To all whom it may concern:

Be it known that I, CHARLES W. BRAY, of
Pittsburg, in the county of Allegheny and
State of Pennsylvania, have invented a
new and useful Improvement in the Manufacture
of Black Plates or Sheets, of which the follow-
ing is a full, clear, and exact description, re-
ference being had to the accompanying draw-
ings, forming part of this specification, in
which—

Figure 1 is a diagrammatic top view
of my improved system, and Figs. 2 and 3 are
diagrammatic views showing the connections
for driving the finishing-rolls in opposite di-
rections.

My invention relates to the production of
black plates and sheets, and is designed to re-
cduce the number of heatings necessary, as
well as the number of separate rolling opera-
tions.

Hereafter in the manufacture of black
sheets four heatings and four different rolling
operations were required in reducing the
sheet-bar to the desired gage. By the use of
my invention only two heatings are required
and two rolling operations, and the output
may be greatly increased with less labor and
expense than is now employed.

Referring to the drawings, in which I show
one form of apparatus for carrying out my in-
vention, 2 represents a continuous heating-
furnace, which may be of any usual type,
having a hydraulic feeding device 3 at its en-
tering or rear end. A positively-driven feed-
table 4 extends from the other end of this fur-
nace to a continuous roughing-mill. I have
shown this mill as containing eight stands of
plain two-high rolls, and feed-tables may or
may not be used between the various rolls of
this mill, as desired. The rolls may be driven
in sets, as shown, by gear connections 5, with
engines 6, though the number of sets of
rolls in the mill, as well as the manner of
driving them, may be widely varied without
departing from my invention. The sheet-bar
emerging from the last roll of this mill is fed
upon a roller-table or other support 7, on
which it may be fed sidewise by a hydraulic
pusher 8 or other suitable mechanism.

Along one side of the feed-table extends a
rotary shear having a number of shearing-
disks, according to the number of plates into
which it is desired to cut the sheet-bar, and
between the shears and table I preferably use
a pair of driven feed-rollers 9, which feed the
bar sidewise through the slitting-shear. The
plates cut by the shear are fed forwardly
upon the chain-conveyor table 10, which may
be of any usual or desirable form and extends
past a series of furnaces 11. The plates car-
rried along this bench or conveyor are switched
off at any desired furnace by the switch de-
vices 12 of the usual type. I have shown these
furnaces as five in number, though any de-
sired number may be used, and for each fur-
nace I provide a finishing-mill consisting of a
pair of two-high reversing-rolls 13. The heat-
ed plates may be fed into the mills on oppo-
site sides by chain-tables 14 or other suitable
feed devices, and from these finishing-mills
the packs may be taken to the squaring-
shears 15.

I have shown the several finishing-mills as
driven from a common shaft 16, actuated by
engine 17, and the reversing is carried out,
preferably, by the means of clutch devices in
the following manner: At one side of each
finishing-mill the shaft 16 is provided with a
pair of pinions 18 and 19. One of these pin-
ions 18 intermeshes with a toothed wheel 20,
which rotates loosely upon the driving-shaft
21, having the usual wobbler connection with
the lower roll of the mill. The other pinion
19 engages an idler-pinion 22, which in turn
engages a toothed wheel 23, which also is
loosely mounted upon the driving-shaft 21.
These two sets of connections to the driving-
shaft are arranged to rotate it at the same
speed, but in opposite directions, and be-
tween them is a clutch device 24, which may
be operated by a hydraulic cylinder or other
suitable connections to connect either of the
gear-wheels 20 or 23 with the driving-shaft on
which they are mounted. The mills may thus
be reversed at the will of the operator.

In making black sheets or plates with my
improved mill I may use the same sheet-bars
now employed, and these bars may be sheared
to a slightly-greater width than that of the
sheets to be made. These bars are charged

UNITED STATES PATENT OFFICE.

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MANUFACTURE OF BLACK PLATES OR SHEETS.


Application filed February 25, 1901. Renewed October 3, 1902. Serial No. 125,721. (No model.)

Along one side of the feed-table extends a
into the rear end of the continuous heating-furnace and are thence passed through the continuous roughing-mill.

The number of passes in this mill may be varied; but in starting with a sheet-bar which is, for example, twenty and one-half inches long by eight inches wide by three-eighths of an inch thick I preferably reduce the same in the roughing-mill to about sixty inches long and, say, about nineteen gage, the width not having been materially changed. This long bar is then fed sidewise to the slitting-shears, and thus cut into pieces of a suitable length for convenient handling in the following operations. I have shown the shears as arranged for cutting the bar in four sections, the outer two of the five shear-disks being used to trim the ends of the sheet-bar. The sections thus cut crosswise of the bar are then distributed to the different furnaces along the conveyer, and having been piled up in packs of from four to twelve, according to the desired gage, these packs are heated in the furnaces and then rolled crosswise in packs in the finishing-mills to the necessary length to give the desired gage. The longer axis of the pack is parallel with the axes of the rolls when the pack is fed in. The packs may then be taken to the squaring-shears.

The advantages of my invention result from the great saving in labor and the increase in the output of the mill. One roughing-mill is preferably used to supply a number of finishing-mills, so that all the mills may be kept in operation. An important advantage flows from the cutting of the partially-rolled bars crosswise into separate sections. This gives sections of a convenient length for handling, and when these bars are piled they are preferably fed into the finishing-rolls in the direction of their width—that is, with their longitudinal axis parallel with the rolls.

Many variations may be made in the form and arrangement of the roughing-mill, the finishing-mill, the conveyers, and furnaces without departing from my invention, since I consider myself the first to partially roll the bars, divide them transversely into separate pieces, and then reheat and pile these pieces, and then roll the packs.

I claim—

1. In apparatus for manufacturing black plates or sheets, a continuous mill comprising a series of sets of roughing-rolls arranged in tandem, mechanism at the end of the roughing-rolls arranged to move the bar at an angle to its path through the rolls, shear mechanism arranged to sever the bar transversely during its movement, and mechanism for transferring the severed sections to a finishing-mill; substantially as described.

2. In apparatus for manufacturing black plates or sheets, a continuous mill comprising a series of sets of roughing-rolls arranged in tandem, mechanism at the end of the roughing-rolls arranged to move the bar at an angle to its path through the rolls, shear mechanism arranged to sever the bar transversely during its movement, and a conveyer leading from the shears to a finishing-mill; substantially as described.

In testimony whereof I have hereunto set my hand.

C. W. BRAY.

Witnesses:
H. M. CORWIN,
GEO. B. BLEMING.