork each arm is connected by flexible links to stationary pins in such manner that when the fork is in an upright position in the center of the table, the links on both sides are taut.

The position of the turnover while receiving a plate is as follows. The pivot bearings on the racks to be at the extreme point of travel on one side of the table. Forks in a horizontal position, parallel with the rack beams, with the bottom arm below the top of the table roller. Flexible links of upper arm to be taut. Flexible link of bottom arm to be loose. In this position there are no obstructions to the free passage of plates down the table and they may, if desired, be passed through the turnover without being turned. In case the plate requires inspection on both sides the turning operation is accomplished by moving the rack beams, on which the pivot bearings are mounted, in a horizontal direction across the table. This moves the bottom of the forks in a horizontal line while the upper ends, limited by the flexible links are caused to describe an arc, bringing the forks from a horizontal position at the beginning of the stroke, to a vertical one in the center and thence to a horizontal position, directly opposite to the original one, at the end. This constitutes one turning operation and is performed by one forward or backward stroke of the rack beam, and leaves the turnover set to receive a new plate when the operation is reversed.

BFSP 7 (1919): 128

to accomplish the same result. The controlling equipment for the turnover motor includes, in addition to the master controller, a geared cut-out by means of which the motor is slowed down at a predetermined point near the end of each stroke by means of a shunted armature. This causes the forks which are descending to approach the table with a continually decreasing speed and finally come to rest without the shock which the momentum of the descending plate and cradles would ordinarily produce.

The general arrangement and plan of this mill was described in the July, 1918, issue of *THE BLAST FURNACE AND STEEL PLANT*.

The total floor space occupied by the plate mill buildings are approximately 210,000 square feet. The buildings are as follows:

The conveyor building is 80 feet wide by 250 feet long, and is in line with the mill and furnace building. It houses the conveying machinery, straighteners, turnovers, rotary shear and end-cut shear, and is equipped with a 10-ton single hook crane.

The warehouse is 93 feet wide by 320 feet long and is placed at the end of, and at right angles to, the conveyor building. It houses the trimming shears, circle shear, castor floor and shipping tracks, and is equipped with two 10-ton cranes with magnet drum.

The buildings are of steel construction and were furnished and erected by the Blaw-Knox Company, of Pittsburgh, Pa., much study being spent on the lighting and ventilation.

All of the buildings except the slab yard are built with the Pond type inverted monitor roof and equipped

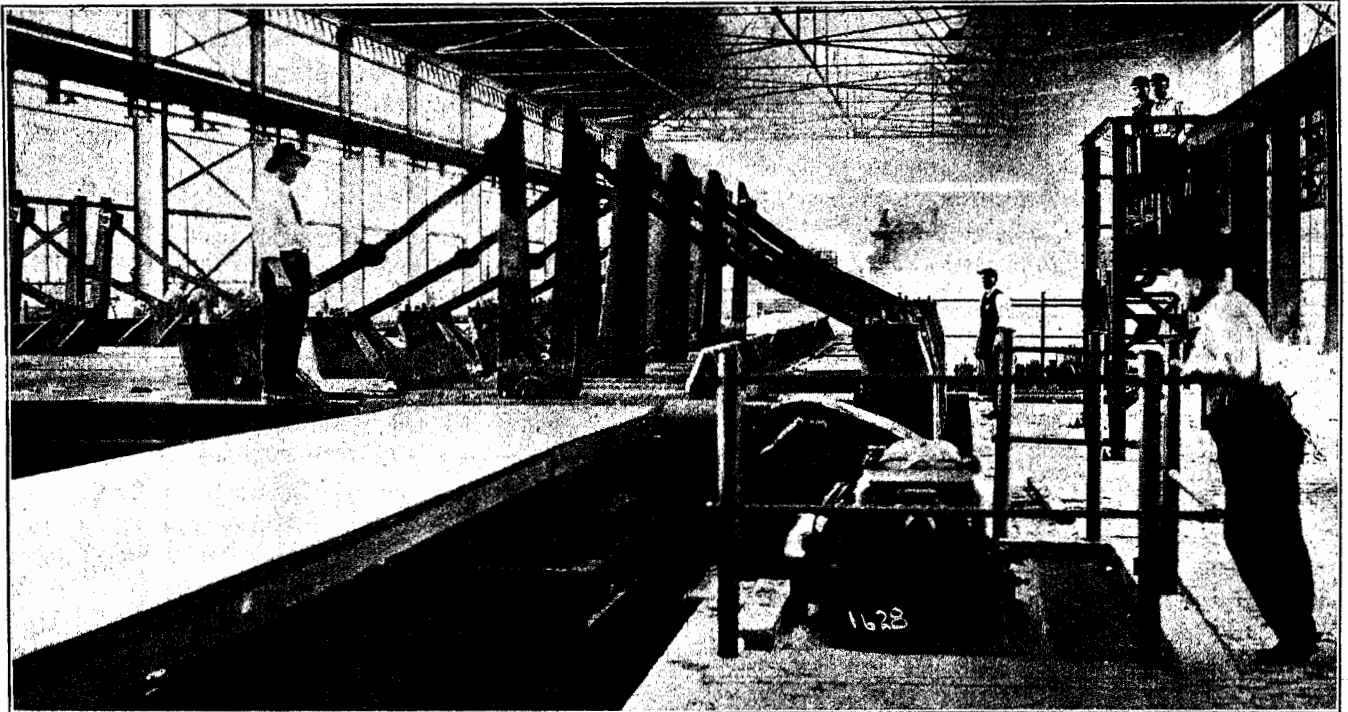


Plate turnover at Youngstown Sheet and Tube Company, plate mill. This device has replaced the usual arrangement of three mechanisms for doing the same work.

Mill and furnace building 80 feet wide by 300 feet long, which houses both mills and the continuous heating furnaces, and is equipped with a 40-ton crane with 15-ton auxiliary hoist and standard gage track for unloading materials.

The slab yard is 80 feet wide and 340 feet long and is equipped with two 10-ton single hook cranes with magnet drum and standard and narrow gage tracks for handling slabs. This building is built parallel with the mill buildings.

The motor room is 80 feet wide by 160 feet long, with brick walls, and is built parallel with the mill buildings. It houses the two 2,000-hp motors which drive the mills and all control equipment for them, and is equipped with a 20-ton single hook crane and standard gage track.

with Lupton top-hung sash and operates in the monitor, and with United Steel sash, furnished by the Trussed Concrete Steel Company for the side walls. The side wall sash consists of two runs of continuous sliding sash, each 5 feet high around all buildings, except the motor room, which building, having brick wall, is provided with ample pivoted ventilating sash.

The 40-ton crane in the mill building, and the 20-ton crane in the motor room, are of massive construction and were furnished by the Cleveland Crane & Engineering Company. The 10-ton cranes in the rest of the buildings are extremely high speed and are well adapted to the service which they perform. These cranes were furnished by the V. R. Browning Company.