DESCRIPTION TO ACCOMPANY APPLICATION
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The picture consists of views of the apparatus used, and the operations followed in the manufacture of Eight Inch Projectiles as indicated by the following headings and notes.

Manufacturing an Eight Inch Projectile at the
Bertram Works
of the
NILES - BEMENT - POND COMPANY,
[illegible]
New [illegible]

GENERAL VIEW OF ONE BAY OF THE SHOP
Note runaways on which shells are rolled from one operation to the next.

THE ROUGH FORGING

DRILLING AND FACING NOSE
The times given include setting and removing work.
Time for complete operation - seven and one-half minutes.
Elevating forging by air hoist and transferring it to trolley chain block.
Lowering on arbor. Note turntable carrying two arbors.
Drilling. Hole started through jig.
Facing the nose.
Forging is held in place by its own weight on a spring controlled plunger which actuates side jaws.

CUTTING OFF OPEN END OF FORGING
Time for complete operation - seven and one-half minutes.
Lifting forging with special hook and placing in Machine.
Cutting off end.

ROUGH TURNING.
Time for complete operation - twenty-six minutes.
Placing forging in lathe. This strap method of handling the work is used on most operations.
Starting cuts on body and nose.
The cuts about half finished; two cuts on nose sometimes necessary.
Finishing cuts and gaging.

ROUGH AND FINISH BORING
Time for complete operation - twentytwo and one-half minutes.
Placing shell in special chuck.
The roughing cutter.
Rough boring.
The [illegible]
Fin[illegible]

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Rem ving shell.
Cut ing lubricant is pumped into nose of shell
through spindle of lathe.
Showing method of transferring shells from one
Runaway to another at end of shop.

FINISH TURNING
Time for complete operation - Twelve minutes.
Arbor with expanding jaws.
Placing shell on the a
The special tool used has a [illegible] which
can be turned to present new cutting edge.
Starting cut and gaging for size.
Finishing cut.
Former on back of lathe for shaping nose.

FINISH BORING NOSE ON TURRET LATHE
Time for complete operation - seven and one-half
minutes.
The expanding arbor.
Placing in lathe and tightening arbor.
Cutter for facing end of shell.
Facing end of shell.
Cutter for boring nose.
Boring nose.
Cutter for recessing the nose.
Recessing the nose.
Cutter for reaming nose.
Reaming nose.
Gaging.

A SPECIAL GAGE TO PUNCH MARK THE CORRECT LENGTH
FOR FACING OFF OPEN END

FACING END AND COUNTERBORING THE BASE
Placing in lathe.
Facing the base.
Rough and finish counterboring.

WAVE RIBBING
Time for complete operation - seven and one-half
minutes.
Placing in lathe.
Rough recessing tool.
Rough recessing.
Wave ribbing tool.
Cutting wave rib (Note reciprocating motion of
toolpost).
Undercutting tool.
Undercutting.

The finished wave rib.

THREAD MILLING THE NOSE
Time for complete operation - two and one-half minutes.
Placing shell in machine and tightening chuck.
Milling the thread and removing shell.
The milling head.
Cleaning nose threads with hand tap.

THREAD MILLING BASE
Time for complete operation - two and one-half minutes.
General view showing putting in shell, taking Out and taking shell out.
Clamping shell in chuck.
Close view of milling head.
Cleaning base threads with hand tap.

PRELIMINARY GOVERNMENT INSPECTION
Nicking wave ribs to allow to escape when pressing on copper band.

OPERATIONS ON ADAPTER
The rough forging.
First roughing operation.
Second roughing operation.
Drilling driver holes.
Driver holes are tapped for holding work in jigs.
Finish turning and threading.
Facing off surplus stock.
Removing threads from driver hole.
The finished adapter.

PUTTING IN ADAPTER
Time for complete operation - one and one-quarter minutes.
Putting putty on base threads.
Putting cement on adapter threads.
Running adapter in by hand.
Putting in screwing-up machine and setting up by power (Notice air clamp for holding shell).

PRESSING ON COPPER BAND
Time for complete operation - two and one-half minutes.
Heating copper bands before pressing them on.
General view showing shell being lowered into place and band pressed on.

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Gage recording pressure used.
Close view of the pressing-on operation.

FACING BASE
Time for complete operation - five minutes.
General view showing shell being placed in machine
and drawn up solid by hand wheel on back of spindle.
Close view of riveting with air hammer located
on lathe carriage
Close view of facing operation
Close view of rounding edge.

REAMING FUSE SEAT

SIZING THREADS IN NOSE WITH HAND TAP

TRUING UP RECESS IN NOSE

FINAL GAGING THE NOSE
Cleaning off putty forced into shell when screwing
in adapter.
Final cleaning to remove dirt from inside of shell.

VARNISHING THE INSIDE
Inspection before varnishing.
A tin protector keeps varnish out of threads of nose.
The varnish is sprayed on inside of shell and then
brushed making a smooth surface.

BAKING THE VARNISH
Ovens for baking the varnish.
The cover or oven carries electric heating coils
which are lowered into each shell.

TURNING COPPER BAND
Time for complete operation - three and three-quarter
minutes.
General view of placing shell in chuck and taking
the cuts.
Filing to gage and showing why gages wear out.
Close view of air chuck.
Close view of tools.

FINAL GOVERNMENT INSPECTION.
Time for complete operation. One and one-half minutes.
Section of a shell.

STAMPING NAME, DATE AND LOT NUMBER OF THE BASE

BOXING FOR SHIPMENT
Greasing the nose and screwing in wooden plug.

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Bring[illegible]ng shell down to the shipping floor.
Final wipe-off and Stencilling N.P. (non-pro of)
on shell.
Covering with vaseline.
Boxing.

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