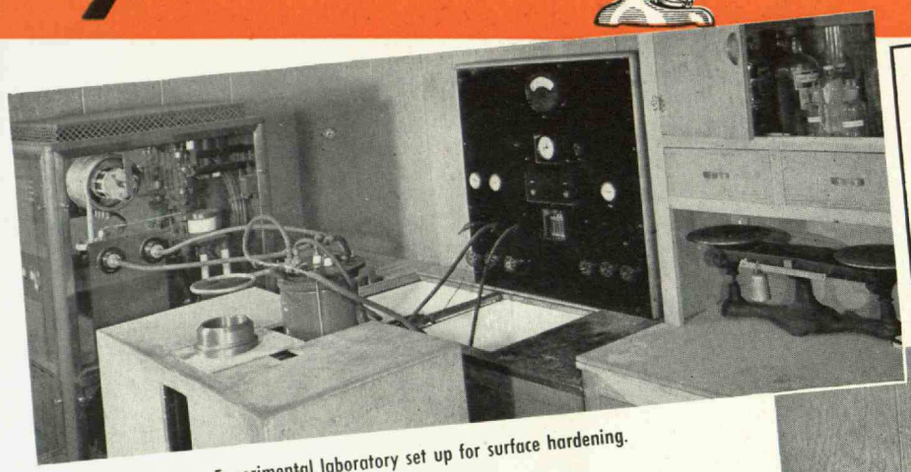
June 1943

TECHNOLOGY REVIEW

Title Reg. in U. S. Pat. Office

Thermonic Laboratories

The Guarantee behind our Production Rate on Thermonic Induction Heating Equipment.



Experimental laboratory set up for surface hardening.

Examining micro-structure of hardened specimens in THERMONIC Laboratory.

For our customer's protection, every production rate, quoted in proposals on THERMONIC equipment, is backed up by thorough laboratory investigation.

IF YOU HAVE A BRAZING PROBLEM

This service includes the cross-sectioning of the joints following brazing to determine the alloy flow, and metallographic analysis to determine the effect of the heating on adjacent sections. Test runs are made on, not one but many samples to ascertain the adaptability of the process to production.

IF YOU HAVE A HARDENING PROBLEM

Hardness values are obtained and the hardenability determined by photomicrographic studies. Temperatures are carefully checked by pyrometric measurements. Again, numerous samples are run, approaching pilot plant technique, to insure uniform results.

IF YOU HAVE AN ANNEALING PROBLEM

Photomicrograph and hardness values are taken as indications of the "before" and "after" physical characteristics, to insure meeting your requirements.

A TYPICAL EXAMPLE OF A HARDENING PROBLEM

Fig. 1

Fig. 2

Fig. 3

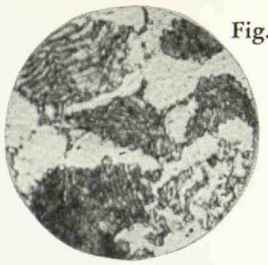
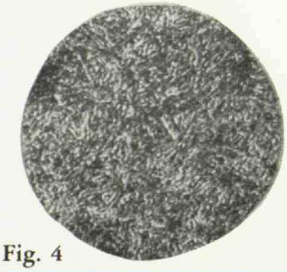


Fig. 4



PROBLEM:

To surface harden a machined ring, S.A.E. 1040 steel, hardness not to penetrate sufficiently to affect the area surrounding the drilled hole, which is subsequently tapped.

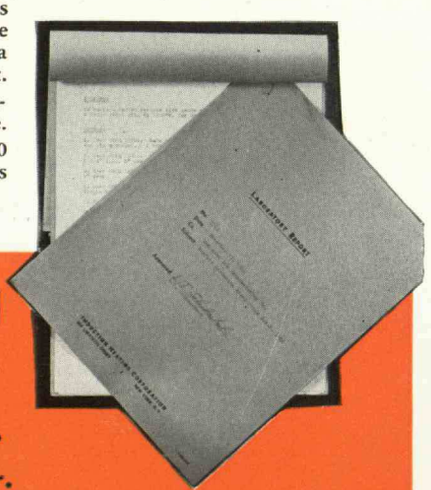
PROCEDURE:

Single turn coil, as illustrated in Fig. 1, heated the outer cylindrical surface of the ring to 1550° F. in 15 seconds, using a Model 1070 THERMONIC Induction Generator. Piece was water quenched, and resultant hardness of Rc 61 was obtained.

Fig. 2 shows an etched cross section. The depth of hardness, transition zone, and original structure are evident. It is clearly seen that the area surrounding the drilled hole remained soft, having only a portion of the transition zone adjacent to it.

Fig. 3 is a photomicrograph taken at 650 magnification of the original pearlitic structure.

Fig. 4 is a photomicrograph taken at 650 magnification on the hardened area; this being a typical martensitic structure.



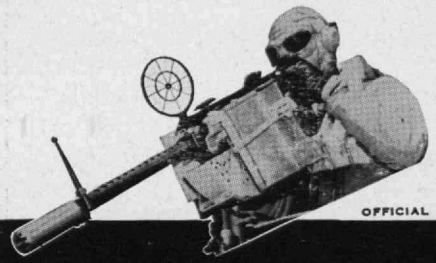
INDUCTION HEATING CORPORATION

Designers • Builders • Of Thermonic Heat Treating Equipment

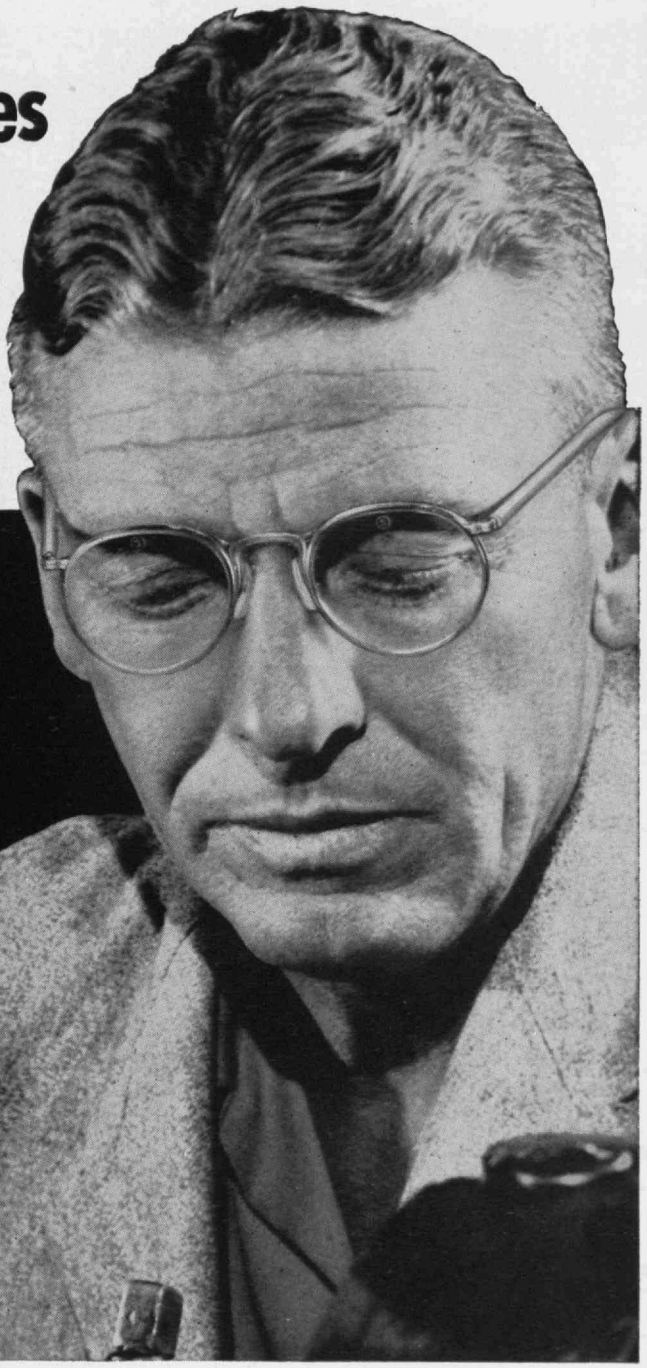
389 LAFAYETTE STREET, NEW YORK CITY, N. Y.

E. S. Goodridge, '33, Pres. **W. A. Gray, '33, Engr.**

Keep Your Workers' Eyes Trained on their Work



OFFICIAL NAVY PHOTOGRAPH



WITH AMERICAN OPTICAL GOGGLES

We need more than our workers' hands to win this war . . . we also need their *eyes*. Yet, for lack of proper goggles, industrial eye accidents are *still* occurring at an alarming rate . . . *still* costing our valiant fighting men much equipment that they need to smash the enemy.

Put on an offensive now to stop eye accidents in *your* plant. American Optical Company, pioneer manufacturer of products to aid and preserve vision, offers you the eye protection equipment and complementary services that your plant needs to protect man-power for war-power. AO Goggles are scientifically designed to give maximum possible protection . . . and workers find them comfortable to wear. Have your Safety Director get in touch with the nearest American Optical Branch Office.

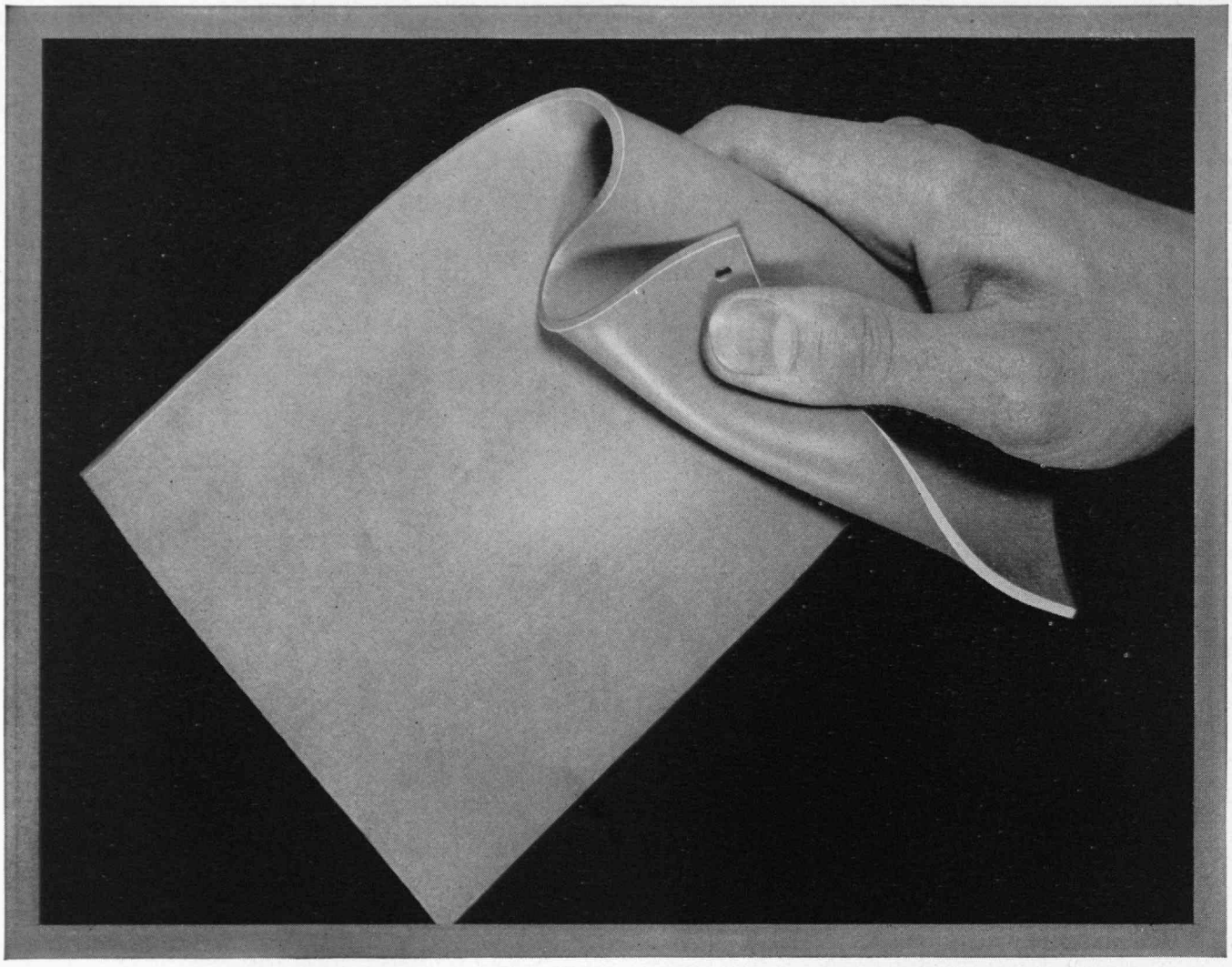
ARMY E NAVY

American Optical

COMPANY

SOUTHBRIDGE, MASSACHUSETTS

THE TECHNOLOGY REVIEW, June, 1943. Vol. XLV, No. 8. Published monthly from November to July inclusive at 10 Ferry Street, Concord, N. H. Publication date: twenty-seventh of the month preceding date of issue. Annual subscription $3.50; Canadian and Foreign subscription $4.00. Entered as second-class matter at the Post Office at Concord, N. H., under the Act of March 3, 1879.



TYGON LOOKS LIKE *Rubber* FEELS LIKE *Rubber*

.... FOR MANY USES IS BETTER THAN RUBBER!

TYGON might not make a good tire for your car, but that's one of the few places where this versatile, flexible plastic cannot act as a more than satisfactory replacement for rubber.

In hundreds of America's war plants, Tygon, pinch-hitting for rubber, is releasing tons of this critical material for work which rubber alone can do. For many of these applications, the superiority of Tygon has been so pronounced that it is unlikely rubber will ever again be used, even when freely available.

For example, Tygon lining materials have replaced rubber for tanks and other equipment in which corrosive acids are made and handled. Here Tygon's unique properties: its almost "universal" resistance to chemical attack, its remarkable durability, its immunity to the oxidizing elements that tend to destroy rubber, and the tenacity with which it can be bonded to steel without the necessity of vulcanizing or curing, have made most users of chemical equipment forget all about rubber.

Tygon flexible tubing has replaced rubber in laboratories, in hospitals, in industry, in fact wherever a highly flexible tubing is required. Resistant to acids, alkalies and oils, Tygon tubing offers the striking additional advantages of transparency or a broad range of color (both unavailable in rubber), transparency for clearly visible fluid transmission — color for ready identification of fluid lines.

Stoneware engineering research met the need for a replacement for molded rubber mechanical goods by perfecting molding techniques which permitted shaping, in standard rubber molds, of Tygon formulations, possessing not only the desirable physical attributes of rubber but the basic chemical inertness of sheet Tygon.

Possibly in your operations, too, there are places where Tygon may not only conserve precious material for war, but may prove of even greater worth than the material it replaces.

Would you like to learn more about Tygon? Write for Bulletin 1620-B. Address The U. S. Stoneware Company, Akron, Ohio. In Canada: Chamberlain Engineering, Ltd., Montreal.

U. S. STONEWARE
AKRON, OHIO

ENGINEERS • MANUFACTURERS • ERECTORS • *of* CORROSION-RESISTANT EQUIPMENT

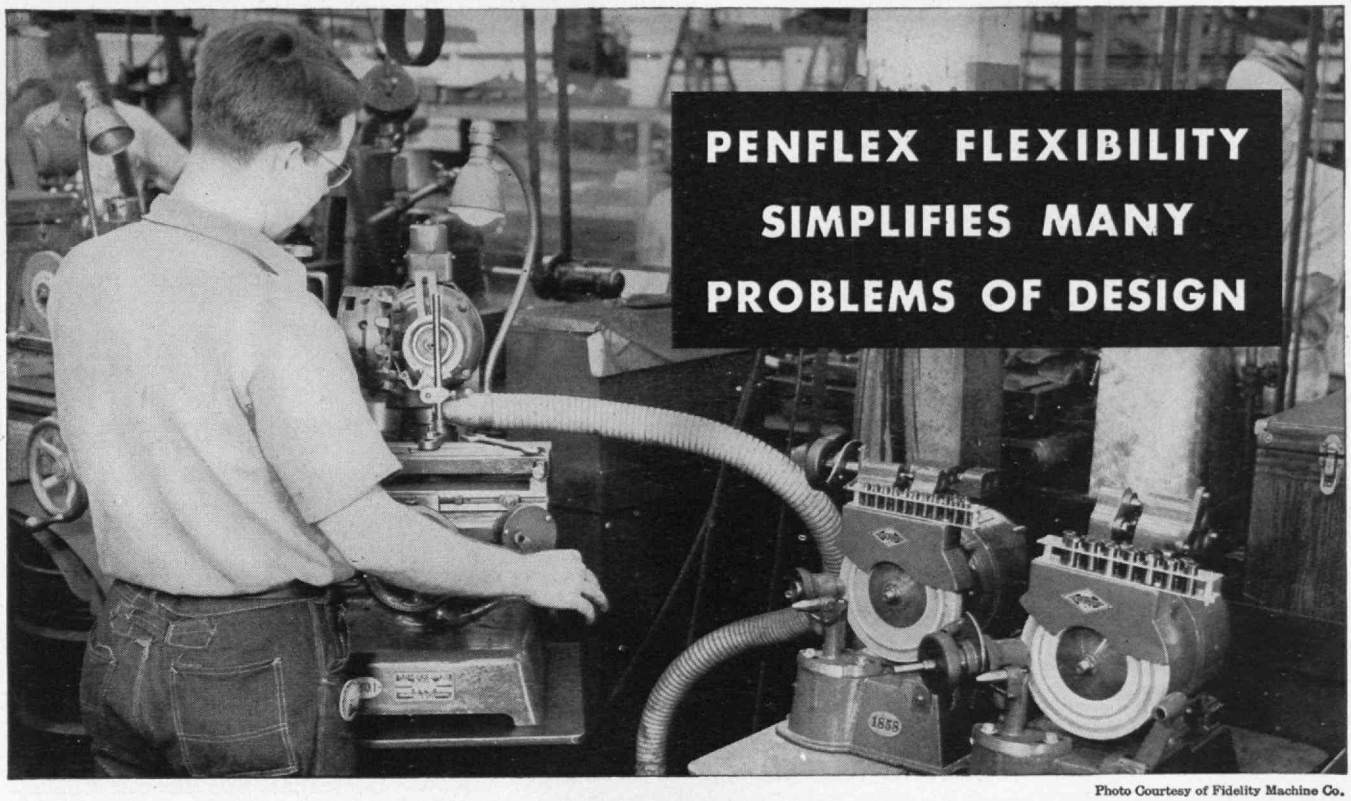
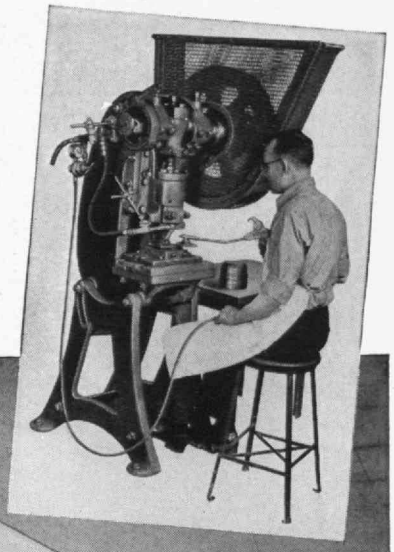


Photo Courtesy of Fidelity Machine Co.

ILLUSTRATED are several applications of PENFLEX Flexible All-Metal Hose and Tubing, showing how PENFLEX simplifies design problems. Light in weight with flexibility to make inaccessible installations easy, PENFLEX All-Metal Hose and Tubing are suitable for mobile units, bilge ventilation, fume exhaust, dust collection, coolant conveying, hydraulic and air controls, vibration isolation, oil can and similar flexible spouting, armor for flexible shafting, conveying of dry granular materials, and many other applications in high or low pressures.

PENFLEX, tight as pipe but flexible, follows any desired path. Material flows through smooth, easy bends without sharp turns to clog.

Tell us what type of material you are handling, and the operating pressures. We will send you data sheets promptly.



PENFLEX METAL HOSE

PENNSYLVANIA FLEXIBLE METALLIC TUBING CO.
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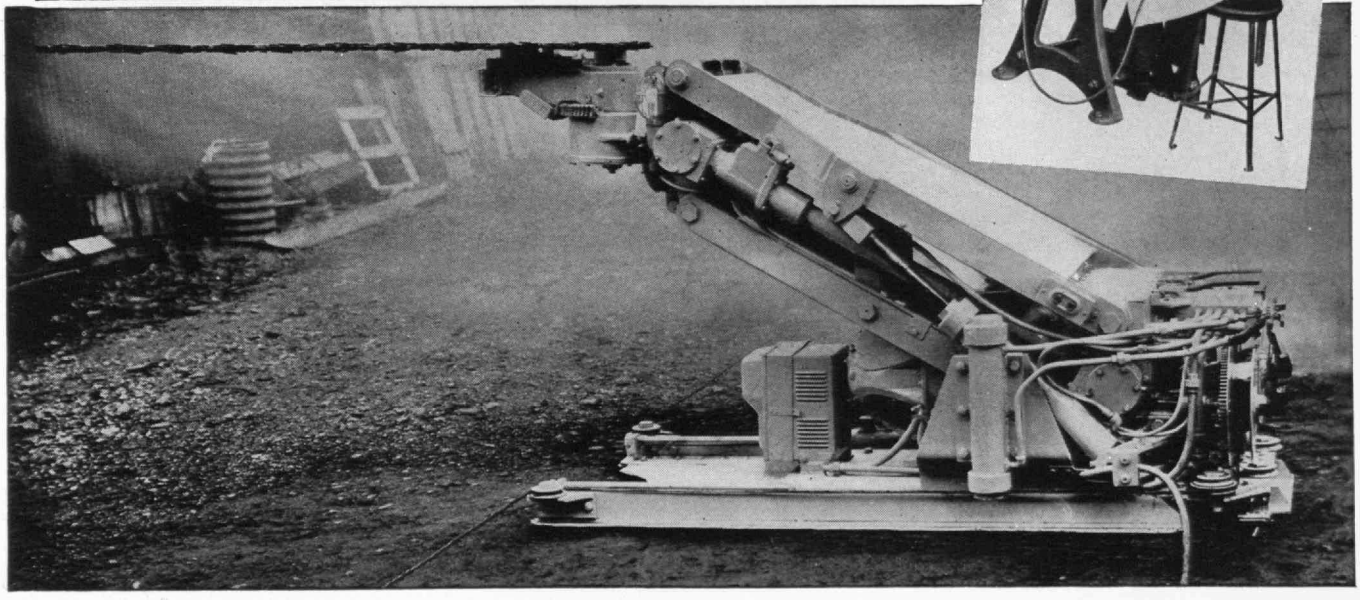
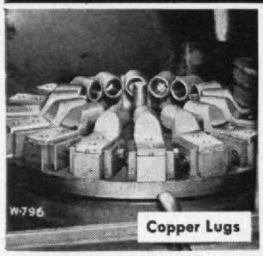
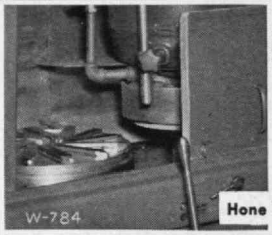
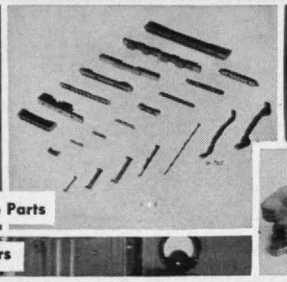
ESTABLISHED 1902

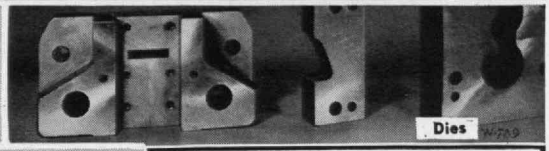


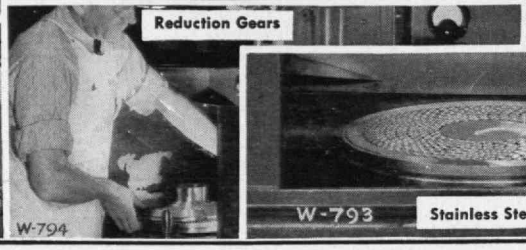
"PUT IT ON THE BLANCHARD"

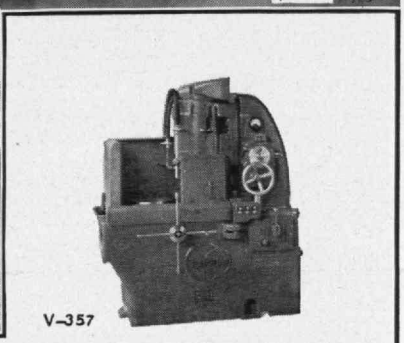




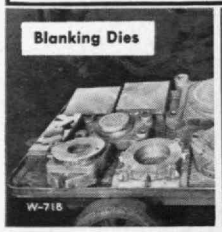


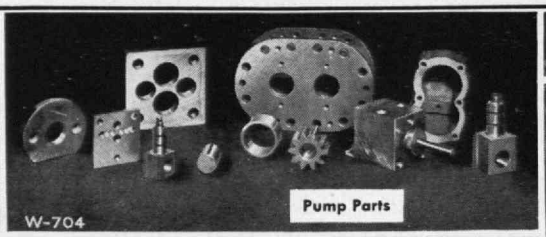


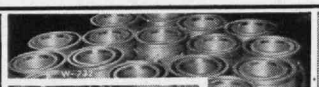


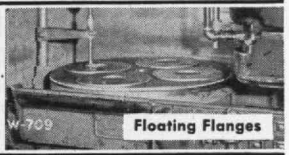


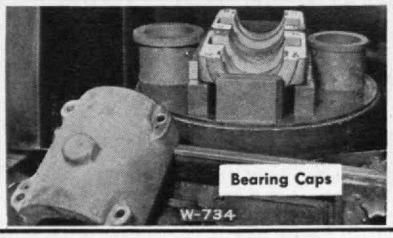
EXAMPLES OF WORK DONE ON THE NO. 11 BLANCHARD SURFACE GRINDER

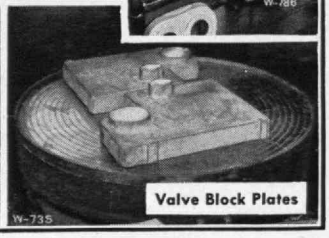


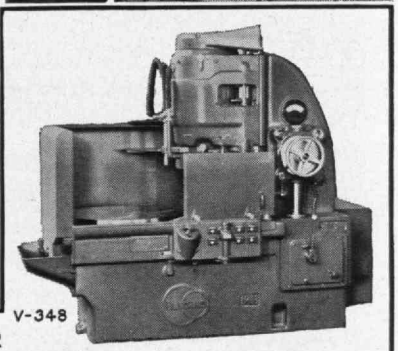




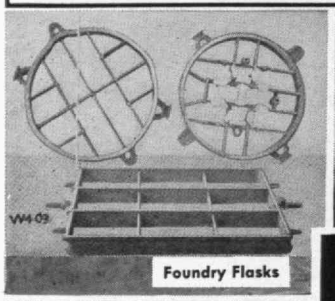


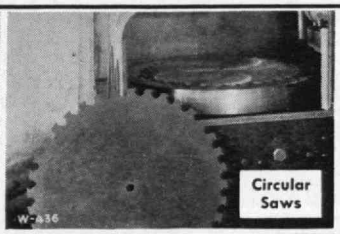


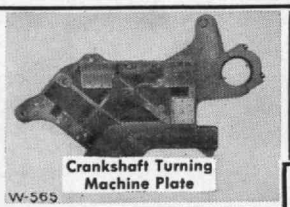


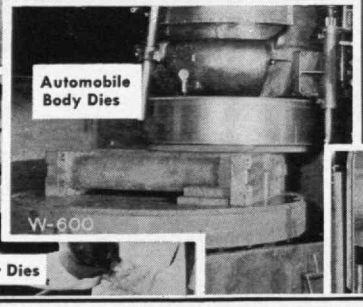


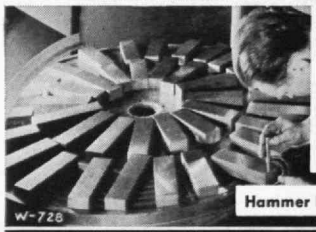
EXAMPLES OF WORK DONE ON THE NO. 18 BLANCHARD SURFACE GRINDER

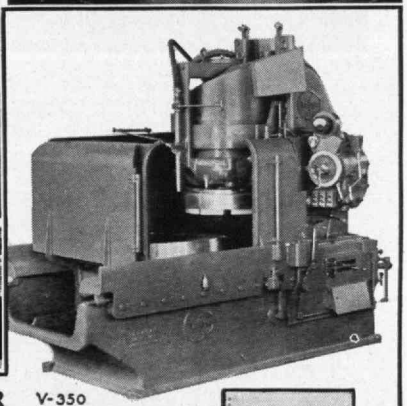












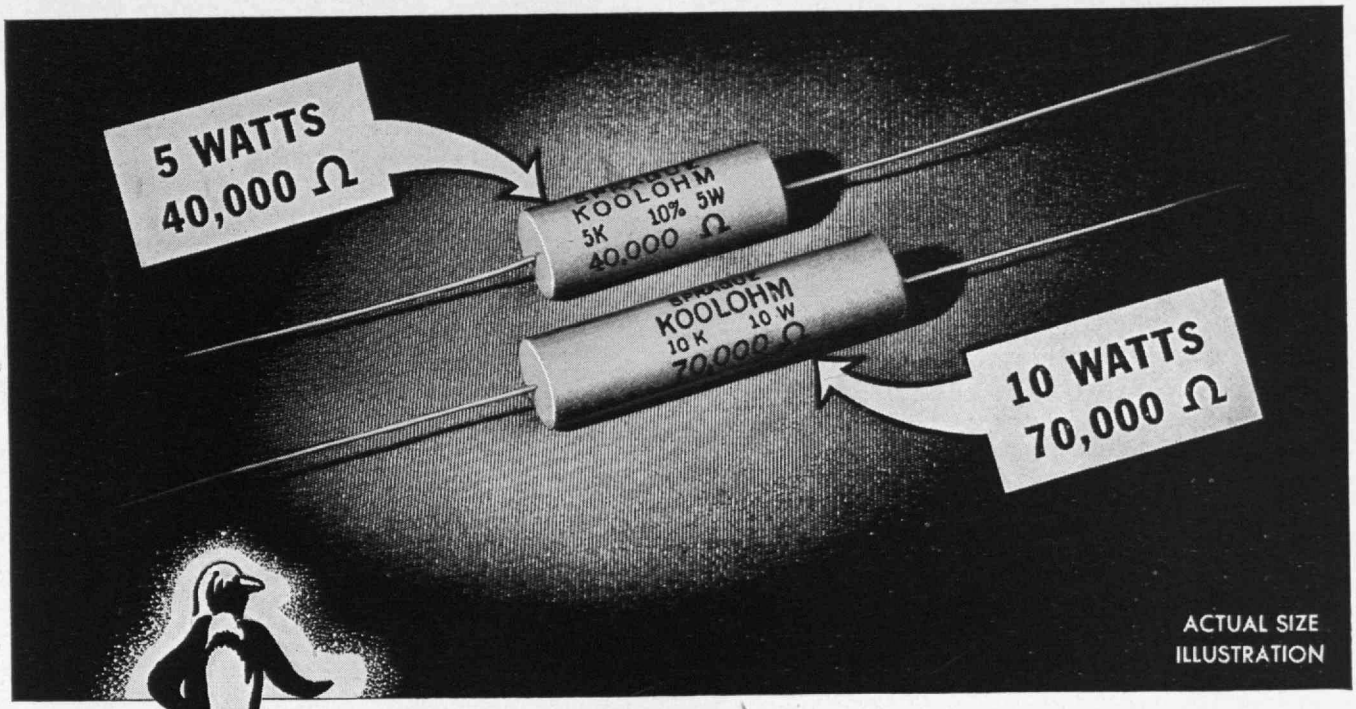
EXAMPLES OF WORK DONE ON THE NO. 27 BLANCHARD SURFACE GRINDER

The BLANCHARD MACHINE COMPANY

64 STATE STREET, CAMBRIDGE, MASS., U. S. A.

SEND FOR THIS WORK BOOK . .

THESE RESISTOR WATTAGE RATINGS MEAN WHAT THEY SAY



...Regardless of the ohmic values

If it's a 5-watt Koolohm, use it at its full 5-watt rating—regardless of whether it has a 1 ohm or a 40,000 ohm value! If it's a 10-watt Koolohm you can count on it dissipating a full 10 watts whether the resistance value is 1 ohm or 70,000 ohms!

In brief, there's no need to "play safe" with Koolohms. You don't have to use a larger resistor than you actually require. You can forget your worries as to whether the wire size is big enough to carry the current and the resistor body large enough to withstand the temperature rise involved. *You can use any Koolohm at its full wattage rating—any time, anywhere!*

This freedom of use is made possible because Koolohm design is based upon a time-tested, inorganic insulating material. This is sintered on the wire *before it is wound*—at 1000° C.! The insulation is flexible, and has a dielectric strength of 350 volts per mil at 400° C.!

Samples free to industrial users. Catalog on request to all who are interested in better, more dependable resistors.

SPRAGUE SPECIALTIES CO., Resistor Division, North Adams, Mass.

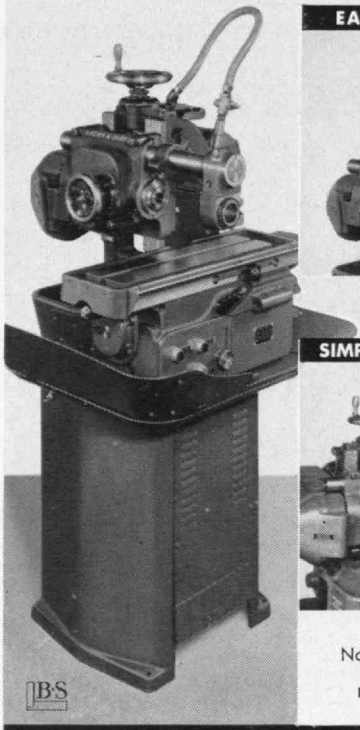
KOOLOHM WIRE IS 2¼ TIMES LARGER

Although Koolohm Resistors themselves are no larger—often smaller—than ordinary resistors, their wire is 2¼ times larger in actual cross-sectional area! This is especially important in the high resistance values where very fine wires so often fail to carry the currents involved in power resistor operation, or to withstand the corrosive effects of operation in high humidities. *Play safe* with Koolohms!

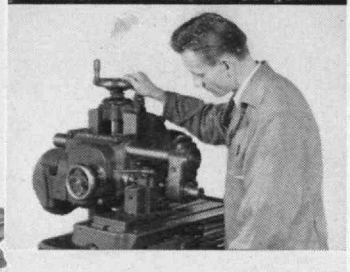
KOOLOHM

POWER WIRE WOUND RESISTORS AND METER MULTIPLIERS

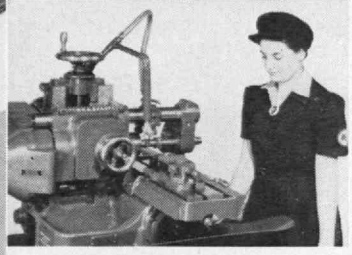
ALL № 000's FEATURES FIT INTO TODAY'S LIGHT MILLING REQUIREMENTS



EASY AND QUICK SET-UP



SIMPLE AND RAPID OPERATION



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BATH, MAINE

THE TABULAR VIEW

Up in the Air. — Ancient history is expected to be marked by vagueness and controversiality; both qualities, however, apply strongly to much modern history, especially to that of modern technologies, where development has been so swift as often to elude the scholar. No one has done more to free the history of aviation from these difficulties than has S. PAUL JOHNSTON, '21. In this issue (page 419), he dispels the vagueness surrounding the story of William Samuel Henson, pioneer in aeronautical imagining, and in our Mail Returns column (page 410) joins with Fred C. Kelly, biographer of the Wright brothers, in analyzing a controversial issue dating back to the Wrights' early experiments.

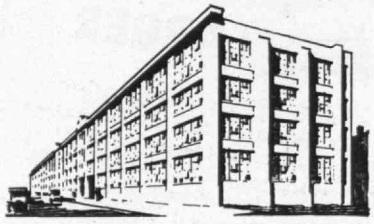
Opportunity. — Discussing another aspect of the problem of postwar economic readjustment which he considered in our issue for April, RALPH E. FREEMAN, Head of the Department of Economics and Social Science at Technology, points out (page 423) the necessity for freedom of action if the forces of technological change are not to impose dangerous strains on the economic structure.

"Gat's" Ancestry. — How the attitude of government toward invention in time of war has changed is clearly stated by GEORGE FORT MILTON (page 425) in his story of Richard Gatling and the famous Gatling gun of Civil War times. Erstwhile editor of the *Chattanooga News*, Mr. Milton is consultant to the National Resources Planning Board and to the Treasury Department. He has written widely on American history of the mid-Nineteenth Century, and as a raconteur of note draws on a limitless store of anecdote and history out of that energetic time.

Social Man. — Imponderable factors in the human equation which are of extreme importance in the personnel relations of industry are evaluated (page 427) by PAUL COHEN, '35, Editorial Associate of The Review and comprehensive analyst of scientific and technological questions.

New Values. — Some of the many ways in which concrete is being utilized to meet new wartime demands are sketched for The Review (page 417) by HARLAND MANCHESTER, special staff writer for the *Reader's Digest* and able reporter on myriad matters.

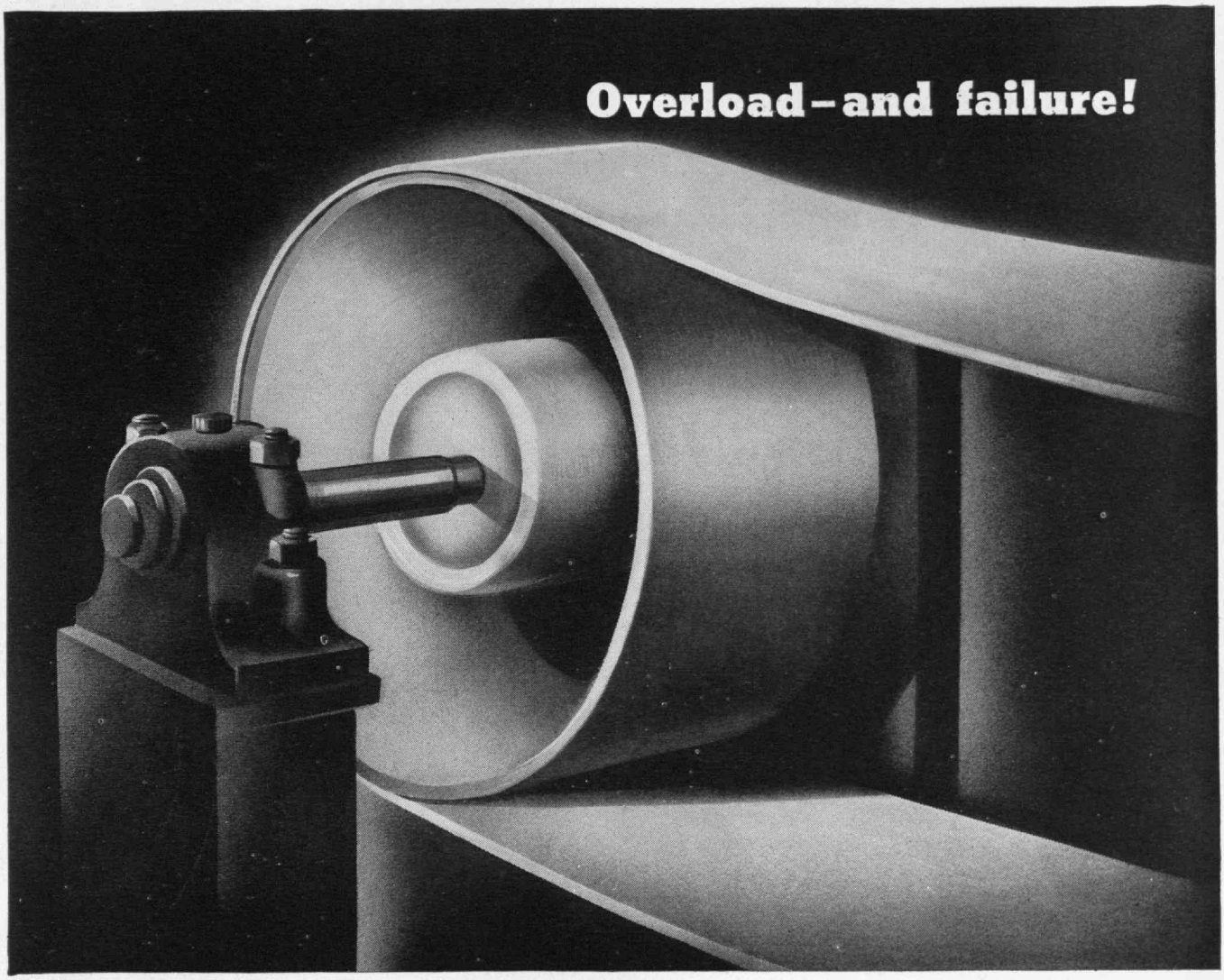
Speed with Economy



Mack International Motor Truck Corp.

Though our basic personnel still remains essentially the same, recent additions to our staff, due to war work, have contributed greatly to our versatility, to the volume of work we are equipped to handle effectively, and to the territory in which we operate.

W. J. BARNEY CORPORATION
101 PARK AVENUE, NEW YORK
INDUSTRIAL CONSTRUCTION
Alfred T. Glassett, '20, Vice President



Information supplied by an Industrial Publication

Recent tests by a well-known rubber company prove that as little as three pounds extra tension on power transmission belting, above recommended tension, will shorten its life as much as 68 percent!

In the tests three grades of the present wartime construction of transmission belting were used. Each belt was run at 15 pounds per inch per ply, a 720 pound total for the tension, the recommended figure, and at 18 pounds per inch per ply, a total of 864 pounds tension, on 4 inch diameter pulleys. Belts were all 6 inches wide, 30 feet long, spliced in 10 foot endless lengths. Tests were all highly accelerated.

Belt No. 1 ran for 95 hours before breakdown under the 19 pound tension, and increased its life to 230 hours before failure when the tension was 15 pounds.

Belt No. 2 ran for 88 hours at the 18 pound tension, and for 263 hours before failure at 15 pounds.

Belt No. 3 ran for 15 hours under 18 pound tension, and the service life before failure jumped to 48 hours under the 15 pound tension.

Close attention to "details" like this will save costly shut-downs and increase productive man-hours. This is just another case of designing to meet requirements — another important conservation measure.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.
MOLYBDIC OXIDE—BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

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INSTRUMENT WIRES AND CABLES

Manufactured in accordance with latest Army and Navy Specifications

Special multiple conductor cable made to order — designed for particular applications on instruments and apparatus

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BOSTON, MASSACHUSETTS

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MAIL RETURNS

The Mysterious Visitor

FROM FRED C. KELLY:

I have recently had my attention called to an article in your issue of March, 1942, in which S. Paul Johnston ['21] quoted from an article of mine in *Harper's Magazine* (August, 1940). Mr. Johnston declared that a statement I made there is untrue. Even though the question in controversy does not seem to me important, I feel as if I should not ignore, even after many months have elapsed, a suggestion that I am an inaccurate reporter, particularly inasmuch as what I wrote is fully supported by incontrovertible facts.

I told in *Harper's* of a mysterious visitor who came in the autumn of 1905 to the field near Dayton where the Wright brothers were making flying experiments; of how this visitor, who did not reveal his identity, turned out to be Charles M. Manly, chief mechanic for Professor Langley of the Smithsonian Institution. Contradicting my story, Mr. Johnston wrote in your magazine, "Whoever the visitor, plenty of evidence is available that it was not Charles Manly." If plenty of evidence is available that the man was not Manly, much more can be presented to show that the man *was* Manly. I shall offer here only part of what is at hand but enough, I believe, to make clear that there can be no question about the identity of the mysterious visitor.

First of all, though, let it be made clear that there was never any indication that Manly had any malign intentions in going to see what the Wrights were doing. There was not a shred of evidence then, and no more today, that Manly had any notion of stealing ideas or knowledge from the Wrights. On the contrary, he made a public statement not long afterward in which he gave them full credit and praise for what they had accomplished. If there can be any criticism against Manly for being a bit mysterious and not revealing his identity, it cannot be against his moral character but only against his sense of discretion. Presumably he had heard exaggerated stories about how secretive the Wrights were and came to the wrong conclusion that he would have been less welcome if they had known who he was. The truth is that the Wrights would have shown every possible courtesy and explained to him more about their machine than he could well have seen at a glance. They knew Professor Langley, with whom they were on friendly terms, to be an honorable man, and would have accepted anyone associated with Langley, in the way Manly had been, as equally honorable. Manly undoubtedly was motivated solely by a desire to satisfy his curiosity — a curiosity naturally more impelling than if he had felt only a casual interest in flying. Since he had worked with Langley during several years of unsuccessful attempts to build a machine capable of flight, his curiosity about the achievements of the Wrights must have been intense.

During the short time of his visit, Manly showed an intimate knowledge of flying machines and great familiarity with aeronautical terms. Charles Taylor, the Wrights' mechanic, who accompanied him into the hangar and workshop, remarked a few minutes later: "That fellow's no writer. At least, he's no ordinary writer. He knows the right name for everything he sees."

In November, a few weeks after the Manly visit, the Wrights received a telephone call from the Secretary of the Dayton Commercial Club (later the Chamber of Commerce), who said he had a telegram from Homer W. Hedge, President of the newly formed Aero Club of America, asking for information about the Wrights' recent flights. In his telegram Hedge said that Charles Manly reported in a speech before the Aero Club (November 14) that the Wrights were able to control their machine in all kinds of weather and that within the last two months they had made more than 50 rounds of their field near Dayton. Later the Wrights received a copy of the New York *Herald* of November 15, containing an article based on Manly's lecture. If Manly had not been a visitor at the Wrights' field, just how did he obtain all the information first revealed in his lecture? No one else had made any statement about what the Wrights had been doing.

A peculiar circumstance was that in a later article dealing more fully with the same subject, the New York *Herald* did not use Manly's name, as it had in the earlier article. In the paragraph telling of the Wrights' recent flights, it attributed the news to "a man in the city who was in the secret of their successes." Why should "a man in the city" not wish to have his name connected (*Continued on page 410*)