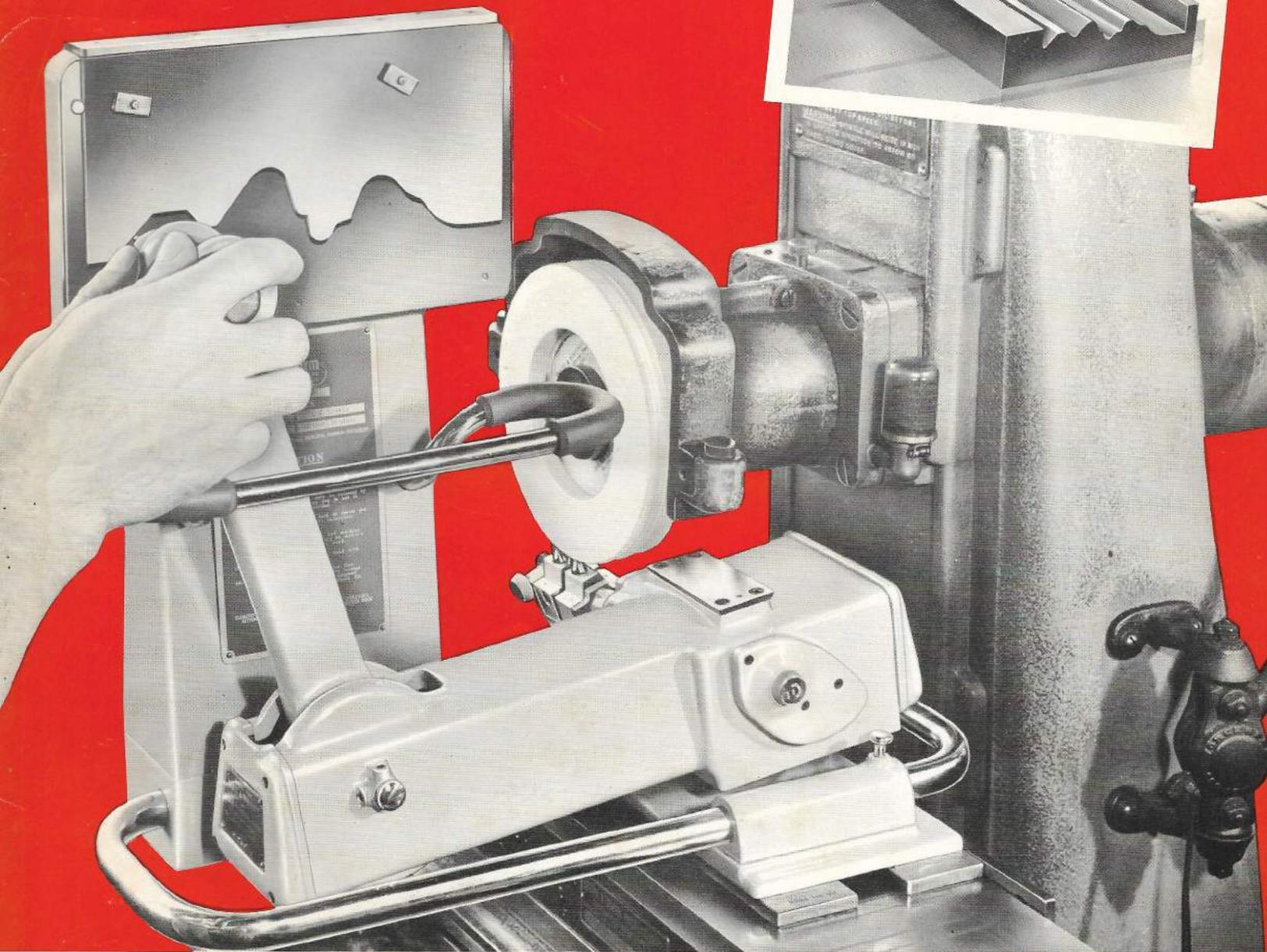


PRATT & WHITNEY

**Diaform**

WHEEL FORMING  
ATTACHMENT

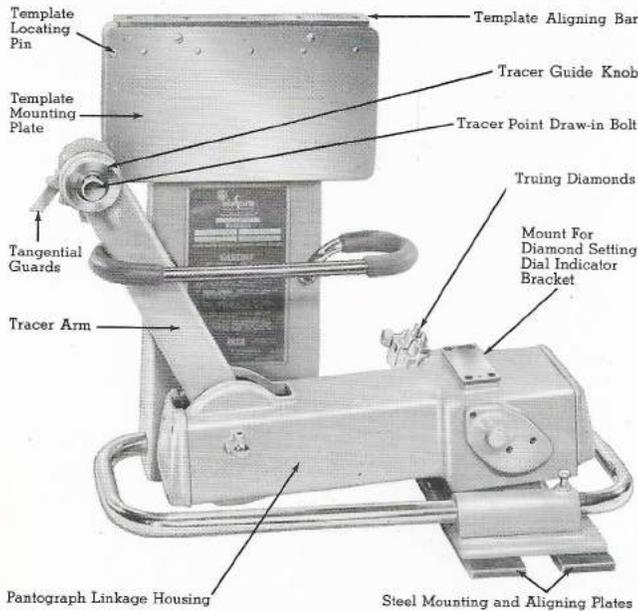


... FOR FASTER AND MORE ECONOMICAL  
**FORMING** AND **RE-TRUING**  
OF COMPLEX FORMS ON GRINDING WHEELS

# PRATT & WHITNEY

## Diaform WHEEL FORMING ATTACHMENT

### ... A LIGHTWEIGHT, A SIMPLE METHOD FORMS ON

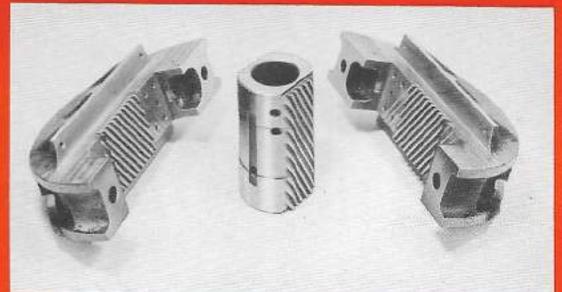


**D**IIFORMING is a simple, rapid and inexpensive procedure which form-trues grinding wheel contours accurately to tenths of a thousandth of an inch — and guarantees repeat truing of any given form to the same degree of accuracy as often as required. It eliminates costly, time-consuming "cut-and-try" methods.

The tool that does the job is the P&W DIAFORM, a light-weight, portable attachment designed for use on conventional horizontal spindle surface grinders, tool and cutter grinders, and universal and tool grinding machines. With it, the operator lightly traverses a tracer over the profile of an easily-made template. The path of the tracer is transmitted at a 10:1 reduction ratio to the truing diamond which quickly and accurately form-trues the grinding wheel to the desired form. It's so simple no skill is required to true the most complicated form on grinding wheels with "tenth" precision.

### DIAFORMING MATING RACKS

Here is an unusual job for which the DIAFORM saved many hours. Each tooth form in the sliding racks of the eccentric housing and sleeve, pictured at the right, was ground with a Diaformed wheel.



Pictures at left show truing the wheel and grinding the sleeve in which .0002" tolerances were held. The ability to accurately repeat truing of a given form was an important feature on this job.

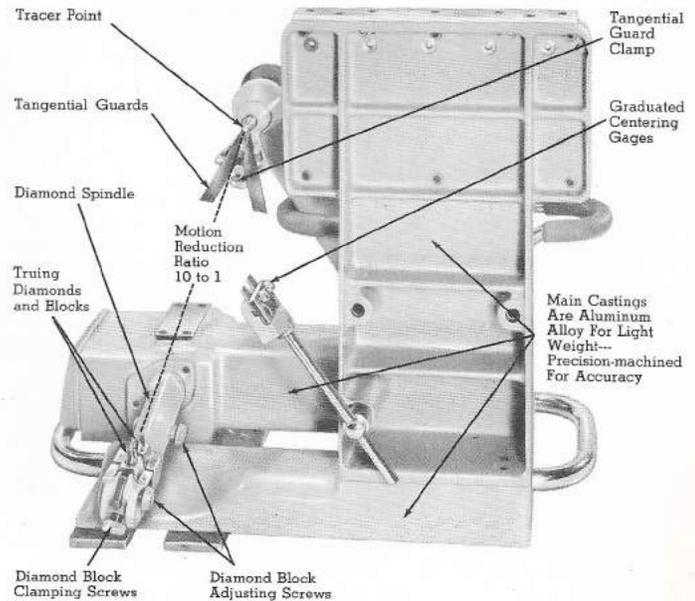
Diaforming can be applied to an unlimited number of jobs where form grinding is required. Besides punch and die work, forming tools and cutters, there are all kinds of special jobs in the toolroom and on the production line, where Diaforming could do the job faster and more accurately. No matter whether the form is simple or complex, Diaforming is done with equal ease — it takes but a matter of minutes to true the complete form on a wheel.

# PORTABLE INSTRUMENT THAT PROVIDES OF ACCURATELY TRUING COMPLEX GRINDING WHEELS . . . *in Minutes*

**THE TANDEM DIAMOND SPINDLE** accommodates two truing diamonds: one used for semi-finishing and the other for finish truing forms on grinding wheels. This exclusive DIAFORM feature extends diamond life and provides greater accuracy.

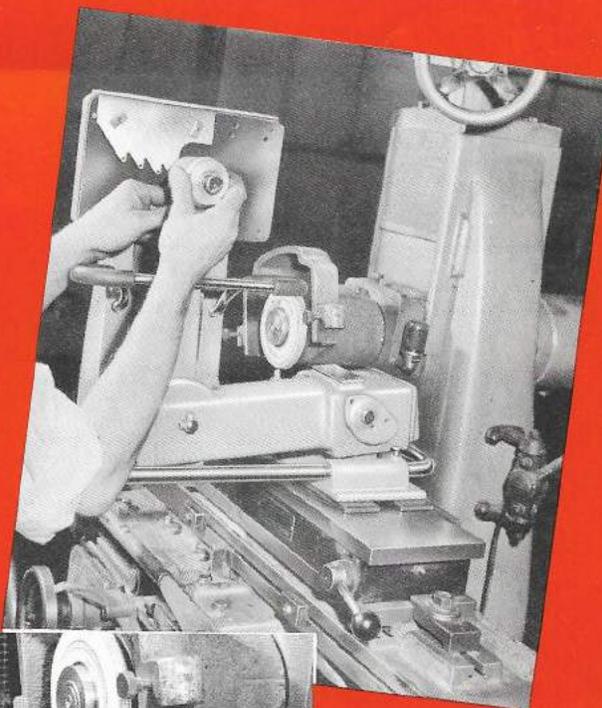
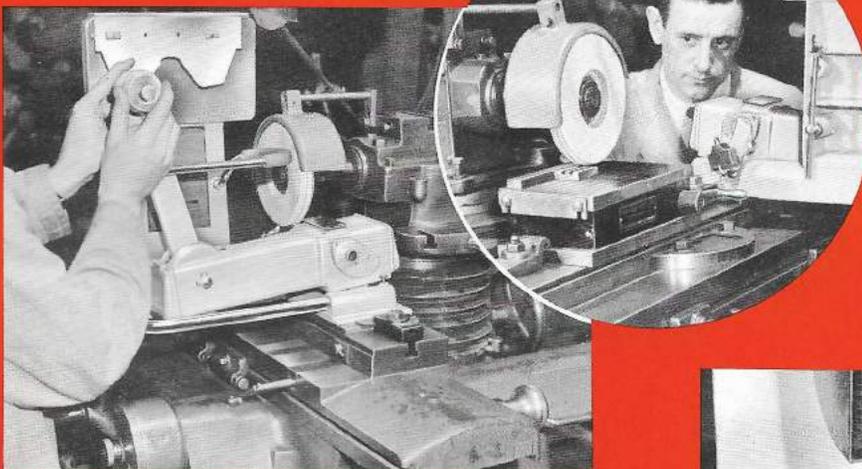
Thus the grinding of complex forms in hardened steel or carbide sectional dies, punches, flat or circular forming tools, cutters, broaches, crusher rolls, gear tooth forms, profile gages and the like, can be accomplished in hours instead of days.

The DIAFORM is a precision instrument, built to the exacting standards that have made the name PRATT & WHITNEY a symbol for accuracy the world over. Tool and die shops, metal blanking and stamping plants, tool rooms, and most all metal working manufacturers will find the DIAFORM to be an extremely versatile and valuable tool, able to render substantial assistance in their constant efforts to cut costs and boost production.



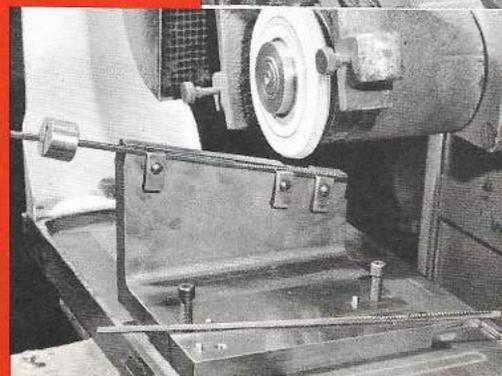
## DIAFORMING A FLAT FORMING TOOL

One of common "everyday" uses of the DIAFORM is the truing of grinding wheels for grinding forming tools, such as the operator is doing in the picture below. The inset at the right shows the grinding operation with the Diaformed wheel.



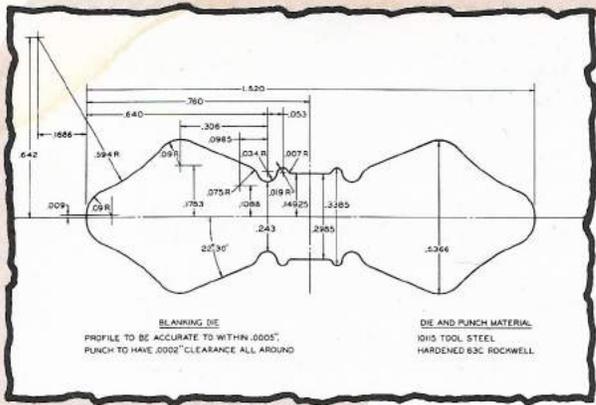
## DIAFORMING A BROACH

Grinding these broaches was a simple matter, using a DIAFORM to form the wheel as illustrated in upper right picture. Here the DIAFORM is held on the magnetic chuck for the truing operation.



# DEMONSTRATION

## 6 HOURS FROM THE PRECISION

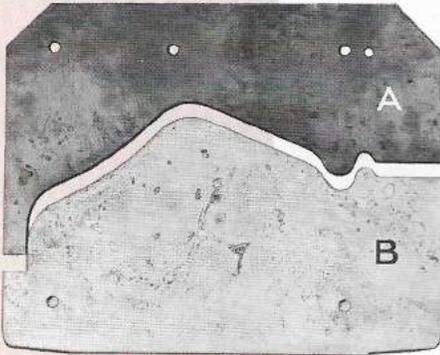


With this step by step picture demonstration of producing a simulated split blanking die and punch, we would like to show you the simplicity of Diaforming and how it can cut your form grinding costs as well as save you valuable shop time.

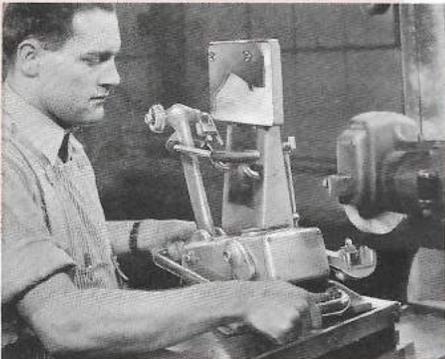
The first step is to make the template. This is done by conventional methods using any mild steel or such, 3/32 inch in thickness. The template form is made exactly 10 times larger and just the reverse of the form required on the finished part. Naturally to obtain good mating results of punch and die, the templates for each must be a good match. This difficult operation is made simple by casting template "B" in type metal from template "A", using a Diaform template casting flask. (see page 7)

With template "A" secured to the mounting plate of the DIAFORM, this lightweight, portable instrument is placed on the magnetic chuck of the surface grinder. The roughing diamond is then mounted on the diamond spindle platform and adjusted until central with the diamond spindle centerline, using a .0001" dial indicator. The diamond must be presented to the wheel at a point directly beneath the centerline of the machine spindle or an untrue shape will be developed on the wheel. This is accomplished easily with a centering gage which pivots between the diamond and machine spindle, and by traversing the machine table, the DIAFORM is brought into proper position.

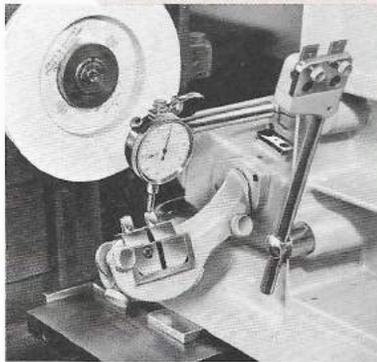
The simple preparatory steps having been completed, the punch form is gradually trued onto the wheel by successive passes of the tracer over the template edge. The tracer itself is



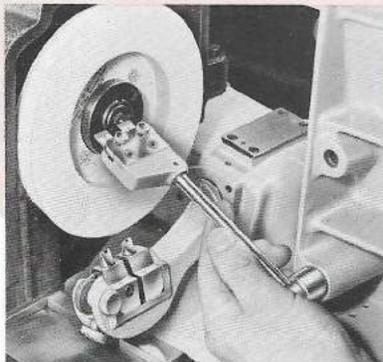
Mating Templates



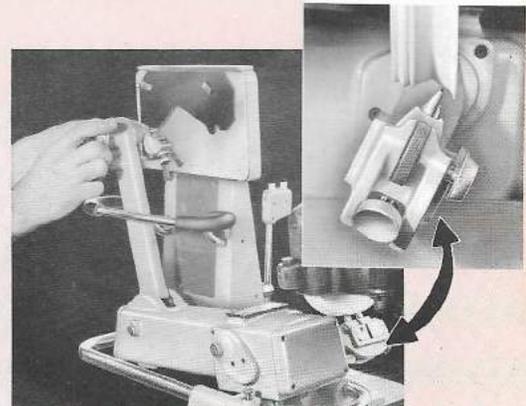
Placing Diaform on Grinder



Indicating the Diamond



Centering Diamond to Wheel



Diaforming Punch Form on Wheel

### TYPICAL PROFILES GROUND



# OF Diaforming

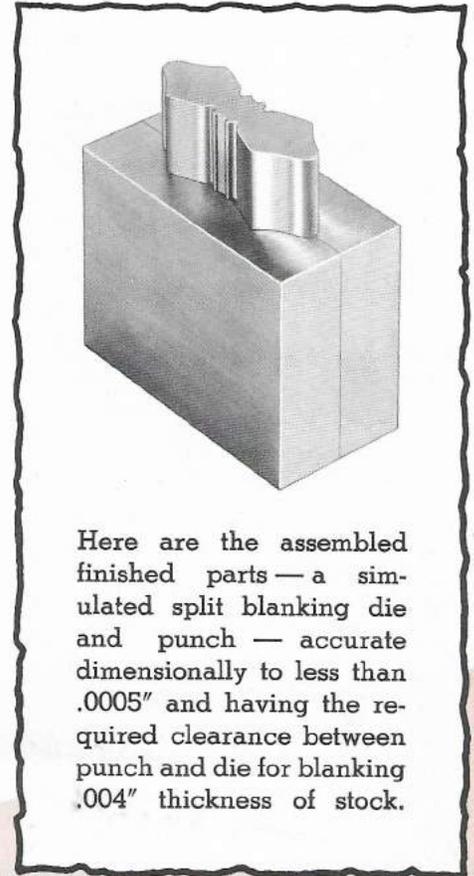
## DIMENSIONED DRAWING TO THE FINISHED GROUND SPLIT DIES AND PUNCH . . .

carried in the top of the vertical tracer arm and is provided with tangential guards having an included angle slightly greater than the angle of the chisel-shaped truing diamond. Thus as the tracer and diamond are oscillated in tracing across the template, the guards prevent the wheel from cutting into the diamond setting and also from damaging the wheel form.

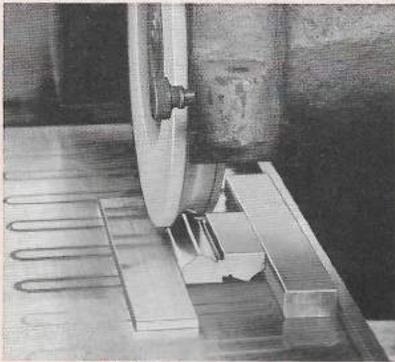
After roughing the form onto the wheel, the roughing diamond is replaced with two finishing diamonds, and each adjusted to obtain a zero reading on the "tenth" indicator when rocking the diamond arm about its axis. The wheel is then trued to precision form using the outer diamond to semi-finish and the inner diamond for final truing.

The DIAFORM is now removed and the hardened punch blank placed on the magnetic table. Plunge grinding in solid metal is employed, grinding one quarter of the punch form at a time. After rough grinding the complete form to within a few thousandths of finish size, the DIAFORM is returned to the table, the wheel retrued, and the punch form finish ground to size.

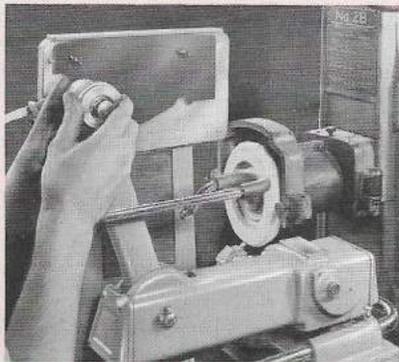
Template "B" is now substituted for template "A" on the DIAFORM and the die profile is trued onto the wheel in the same manner as that described for the punch form. The two die halves are ground in tandem, plunge grinding one half of the complete die form at a time. The same procedure of roughing down to within a few thousandths of final form, retruing the wheel, and finish grinding to size, is again followed — and the demonstration is completed.



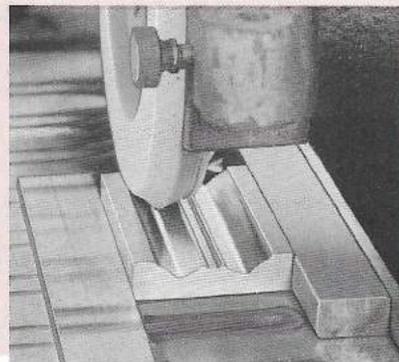
Here are the assembled finished parts — a simulated split blanking die and punch — accurate dimensionally to less than .0005" and having the required clearance between punch and die for blanking .004" thickness of stock.



Grinding Punch

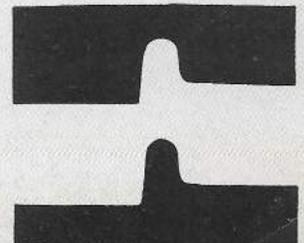


Diaforming Die Form on Wheel



Grinding Dies

## WITH DIAFORMED WHEELS

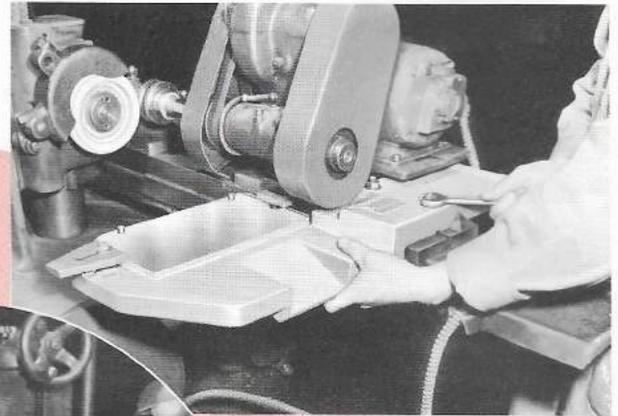




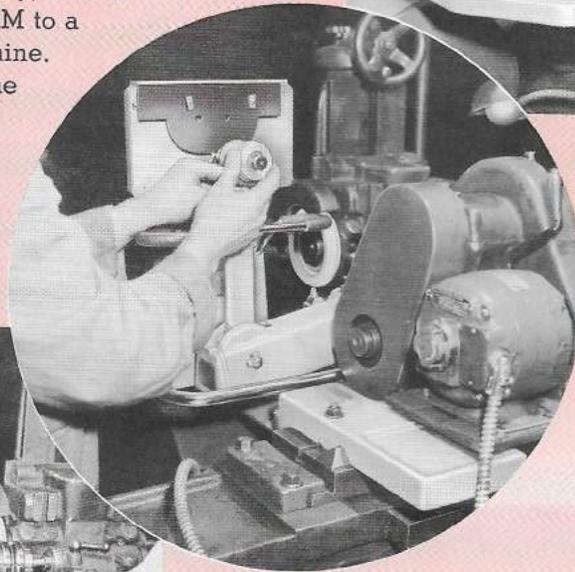
## CIRCULAR FORM GRINDING SIMPLIFIED . . .

### Adapter Permits Diaforming on Universal and Tool Grinding Machines

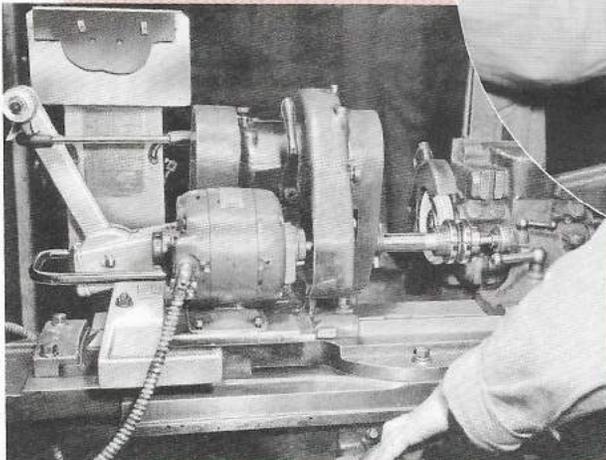
The many hours spent in "cut-and-try" methods of form truing and re-truing wheels for circular forming tools, wheel crusher rolls and the like, can be reduced to minutes by Diaforming. It is not only time-saving, but the same accurate form is guaranteed no matter how many times the wheel is re-trued and the tool re-ground. A special adapter, designed by Pratt & Whitney, can be furnished for attaching the DIAFORM to a Universal and Tool Grinding Machine. The adapter fits on the end of the swivel table where the DIAFORM is out of the way when not in use. A work speed reducer can also be furnished for large diameter work.



1 Mounting the Diaform Adapter Plate on the left end of the table of a Universal and Tool Grinding Machine.



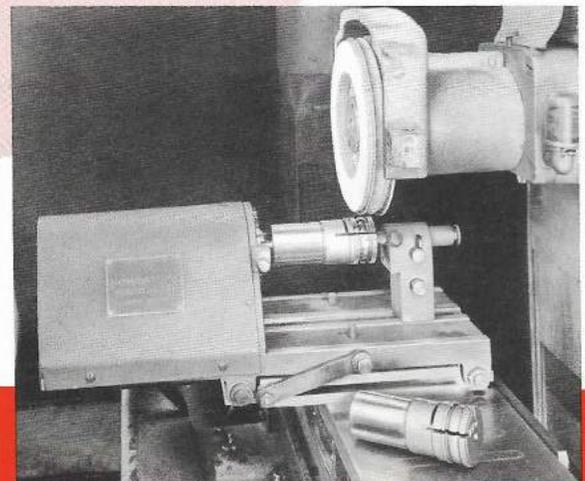
2 Diaforming a wheel. The DIAFORM is brought into position by traversing the table until the diamond is properly located beneath the wheel.



3 Grinding the form in a circular forming tool with the Diaformed wheel. When not in use the DIAFORM remains set up at the left end of the table without interfering with the grinding operations.

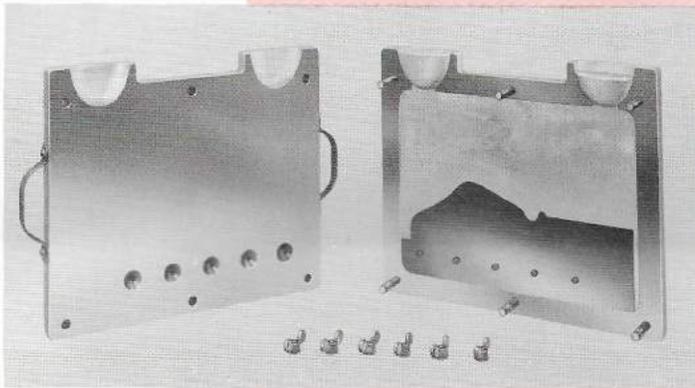
### Circular Grinding Attachment for Surface Grinders

An ideal companion attachment for the DIAFORM where only a conventional surface grinder is available. This small motor-driven unit is mounted on the magnetic table of the surface grinder and permits circular form grinding to be performed on small diameter work. The attachment is also handy for small cylindrical work, tapers, and work requiring indexing.



## Diaform Template Casting Flask

The difficult task of grinding mating forms, such as in punch and die sets, is made easy with a Diaform Template Casting Flask. One template is made by conventional methods and serves as a master for casting the mating template in type metal. The flask consists of two half-sections, each a flat rectangular casting. One side of each half is a ground surface to assure a tight seal when assembled. On one of the halves, the ground surface is recessed to a depth of  $\frac{3}{32}$ " (the thickness of the template) for an area of 9" x 12". This provides a cavity to fasten the master template and to cast the mating template. The two halves are held together by six studs with wing nuts and the molten metal is poured into the cavity through one of two gates at the top of the assembled flask.

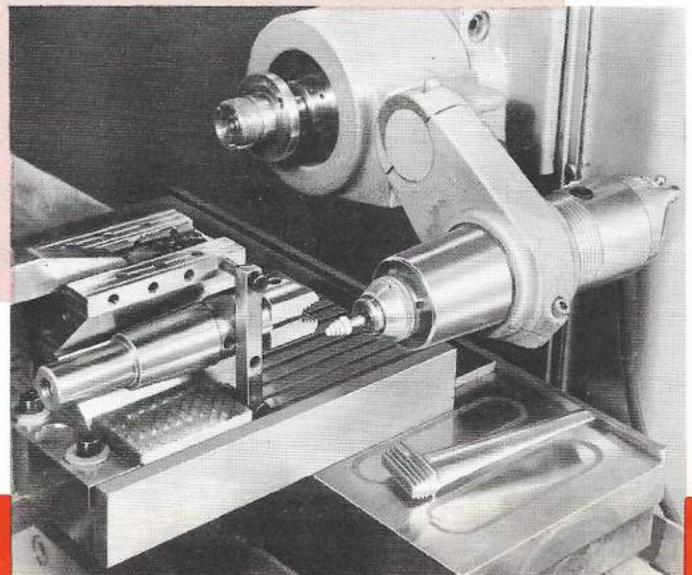


## Left-hand Model Diaform (For Counterclockwise Grinding Wheel Rotation)

Although they are not common, there are some surface grinders equipped with spindles which run counterclockwise. No attempt should be made to use a standard DIAFORM on these machines as this would cause damage to both the diamond and mechanism. A Left-hand Model DIAFORM can be furnished which is basically the same as the standard model, but has the diamond spindle and centering gage on the front side instead of in the rear, thereby preventing any tendency of the diamond to dig into the wheel.

## High Speed Grinding Attachment

For grinding in close areas requiring small diameter wheels, high speeds are necessary. This illustration shows a portable grinder being used to form grind holders for gripping serrated roots of jet engine turbine blades. The grinder has extremely accurate spindle bearings and collet and delivers  $\frac{1}{4}$  hp at the wheel. Speed of rotation is controllable between 15,000 and 45,000 rpm. In this operation it was used at 40,000 rpm and the fir tree form was "Diaformed" into a  $\frac{3}{8}$ " diameter wheel. After slitting and rough grinding a V shape in the work, the "Diaformed" wheel was used in plunge grinding the fir tree form. Another wheel was then trued by "Diaforming" and the form was finished ground.



# Diaform

WHEEL FORMING ATTACHMENT

## SPECIFICATIONS

Width of form produced on wheel, maximum.....	1"
Depth of form produced on wheel, maximum.....	1/2"
Ratio of pantograph mechanism.....	10 to 1
Diameter of wheel that can be formed, maximum.....	10"
Width of form on template, maximum.....	10"
Depth of form on template, maximum.....	5"
Thickness of template.....	3/32"
Base dimensions.....	11 1/4" x 5 1/4"
Height, base to centerline of diamond pivot (with tracer in highest position).....	4 1/2"
Storage Cabinet outside dimensions — Length.....	30"
Depth.....	19"
Height.....	25"
Weight { DIAFORM.....	36 lb.
{ DIAFORM with accessories and Storage Cabinet.....	100 lb.
{ Shipping weight (boxed).....	145 lb.

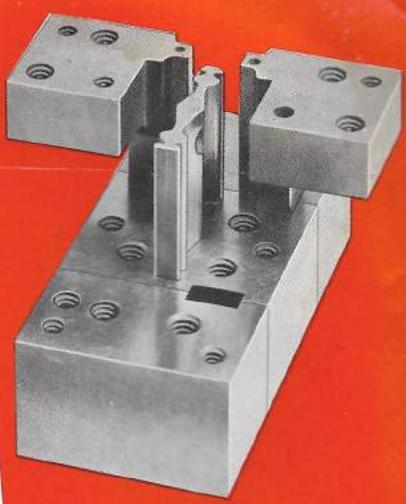
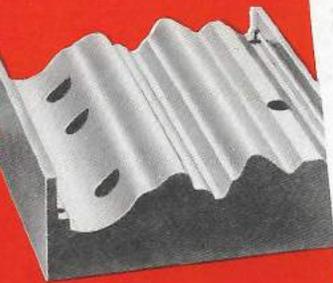
SEE PAGES 6 AND 7 FOR ADDITIONAL EQUIPMENT

### FOR LARGER DIAFORMING

Two larger models are available

**Model No. 2** - for truing forms up to 2" width x 1" depth on 14" maximum diameter wheels.

**Model No. 4** - for truing forms up to 3" width x 1" depth on 20" maximum diameter wheels.



1. Instruction Book
2. One 7" x 1" x 1/4" Grinding Wheel
3. One Plastic Dust Cover for Diaform Proper
4. One Plastic Dust Cover for Junction of the Vertical Arm and Linkage Housing
5. Three Socket Screw Wrenches
6. Pair 60° Tangential Tracer Guards
7. Pair 40° Tangential Tracer Guards
8. Tangential Guard Clamp and Screw
9. Diamond Setting Indicator and Bracket
10. Taper Shank Tracer Point .600" dia.
11. Taper Shank Tracer Point .200" dia.
12. Taper Shank Tracer Point .100" dia.
13. One Tracer Point Draw-in Bolt
14. One Key for Cabinet
15. Two Diamond Block Clamping Screws
16. Two Template Mounting Screws, Nuts and Washers
17. One Rough Truing Diamond
18. One Finish Truing Diamond 60° x .010" rad.
19. One Finish Truing Diamond 40° x .005" rad.
20. Five Diamond Blocks
21. Pressure Lubricating Gun
22. Grinding Wheel Centering Gage
23. Storage Cabinet with Three Drawers

The description, illustrations and specifications in this circular are correct at the time of printing. Since the policy of Pratt & Whitney is constantly to improve its machines and equipment, we reserve the right to change the design and specifications of any product without notice.

# PRATT & WHITNEY

DIVISION NILES-BEMENT-POND CO.

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