

1942 saw Parachute Flare production gathering momentum.

In May 1942, the last civilian Electric Fan and Appliance for the wars duration was made.

In June 1942, Erector Sets, American Flyer Trains and other Scientific Engineering and Educational products made of metal were abandoned.

All during 1942 experimenting, engineering and development of Firing Devices was being carried on by The A. C. Gilbert Engineers in collaboration with Engineers at Fort Belvoir and other Governmental agencies.

This new arm of service eventually became an important factor in the winning of the war. The major portion of the Allied requirements were made at The A. C. Gilbert Company plant at New Haven, Conn. , production peak reaching above 3,000,000 pieces monthly.

We also took on contracts to supply the U. S. Navy with Mk V and Mk 6 Parachute Flares and Range Indicators.

We are presenting a partial review of our accomplishments during the first half of 1942:

Work done on Army Contracts includes the following:

Parachute Flares
Firing Devices, Restricted
Gun Parts
Firing Pins

Work done for Air Force contracts, we being the sub-contractors:

Trim Tab Electric Motors
Airplane Engine Parts
Mechanical Trim Tab Assemblies

Work done on Navy prime contracts includes the following:

Parachute Flares
Range Indicators, Restricted

Approximate value of this Company's war contracts is as follows:

| | | |
|--------------------|---|----------------------------|
| For the Army | - | \$7,475,693.00 |
| For the Navy | | 4,670,213.00 |
| For the Air Forces | | 317,063.00 (Sub-contracts) |

Total amount of undelivered contracts as of July 1st was - \$11,094,041.00

Status of spare deliveries. Where spares are ordered, they are delivered concurrently with regular production, and in each instance we are ahead of scheduled dates. There are no arrearages on spares. An outstanding example of our recognition of the importance of delivering spares is as follows:

The British Trade Commission needed some spares for P-40 Kittyhawks grounded in the Middle East and we were able to produce and ship this requirement by air mail within 24 hours of the receipt of the request.

Quality and Achievements

M26 Flare for Army. Samples and production as made per specifications, when tested at Aberdeen, Md., showed some unsatisfactory results, not alone the samples and production by The A. C. Gilbert Company but by contemporary manufacturers making the same device and making them to the same specifications as were furnished by the War Department. The A. C. Gilbert Company, in their own Engineering Department, did make improvements and important changes which solved the problem, and when samples were sent to Aberdeen again for test, they proved satisfactory and ultimately mandatory changes came through, based on the changes we originated, to ourselves and all other manufacturers of the M26, which in effect adopted the suggestions that we made. This statement can be confirmed by consulting with Mr. Robinson of the Picatinny Arsenal.

To stop premature shade opening, we recommended, and it was approved, the use of four pins in the closing cover at the bottom of the candle, instead of two. This later became a mandatory change.

We also recommended and are using a different method for the fastening of the suspension cable to the spool and igniter block. A wedge is used to insure the fraying of the wires before soldering. This eliminates the chance of the wire coming free from the base block or spool, and causes the chute to leave the candle.

In the manufacture of the Flare it was found that the sleeve was far from satisfactory, inasmuch as it would not properly check the fall of the Flare, and in many cases tore loose when the Flare was released from the plane.

This caused the Flare to fall at terrific speed, and when the chute was expelled from the case, it could not stand the strain and would tear and break away from the candle. This trouble was encountered by all of the manufacturers of the M26.

In collaboration with Mr. Robinson of Picatinny Arsenal, in our Engineering Dept. we experimented with various types of sleeves to overcome the above mentioned difficulty. We designed an entirely different sleeve of stronger construction and 450 lb. shroud line was used instead of the 90 lb. shroud line called for on original specifications. We designed an entirely different sleeve after much experimentation, tests and trials. We then built 75 samples which were sent to Aberdeen and found to be a great improvement, and have now become a mandatory change.

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Trim Tab Motors for Curtiss-Wright

In early December 1941, we received a telephone call from Mr. Coleman of Curtiss-Wright of Buffalo asking us if we could make an electric motor to operate a trim tab on a P-40 Curtiss-Wright Fighter. He had been experimenting with motors for a period of time and they did not function correctly. We immediately sent our Chief Engineer, Mr. Frisbie, by plane to Buffalo, who analyzed their problem and returned to the factory. Within 72 hours we designed and perfected, working day and night, a motor which Mr. Frisbie flew back to Buffalo with, and after putting the motor through vigorous tests, it was approved as being perfect for the job intended. Within 5 weeks we tooled up the job, our Expeditors got the material into the plant, we put the job into production and started deliveries. We are now several months ahead of the schedule, and it has now been adopted by Grumman and Vultee, and with slight changes they are now in production. Our rejections on this job are practically zero. The spares required are also ahead of schedule. We refer you to Mr. Coleman of Curtiss-Wright.

Anti-Aircraft Range Indicator for Navy - Restricted

This device was never made in America previously. There was an English design. In collaboration with the Navy we designed a new Range Indicator so that it was suitable for use in our Navy. In this re-designing we saved the United States Government approximately \$8.00 to \$10.00 per device as against what they expected to pay. These accomplishments can be checked with Lt. Commander Rose of the Navy Department in Washington.

Excerpt from report of our representative in Washington:

"The Officers of the Ordnance Section of the Navy, as well as the Engineers in the Technical Division, are most gratified and have commended us on the appearance, as well as the mechanism, of the Range Indicators."

Firing Devices (Restricted)

We engineered, designed and produced for the Engineer Board, Fort Belvoir, Va. - Firing Devices. Captain Erhardt of The Engineer Board visited us in New Haven with drawings of an English Firing Device. We experimented and found it not practical. We then designed and revamped the entire working mechanism in our own Engineering Department in collaboration with Capt. Erhardt. We were submitted drawings by Fort Belvoir of this device, which was to be used with the bounding mine, (Restricted). This device was only to be used as a pressure type. Mr. Schumacher, our Engineering Department and Capt. Erhardt re-designed a complete new unit which was a combination Firing Device and had the two features which were required, both pull type and pressure type, in one unit. The Engineering and experimentation and changes were all accomplished in a period of approximately six weeks and production was started within six weeks' time.

Quality Production

We are far ahead of our schedule on Trim Tab Motors for Aircraft use. We are ahead of our schedule on Range Indicators for the Navy, by several months. We are ahead of our schedule on:

Colt's - Gun Parts
Pratt & Whitney - Airplane Engine Parts
High Standard - Gun Parts
Winchester - Gun Parts

The only reason we are not ahead on all war contracts is because we can not get materials on account of the operations of the priorities system.

We overcame the shortage of machines in our own plant by sub-contracting to others and by combing the territory and locating open capacity on Screw Machines that were not operating at that moment. This has enabled us to bring our production up to, or head of, schedule, or up to at least the limits of materials procurable. We changed operations to different methods where there were machine shortages.

Labor

We have overcome labor shortage by training women to supplant men and also by voluntarily eliminating practically all civilian manufacturing, thereby transferring this labor to war work at the expense of freezing some \$600,000 worth of fabricated materials designated for civilian use.

We have suggested to several Government Agencies the substitution of procurable materials and we have succeeded, in some instances, in getting them to adopt these substitutions. For example, we initiated and obtained permission from the Navy to substitute commercial brass for Navy brass on the Range Indicator, thereby speeding production. We recommended to The Engineer Board at Fort Belvoir, and have re-designed one of the Firing Devices, substituting die cast material in place of brass, which is more critical. This alone will save many thousands of pounds of brass and reduce the price considerably and speed production. They have approved our design and substitution and have placed contract with us.

Production obstacles have been overcome as outlined above.

Work Stoppage

That is always a possibility because of non-delivery of material. However, we have brought these work stoppages down to the very minimum by having a large crew of Expeditors out in the field at all times clamouring for materials from our suppliers. We have representatives in Washington attempting to get cooperation from procurement agencies in securing higher ratings or necessary directives. Every key man and executive, including our President and all officials, meet every morning at 7:30 to find the bottlenecks and lick them.

Fair Labor Standards

Fair Labor Standards have been adhered to at all times. Nothing that we could possibly foresee has been left undone to make the working conditions ideal for the workers. We have committees for complaints, safety, hazards, suggestions, etc., and rewards are given for suggestions. Our employees are enthusiastic in their work and are attempting to beat production schedules by taking their work very seriously. We have installed a broadcasting system in our plant and Officials announce to the workers progress and the achievements desired, for the purpose of building up and maintaining morale.

Training Additional Workers.

We have a very thorough apprenticeship training course in which experienced men are teaching these learners how to improve and become expert workman.

Cooperation of Management

The management is cooperating effectively. We have established a Personnel Department to work with various employee committees. Recommendations and suggestions from them for improvement are presented to the Management and are acted upon. We have established Recreation Rooms and the loud speaker system supplies music to make people's work more pleasant. Bonuses for outstanding production achievements have been awarded. Outside recreations, such as picnics, etc. have been provided.

Accidents

Our accidents are always kept to a minimum in this plant as we have an efficient safety committee made up of Labor and Management who are continually on the lookout for any condition such as building, equipment, operations that might cause an accident and if an accident does occur, the cause is immediately investigated and corrected. Minor accidents are investigated as well as other accidents. We have a modern up-to-date First Aid Room with a full time nurse on day and another at night. Safety Bulletins and Posters are continually placed throughout the plant as a safety reminder. Each Saturday the Foremen are instructed in new safety methods and are kept safety minded. Each new employee is instructed in the safe way of doing his job. The Company has on hand many articles of safety equipment such as goggles, face shields, safety shoes, hair nets, etc.

Health

Recently the Connecticut State Department of Health made a survey thru the entire plant. From this survey they made only four minor recommendations which were immediately taken care of.

Throughout the plant we have adequate exhaust systems, hoods, blowers, and all the equipment which we find necessary to maintain the good health of our employees. The plant is heated by thermostatically controlled unit heaters in part and the rest by steam radiators.

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Milk dispensers are located in various points about the shop. We also have salt tablets available in the First Aid Room as well as Salt Tablet dispensers in the Die Cast Department.

Showers are being installed in several Departments where girls are now working on Fiber Glass.

Sanitation

We provide excellent sanitation facilities. Additional new toilets have just been completed, another new one is being constructed and the old toilets are being done over. All the toilets are cleaned and washed every day. Rubbish cans throughout the shop are steamed and washed daily. We have modern up-to-date water fountains in each department. Floors are swept daily, wastepaper, rubbish and trash is collected daily.

The factory is cool, light and airy and well ventilated and properly heated in the winter.

Plant Protection

We have followed closely recommendations made by the War Department on Plant Protection.

Each employee is provided with an identification badge including picture, department and number; these are shown to the armed guard upon each entry to the factory. All visitors must fill out our Visitor's Register which has been approved by the Springfield Ordnance. One copy of the register is kept here, the other is mailed to the Springfield Ordnance. All visitors must obtain permission to enter the plant. Upon entry after the pass is filled out they must wear our red Visitor's button at all times.

Our Transformers have been enclosed and main switches locked up to prevent sabotage.

Uniform guards have been placed at the main entrance as well as inside the plant and they check all objects and material entering or leaving the plant.

The plant has a Sprinkler System throughout as well as adequate fire fighting equipment.

Personal Security Survey forms for the Ordnance Department and Fingerprints of all key men and men in responsible positions are on their way to be completed.

Sub-contracting

We have given out a considerable amount of subcontracting work to enable us to meet contract delivery dates and to spread out the work where possible and practical to such companies as had in their possession better facilities for the production of certain requirements than we do, or more open capacity than was available in our plant.

We gave our sub-contracts on the Parachute, as any company who has sewing machines and has open capacity is better fitted to do this work than we were, and by giving this work out on a sub-contracting basis, it eliminated the necessity of obtaining duplicate critical machines. We also gave out sub-contracts on the illuminants that go into the Flares, as that type of work belongs to a powder company, or a fireworks type of company.

We also gave out Screw Machine work where our work exceeded our capacity. This was divided amongst a number of nearby manufacturers.

Our Company is both a prime and a sub-contractor; about 94% prime and 6% sub-contractor.

I believe that the Management should take some credit for the conversion of this plant from a peace time factory to a war time factory.

As early as 1940 we began to inquire, and did secure, some sub-contracts in anticipation of a possible war. In the Spring of 1941 we redoubled our efforts to secure war contracts. We received our first prime contract on September 3rd, although our negotiations started in the late Spring. We adopted a policy during July 1941 that we must secure war orders to take up to at least 50% of our capacity. This was a policy, but we couldn't find the orders. After Pearl Harbor, we offered to the Government all of our facilities and equipment for the war effort. We began to get more prime and sub-contracts and in the brief period of five months in 1942, we changed over from a civilian factory to a 100% war factory. Our conversion has been completed. The only reason we are not still further ahead on our schedules is chargeable to the fact that we cannot secure the materials that have been allocated to us.

PRODUCTION OF M26 FLARES

First Production Started
January, 1942

| | <u>Contract Calls For</u> | <u>Cancelled</u> | <u>Shipped</u> | |
|--|-----------------------------------|------------------|-----------------|---------------------|
| 9/3/41 SOD W478-Ord-1376 | 7,500 | | 7,500 | Completed 7/13/42 |
| 1/21/42 SOD W478-Ord-1479 | 24,983 | | 23,179 1,804 | " 1942 " 5/10/43 |
| 6/8/42 SOD W478-Ord-1896 | 70,000 | 70,000 | | |
| 10/23/42 SOD W478-Ord-1896 Reinstated | 11,463 | | 11,463 | Completed 6/4/43 |
| 5/21/43 SOD W478-Ord-3731 | 10,960 | | 9,407 1,553 | " 1943 " 1/21/44 |
| 5/21/43 SOD W478-Ord-3731 Rework | 3,964 | | 3,964 | " 8/24/43 |
| 8/4/43 SOD W478-Ord-43 | 24,000 | 16,150 | 4,000 3,850 | " 1943 " 3/16/44 |
| | <u>152,870</u> | <u>86,150</u> | | |
| Less Cancellations | <u>86,150</u> | | | |
| | 66,720 | | 66,720 | |

BOSTON CHEMICAL WARFARE PROC. DIST.

BOSTON, MASS.

FIRING PIN

This Firing Pin is used in the incendiary bombs which are dropped from bombers on enemy objectives.

1st Order Rec'd. 1/14/42

PRODUCTION

| | |
|------|---------------------|
| 1942 | 2,493,000 pcs. |
| 1943 | 1,402,000 pcs. |
| 1944 | <u>718,770</u> pcs. |
| | 4,613,770 |

CONTRACTS

| | | | |
|---------|----------------|------------|-----|
| 1/14/42 | 2,000,000 | W 1302-CWS | 368 |
| 8/4/42 | 1,000,000 | " | " " |
| 3/26/43 | 450,000 | " | " " |
| 5/3/43 | 445,000 | " | " " |
| 9/24/43 | <u>718,770</u> | " | " " |
| | 4,613,770 | | |

GRUMMAN AIRCRAFT ENG. CORP.

BETHPAGE, L. I., N. Y.

B7000G2 MOTORS

With minor modifications the B7000 motor was used in the famous Grumman Hellcat. These motors activated the hydraulic valves which forced the wing flaps down when the pilot went into a dive or prepared for a landing.

Production on B7000 G2 Motors

Grumman Pilot Order Rec'd. Jan. 23, 1942

| <u>PRODUCTION</u> | | <u>CONTRACTS</u> | | |
|-------------------|----------------|------------------|---------|----------------|
| 1942 | 2135 pcs. | 7/16/42 | A 5862 | 1261 pcs. |
| | | " | " | 874 pcs. |
| 1943 | 5015 pcs. | 1/14/43 | A 17550 | 3730 pcs. |
| | | 6/8/43 | A 23204 | 1160 Pcs. |
| 1944 | <u>50</u> pcs. | 8/11/43 | A 34964 | 125 pcs. |
| | | 2/5/44 | A 76984 | 25 pcs. |
| Total | 7200 | 3/7/44 | A 79763 | 10 pcs. |
| | | 3/22/44 | A 80990 | <u>15</u> pcs. |
| | | | | 7200 |

WATERBURY CLOCK

U. S. TIME CORPORATION

WATERBURY, CONNECTICUT

Part B F M21A Used in a British Fuze

| | <u>Order</u> | <u>Pcs.</u> | <u>Production</u> <u>1942</u> |
|---------|--------------|----------------|----------------------------------|
| 1/24/42 | 1143 | 100,000 | |
| 7/27/42 | 7324B | 100,000 | 300,000 |
| 9/5/42 | 8860F | <u>100,000</u> | <u> </u> |
| | | 300,000 | 300,000 |

Part B F M8A

| | <u>Order</u> | <u>Pcs.</u> | <u>Produced</u> <u>1942</u> |
|---------|--------------|-------------|--------------------------------|
| 1/24/42 | 1143 | 100,000 | 100,000 |

Part 184878B Steel Knife Edge Post

| | | | <u>Production</u> |
|---------|------|-------------|-------------------|
| 3/10/42 | 2738 | 11,000 Pcs. | <u>11,000</u> |

Parts for Sperry Gyroscope

184863 ANVIL

| | <u>Order</u> | <u>Pcs.</u> | <u>Production</u> | | | | <u>Open</u> |
|----------|--------------|--------------|-------------------|-------------------|-------------------|--------------|-------------|
| | | | <u>1942</u> | <u>1943</u> | <u>1944</u> | <u>1945</u> | |
| 3/4/42 | 2584 | 5636 | 5636 | | | | |
| 10/20/42 | 10345 | 43000 | 3470 | 39530 | | | |
| 4/7/43 | H6392-3 | 50000 | | 36834 | 13166 | | |
| 1/29/43 | SC19488-3 | 20000 | | | 20000 | | |
| 3/14/44 | SC3951-3 | 31144 | | | 31144 | | |
| 8/23/44 | SC11922-3 | 15000 | | | 15000 | | |
| 9/4/44 | SC12477-3B | 3500 | | | 3500 | | |
| 9/4/44 | SC12476-3A | 25020 | | | 18843 | 6177 | |
| 12/28/44 | SC17917-3C | <u>20000</u> | <u> </u> | <u> </u> | <u> </u> | <u>16175</u> | <u>3825</u> |
| | | 213,300 | 9106 | 76364 | 101,653 | 22,352 | 3825 |

184884 BRACKET

Parts for Sperry Gyroscope

| | <u>Order</u> | <u>Pcs.</u> | <u>1942</u> | <u>Production</u> <u>1943</u> | <u>1944</u> | <u>1945</u> |
|----------|--------------|--------------|-------------|----------------------------------|----------------|--------------|
| 3/4/42 | 2584-sgo | 22000 | 17818 | 4182 | | |
| 10/20/42 | 10345-sgo | 172000 | | 172000 | | |
| 4/7/43 | H6392-3 | 220000 | | 68064 | 151936 | |
| 3/14/44 | SC3951-3 | 100000 | | | 100000 | |
| 8/18/44 | SC11580-3A | 89999 | | | 54049 | 35950 |
| 8/18/44 | SC11584-3B | 13000 | | | 13000 | |
| 12/28/44 | SC17920-3C | <u>50000</u> | | | | <u>22866</u> |
| | | 666,999 | 17,818 | 244,246 | 318,985 | 58,816 |
| | | | | | Bal. Unshipped | 27,134 |

B F M 80

Used in a British Fuze

| | <u>Order</u> | <u>Pcs.</u> | <u>Production</u> <u>1942</u> | <u>1943</u> |
|----------|--------------|-------------------------|----------------------------------|-------------------------|
| 10/20/42 | 10346-F | 200000 | 131200 | 68800 |
| 1/12/43 | SC2647-13 | <u>77885</u> 277,885 | <u>131,200</u> | <u>77885</u> 146,685 |

B F M 82

Used in a British Fuze

| | <u>Order</u> | <u>Pcs.</u> | <u>Production</u> <u>1942</u> | <u>1943</u> |
|----------|--------------|--------------------------|----------------------------------|--------------------------|
| 10/20/42 | 10346F | 200000 | 48833 | 151167 |
| 1/13/43 | SC2648-13 | 300000 | | 300000 |
| 4/22/43 | SC7154 | 100000 | | 100000 |
| 7/13/43 | SC1273-13 | <u>213359</u> 813,359 | | <u>213359</u> 764,526 |

184864 - BRACKET

Parts for Sperry Gyroscope

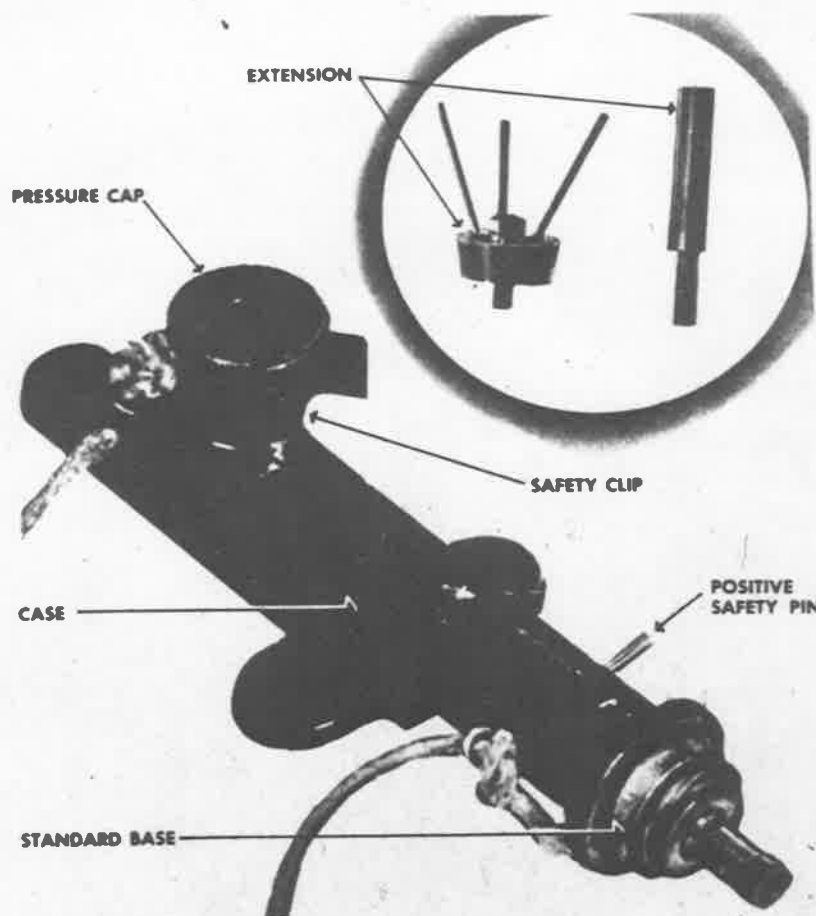
| | <u>Order</u> | <u>Pcs.</u> | <u>1942</u> | <u>1943</u> | <u>Production</u> <u>1944</u> | <u>1945</u> |
|----------|--------------|-------------|-------------|-------------|----------------------------------|-------------|
| 3/4/42 | 2584 | 11000 | 11000 | | | |
| 10/20/42 | 10345 | 86000 | | 86000 | | |
| 4/7/43 | SC6392-3 | 110000 | | 50034 | 59966 | |
| 3/14/44 | SC3951-3 | 50000 | | | 50000 | |
| 7/22/44 | SC3951-3 | 20000 | | | 20000 | |
| 8/18/44 | SC11585-3B | 7000 | | | 7000 | |
| 8/18/44 | SC11578-3A | 50332 | | | 50332 | |
| 1/26/45 | SC11578-3A | <u>3927</u> | | | | <u>3927</u> |
| | | 338,259 | 11,000 | 136,034 | 187,298 | 3927 |

184880 NOZZLE

Parts for Sperry Gyroscope

| | <u>Order</u> | <u>Pcs.</u> | <u>1942</u> | <u>1943</u> | <u>Production</u> <u>1944</u> | <u>1945</u> |
|----------|--------------|--------------|-------------|-------------|----------------------------------|--------------|
| 3/4/42 | 2584- sgo | 4108 | 4108 | | | |
| 10/20/42 | 10345- sgo | 43000 | 4180 | 38820 | | |
| 4/19/43 | SC6971-3 | 54000 | | 22319 | 31681 | |
| 3/14/44 | SC3951-3 | 24970 | | | 24970 | |
| 9/4/44 | SC12475-3B | 3000 | | | 3000 | |
| 9/4/44 | SC12474-3A | 22000 | | | 14484 | 7516 |
| 12/28/44 | SC17953-3A | 3000 | | | | 3000 |
| 2/1/45 | SC30002-3C | <u>19840</u> | | | | <u>19840</u> |
| | | 173,918 | 8288 | 61,139 | 74,135 | 30,356 |

U. S. PRESSURE FUZE M1A1



TYPE. Pressure fuze

COLOR. Olive-drab

CASE. Alloy metal

EMPLOYMENT. In antipersonnel mines and booby traps.

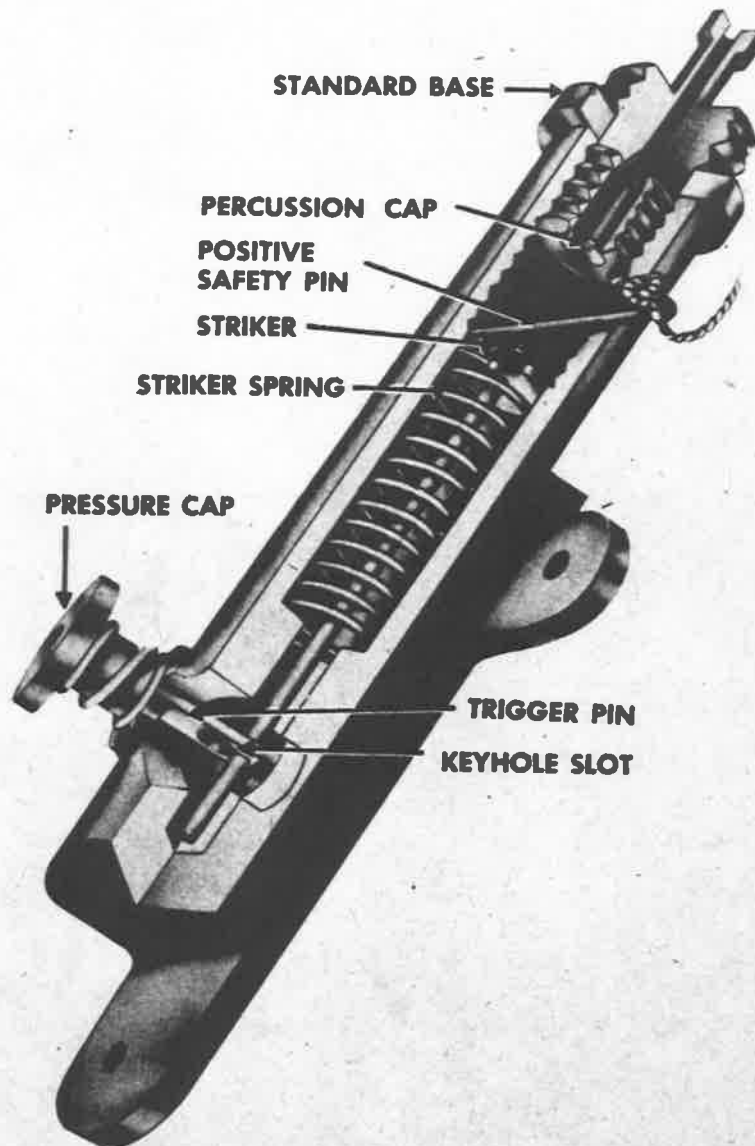
FM 5-31

1 NOV 1943

53.01-a

RESTRICTED

U. S. PRESSURE FUZE M1A1



FUNCTIONING

1. Pressure of 20 or more pounds on pressure cap compresses trigger spring and pushes trigger pin into barrel.
2. When enlarged portion of keyhole slot in trigger pin is in position, striker is released.
3. Striker, driven by striker spring, fires percussion cap.

83.01-b

1 NOV 1943

FM 8-31

RESTRICTED

THE ENGINEER BOARD

FT. BELVOIR, VA.

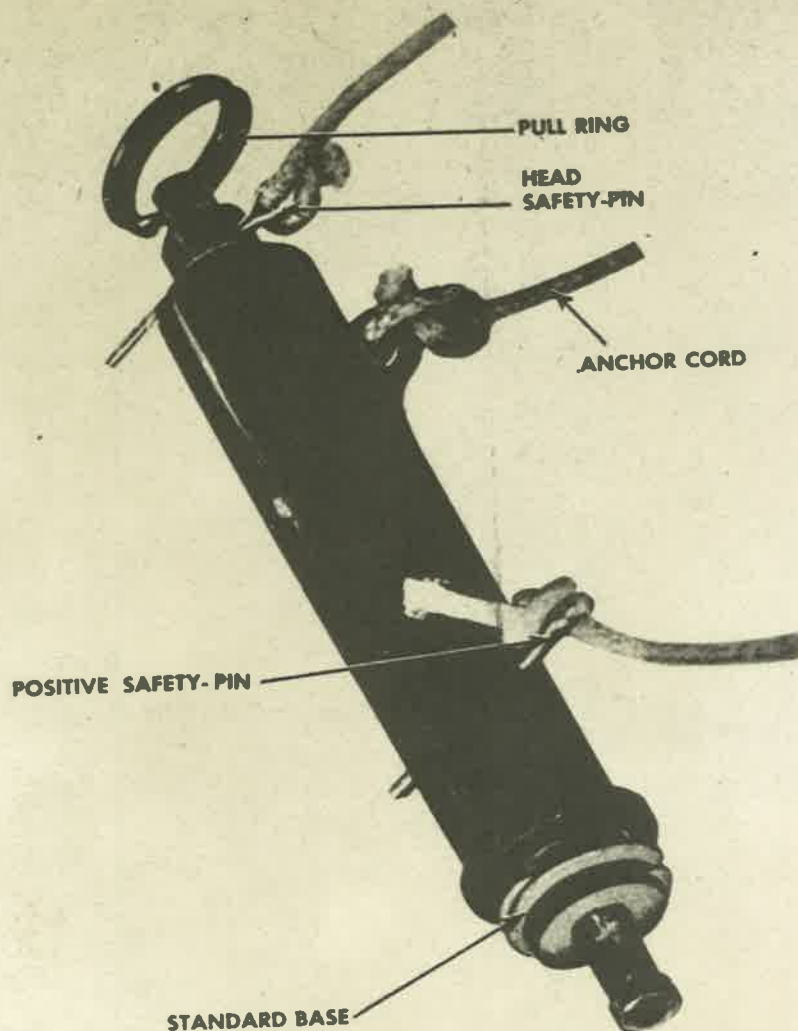
M1 PRESSURE FIRING DEVICE

1st. Pilot Order for 10,000 pcs. Rec'd. 2/13/42

This device is used in connection with anti-personnel mines or booby traps. For example, this device is screwed into an explosive charge and concealed so that anybody stepping on it will detonate the charge.

| | PRODUCTION | | CONTRACTS |
|-------|------------------|---------|----------------------------------|
| 1942 | 165,203 pcs. | 2/13/42 | W145 Eng. 333 - 10,000 pcs. |
| 1943 | <u>504,797</u> " | 3/31/42 | W145 Eng. 361 - <u>660,000</u> " |
| Total | 670,000 pcs. | | Total 670,000 pcs. |

U. S. PULL FUZE M1



TYPE. Pull fuze

COLOR. Olive-drab

CASE. Alloy metal

EMPLOYMENT. In antipersonnel mines and booby traps

PACKING AND TRANSPORTING

Five fuzes, complete with percussion caps in their bases, and two 80-foot spools of trip wire, packed in watertight cardboard box, about 5 by 5 by 1½ inches. Loaded, weighs 1¼ pounds.

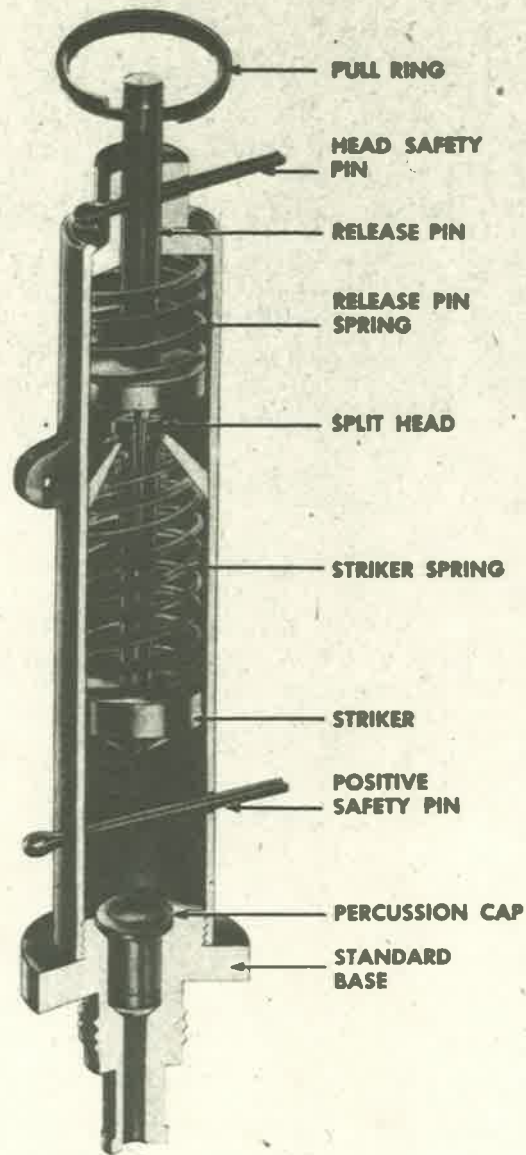
FM 5-31

1 NOV 1943

53.02-a

RESTRICTED

U. S. PULL FUZE M1



FUNCTIONING

1. Pull of 3 to 5 pounds on pull ring compresses loading spring and pulls release pin out of split head of striker.
2. This permits split head of striker to compress and slip through constriction in collar.
3. Striker thus released, driven by spring, sets off percussion cap.

53.02-b

1 NOV 1943

FM 5-31

RESTRICTED

THE ENGINEER BOARD

FT. BELVOIR, VA.

M1 PULL FIRING DEVICE

1st Pilot Order 10,000 pcs. Rec'd. 2/13/42

This device is used with anti-personnel mines and booby traps. It is screwed into an explosive charge and a trip wire is attached. Tripping over this wire or moving the object to which the wire is attached will detonate the charge.

| | <u>PRODUCTION FT. BELVOIR</u> | <u>CONTRACTS</u> |
|------|-------------------------------|--------------------------------|
| 1942 | 536,200 | 2/13/42 W145-Eng. 333 - 10,000 |
| 1943 | <u>133,800</u> | 3/31/42 " " 361 <u>660,000</u> |
| | 670,000 | 670,000 |

RESTRICTED

O.D. No. 4392

7 Pages

Page No. 1

INSTRUCTION PAMPHLET
FOR
ANTIAIRCRAFT RANGE INDICATOR MARK 1

THE A. C. GILBERT COMPANY
NEW HAVEN, CONNECTICUT

M. H. FRISBIE
Chief Engineer

APPROVED 13 MAY, 1942

W. H. BROWN,
Chief Draftsman

M. EMERSON MURPHY, *Commander, U.S.N.*
For the Chief, Bureau of Ordnance,
U. S. Navy

| REVISIONS | | | |
|-----------|-----|------|--------------------------|
| LOC. | NO. | DATE | Changes appear on sheets |
| | | | |
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RESTRICTED

O.D. No. 4392

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TYPES OF FOREIGN AIRCRAFT WHICH MAY BE ENCOUNTERED AND THEIR WING SPAN

| GERMAN | | | ITALIAN | | |
|--------------------------------------|--|-----------|------------------------|------------------|-----------|
| VF (Fighter) | | | VF (Fighter) | | |
| Single Engine | | | Single Engine | | |
| Name | | Wing Span | Name | | Wing Span |
| *Me 109 F4. G | | 33' | Caproni-Vizzola F5 | | 39' 1" |
| He 113 (He 100) | | 31' | *Fiat CR42 | | 31' 8" |
| *FW 190 A3 | | 34' 6" | Fiat G50 | | 35' 9" |
| Me 209 | | 31' 3" | Macchi MC200 | | 35' |
| | | | *Macchi MC202 | | 35' |
| | | | Regianne Re2000 | | 36' |
| | | | *Regianne Re2001 | | 36' |
| | | | S.A.I. 207 | | 29' 8" |
| Twin Engine | | | VB (Bomber) | | |
| *Me 110 | | 54' | Two or Three Engine | | |
| Me 210 | | 55' | Breda Ba65 | | 39' 9" |
| *Ju 88 | | 65' | Breda Ba88 | | 50' 10" |
| Hs 129 (Henschel) | | 50' | *Cant. Z1007 bis. | | 81' 10" |
| FW 187 | | 51' | Caproni Ca135 bis. | | 61' 8" |
| | | | *Caproni Ca312 | | 53' 4" |
| | | | Fiat Br20M | | 70' 6" |
| | | | Piazzo P32 bis. | | 59' |
| | | | Piazzo P108 | | 106' |
| | | | *Savoia Marchetti SM79 | | 69' 6" |
| | | | *Savoia Marchetti SM84 | | 69' |
| | | | Savoia Marchetti SM86 | | 46' |
| VB (Bomber) | | | Seaplanes | | |
| Single Engine | | | *Cant. Z506B | | 86' 10" |
| *Ju 87B | | 45' 4" | Cant. Z511 | | 132' |
| | | | *Caproni Ca312 bis. | | 53' 4" |
| | | | Caproni Ca316 | | 53' 2" |
| Twin Engine | | | JAPANESE | | |
| *Ju 86P2 | | 77' | Single Engine | | |
| Ju 288 | | 63' | Name | Type | Wing Span |
| Do 217E2 | | 62' 5" | T-97 | Army Fighter | 35' 7" |
| He 111 | | 73' 11" | T-00 | Navy Fighter | 39' 4" |
| He 177 | | 103' 4" | T-01 | Navy Fighter | 36' |
| Hs 129 | | 50' | FW 190 | Fighter | 37' |
| | | | Me 109F | Fighter | 32' 8" |
| | | | T-95 | Navy Recon. F/P | 36' 2" |
| | | | T-00 | Navy Recon. | 37' |
| | | | *T-97/3 | Navy Torpedo | 52' |
| | | | *T-99 | Navy Dive Bomber | 47' 5" |
| Four Engine | | | Twin Engine | | |
| Ju 290 | | 123' | *T-96/4 | Navy Med. Bomber | 82' |
| He 116P | | 72' 3" | *T-97 | An Med. Bomber | 72' |
| FW 200K | | 108' | *T-01 | Navy Med. Bomber | 76' |
| Seaplanes — Bombers — Reconnaissance | | | Four Engine | | |
| Transport | | | | | |
| Single Engine | | | | | |
| Ar 196 | | 49' 6" | | | |
| *He 114 | | 44' 5" | | | |
| Fi 167 | | 44' 4" | | | |
| Twin Engine | | | | | |
| Ha 140 | | 68' 10" | | | |
| *He 115 | | 72' 10" | | | |
| *Do 18 | | 77' 9" | | | |
| Three Engine | | | | | |
| Do 24 | | 88' 7" | | | |
| Four Engine | | | | | |
| Do 26 | | 98' 6" | | | |
| Ha 139 | | 96' 10" | | | |

*Types most likely to be met in combat.

DESCRIPTION AND PRINCIPLE OF OPERATION

The Antiaircraft Range Indicator Mark 1 is a device designed to indicate to a machine gunner when an airplane target has approached within the range of his machine gun. This distance is determined by the stadimeter principle of similar triangles. One triangle is formed by a point at the eye of the operator and a pair of wires held at a fixed distance from the eye. The separation between the wires is adjustable at will. The other triangle is formed by the eye and the wing-spread of the airplane target at the firing range.

The indicator is designed, like a hand mirror, to be held in the hand at arm's length. In place of the mirror is a graduated plate. A two-inch hole in the plate exposes a pair of vertical wires. The distance between these wires may be varied by moving a pointer over the face of the plate.

This indicator is designed to be used against targets approaching directly toward the operator.

INSTRUCTIONS FOR OPERATOR

The following procedure should be followed in determining the range for opening fire:

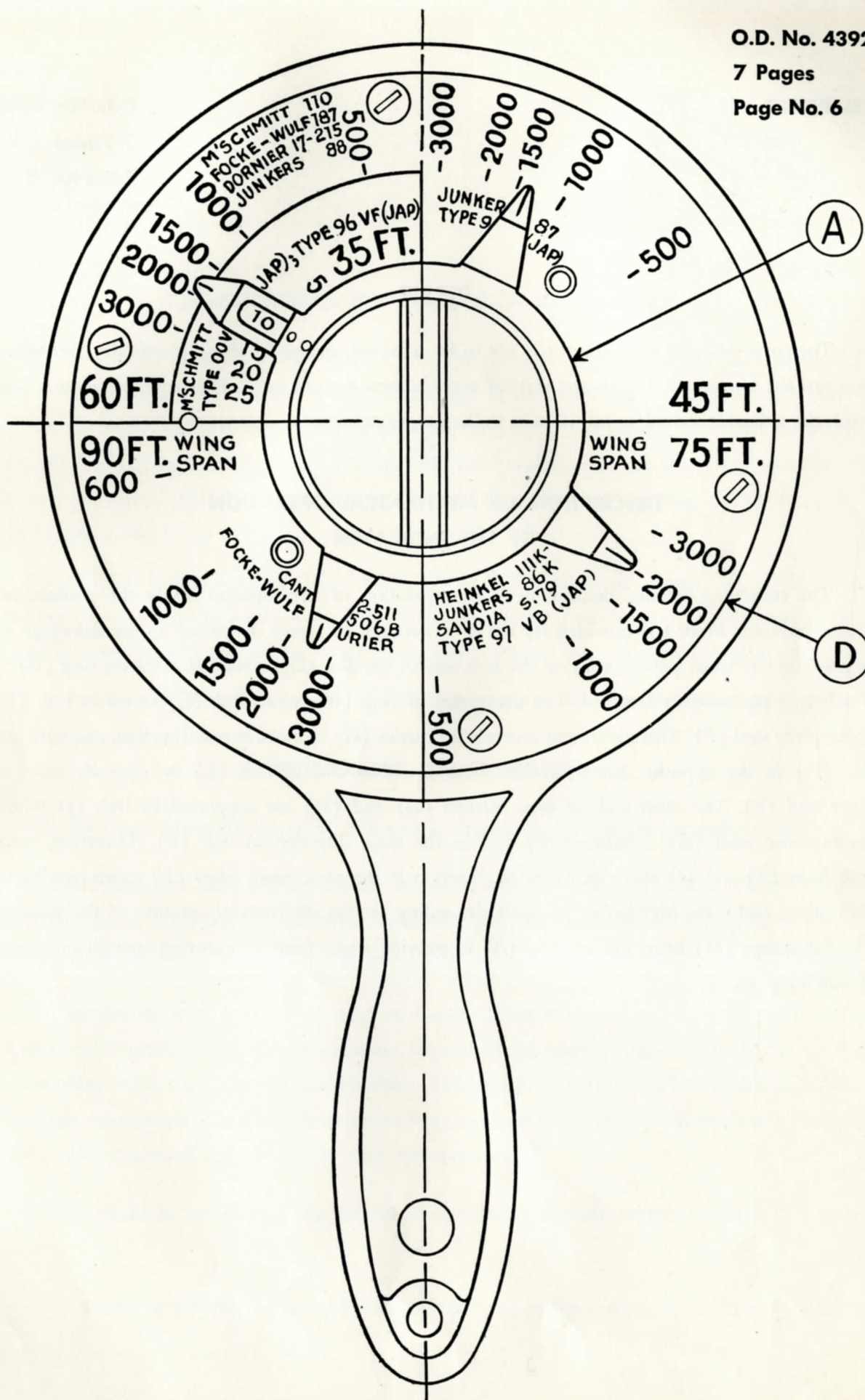
1. The lanyard attached to the indicator should be adjusted so that the distance from the indicator to the eye is maintained at 24 inches when the loop is dropped around the operator's neck and the lanyard is taut.
2. Estimate the wing span of the airplane target. These estimates may be aided by recognition of the silhouettes of the various airplanes. Several of the known airplanes are marked in the corresponding wing span zones on the indicator. Others are shown on page 3 of this pamphlet. In the zone corresponding to the airplane target wing span, set the pointer at the maximum effective range of the antiaircraft gun, or at any other optimum range.
3. Sight at the aircraft through the vertical wires, holding the indicator perpendicular to the line of sight.
4. When the gap between the vertical wires is bridged by the wing-spread of the aircraft, the signal for opening fire should be given.

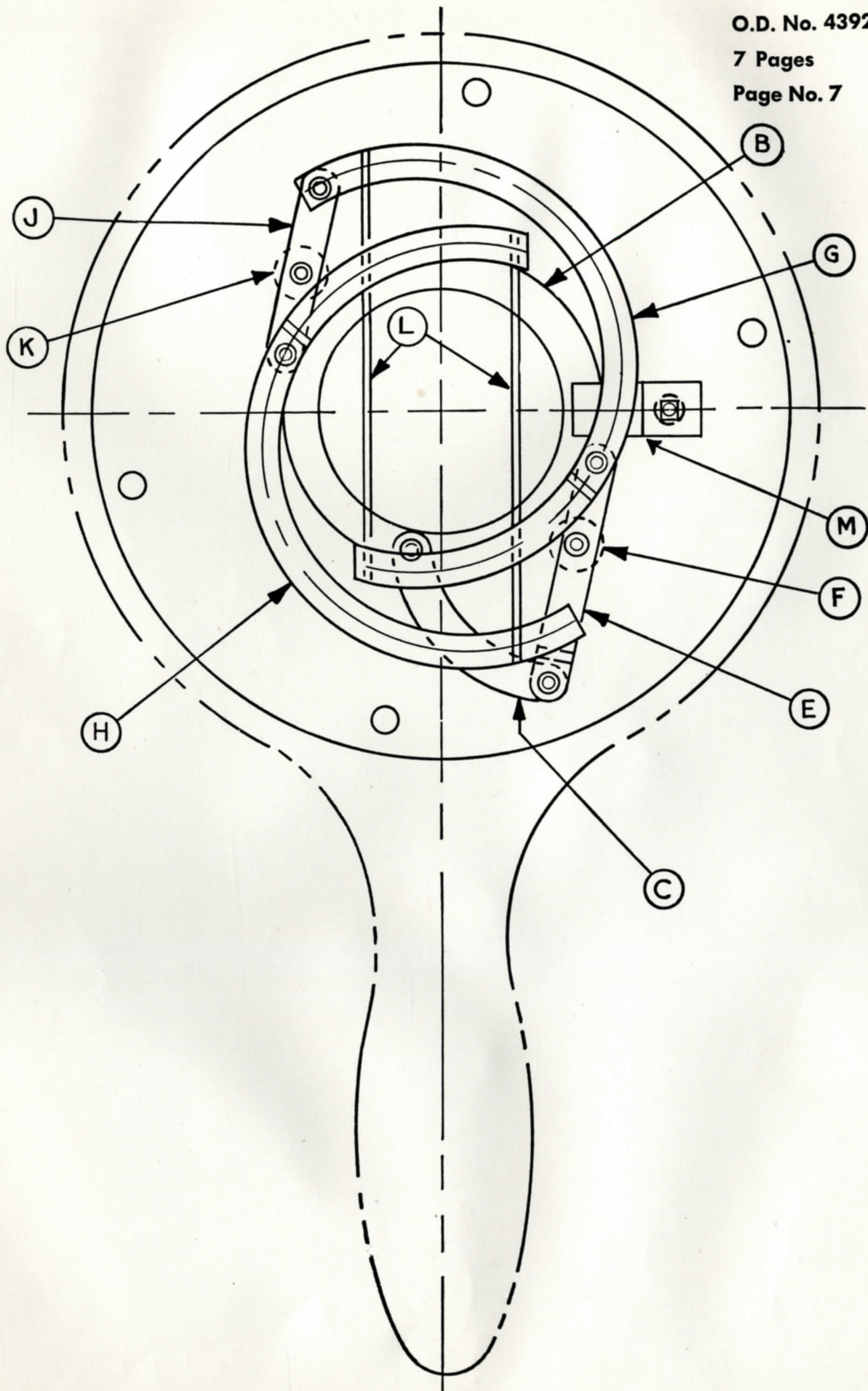
REPAIR

The cover plate of the indicator is not to be removed, except by those specifically authorized to repair the instrument. In case the vertical wires become warped or the instrument requires adjustment, the indicator should be turned over to the proper repair or maintenance personnel.

DESCRIPTION OF MECHANICAL OPERATION OF THE INDICATOR

The following detailed description of the operation of the linkages inside the Antiaircraft Range Indicator Mark 1 is provided for use in adjustment or repair. Referring to the drawings on pages 6 and 7, when pointer (A) on the face side of the dial (D) is rotated, it moves ring (B) to which it is permanently fastened. The movement of ring (B) causes link (C) to rotate link (E) about pivot stud (F). This movement causes wire carrier (G) to move in one direction, and wire carrier (H) in the opposite direction, since both are connected to link (E) on opposite sides of pivot stud (F). The other ends of wire carriers (G) and (H) are supported by link (J) which pivots about stud (K) simultaneously and in the same direction as link (E). Therefore, since both links (E) and (J) rotate in the same direction at the same time, wires (L) move parallel to each other, and come together or go apart depending on the direction of rotation of the pointer. The flat spring (M) bears against ring (B) to provide slight friction, ensuring smooth operation of moving parts.





NAVY DEPARTMENT
BUREAU OF SUPPLIES & ACCTS.
WASHINGTON, D. C.

ANTI-AIRCRAFT RANGE INDICATOR

This device previous to the time we manufactured it had never been made in America. This was an English design. In collaboration with the Navy we designed a new Range Indicator so that it was suitable for use in our Navy. In this redesigning we saved the U. S. Gov't. about \$8.00 to \$10.00 per device as against what they expected to pay.

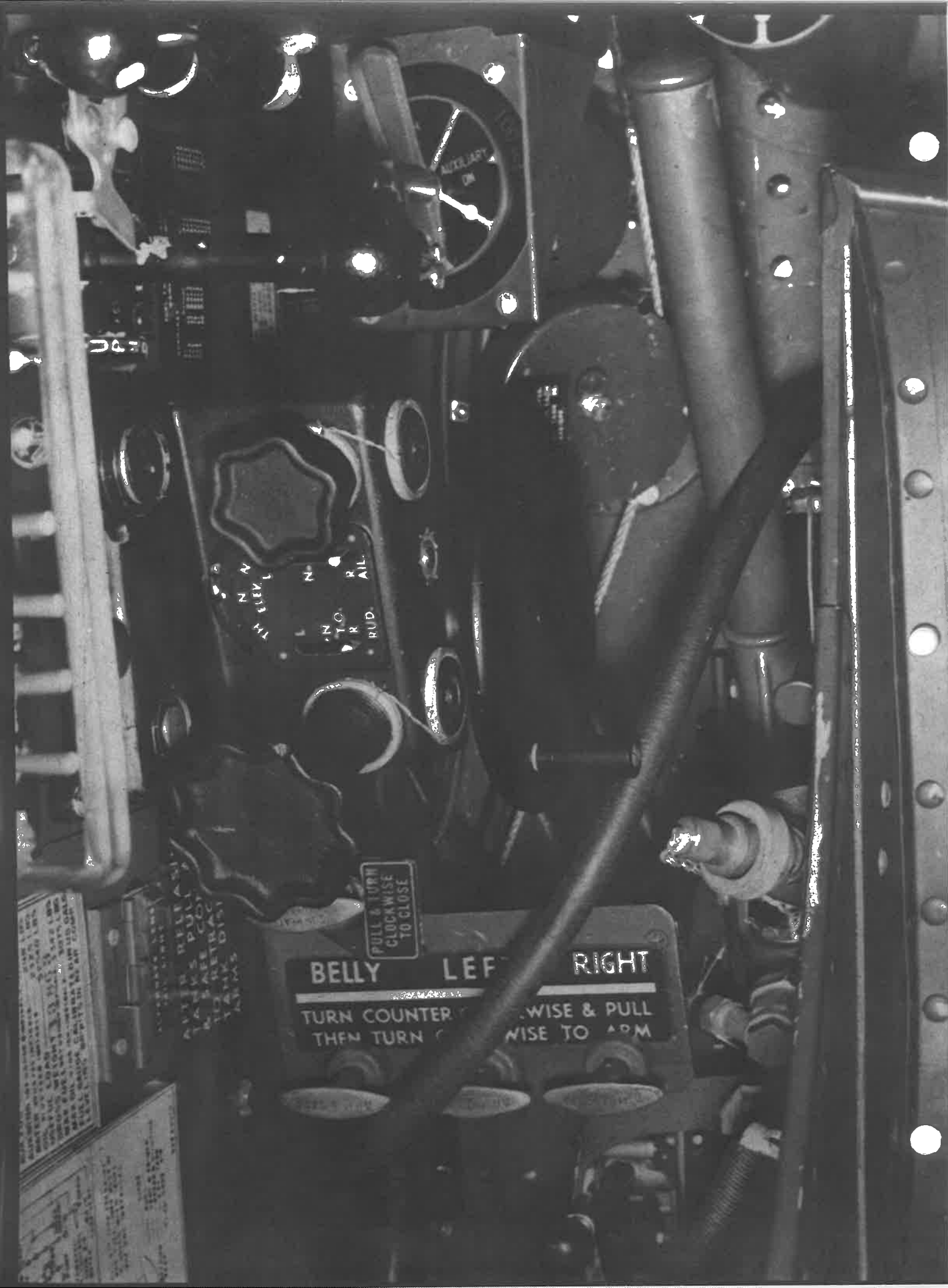
Excerpt from report of our representative in Washington:

"The officers of the Ordnance section of the Navy as well as Engineers in the Technical Division, are most gratified and have commended us on the appearance, as well as the mechanism of the Range Indicator."

The function of this Range Indicator is to indicate the distance an airplane is from the observer. It is used in connection with the anti-aircraft guns.

1st. Order Rec'd. March 7, 1942

| PRODUCTION | | | CONTRACTS | | |
|------------|---------------|------|-----------|------------|---------------|
| 1942 | 10,000 | pcs. | 3/7/42 | Req. 1341 | 5,000 |
| | | | 4/30/42 | Ord. 99726 | 5,000 |
| 1943 | 73,023 | " | 10/29/42 | NXso-16539 | 100,000 |
| | | | 10/4/43 | NOrd 4507 | <u>57,165</u> |
| 1944 | <u>84,142</u> | " | | | |
| | 167,165 | pcs. | | | 167,165 |



REPUBLIC AVIATION CORPORATION

FARMINGDALE, L. I., N. Y.

PRODUCERS OF THE FAMOUS P-47 THUNDERBOLT

89F36190 MECHANICAL TRIM TAB UNIT

After completing the dies and fixtures on this job, we submitted the first samples to Republic for approval. While these were built in exact accordance with the drawings and specifications, they did not meet their approval due to the fact that they had not allowed close enough tolerance on certain parts. It was, therefore, necessary for us to hand fit many of the pieces which we had planned to assemble directly from the machining. This hand fitting proved to be such a laborious job that it was impossible for us to meet the production requirements.

We then proceeded with an experimental model incorporating our own ideas which eliminated the hand work. This was very acceptable to them and the tool changes, due to the new design, were made at their expense.

Due to inherent troubles with the plane on which this unit was to be used, they required extremely accurate pointer calibration which was impossible to obtain with the tolerances allowed on the specifications. We again went to work and designed a spring take-up on this pointer which entirely eliminated the objectionable backlash. This change has just recently been put into effect.

This job has been an extremely difficult one due to the exacting requirements of Republic and the Air Corps and it was necessary for us to keep at least one of our top engineers constantly on this job.

Over the years, we have constantly made their requirements and at times we have come to their aid with additional extra production when they were in need of it.

PRODUCTION OF 89F36190 TRIM TAB UNITS

| | | |
|---------|-------------|--------------------------|
| 3/20/42 | 669 | pcs. |
| 1943 | 3337 | pcs. |
| 1944 | 4507 | pcs. |
| 1945 | 1313 | pcs. shipped to 6/28 |
| 1945 | <u>2044</u> | pcs. on unshipped orders |
| | 11,870 | pcs. |

CONTRACTS

| <u>Date</u> | <u>Contract No.</u> | <u>Pcs.</u> |
|-------------|---------------------|-------------|
| 3/20/42 | A9456 | 634 |
| 3/30/42 | A9457 | 910 |
| 9/28/42 | 0294049 | 2000 |
| 9/28/42 | " | 315 |
| 12/31/43 | E125206 | 50 |
| 7/14/43 | 0373022-96A | 2450 |
| 8/4/42 | 0381040 | 25 |
| 2/10/44 | 02200-96B | 2186 |
| 8/5/44 | 04390 | 800 |
| 12/29/44 | 06015 | 1000 |
| 3/5/45 | 06738 | 1350 |
| 3/20/45 | 07013 | <u>150</u> |
| | | 11,870 |



M1 CARBINE

WINCHESTER REPEATING ARMS COMPANY

NEW HAVEN, CONNECTICUT

For Winchester we produced Butt Plates Hand Guard Liners which were used on the M1 Carbine. This Carbine is a semi-automatic weapon and it was especially designed to replace the 45 calibre revolver, carried by the officers. It proved to be a very popular weapon, so much that some were issued to troops.

PRODUCTION

CONTRACTS

1st order rec'd 3/21/42

| | | | | <u>Butt Plate</u> | |
|------|---------------------|------------|----------|-------------------|----------------|
| 1942 | 423,853 pcs. | Butt plate | 3/21/42 | Ord. 67896G | 423,853 |
| | | | 6/5/43 | Ord. 1429H | 145,000 |
| 1943 | <u>305,000</u> pcs. | " " | 11/15/43 | Ord. 9594H | <u>160,000</u> |
| | 728,853 | | | | 728,853 |

Hand Guard Liners

| 1942 | 425,154 pcs. | Hand Guard Liners | 3/30/42 | 68567G | 408,154 |
|------|---------------------|-------------------|----------|--------|---------------|
| | | | 6/18/43 | 1421-H | 126,815 |
| 1943 | <u>296,815</u> pcs. | " " " | 11/15/43 | 9595-H | 170,000 |
| | | | 7/18/42 | 6867G | <u>17,000</u> |
| | 721,969 | | | | 721,969 |

U. S. NAVY DEPARTMENT
BUREAU OF SUPPLIES & ACCT.

WASHINGTON, D. C.

MARK V AND MARK VI PARACHUTE FLARES

We were the first manufacturers to produce Mark V Flares with an all rayon 'chute. This 'chute gave us considerable trouble due to the fact that it was not as strong as the original silk one which was being used by other manufacturers. After building approximately 47 lots, it was found necessary to redesign this 'chute so as to eliminate tearing of the cloth. We made several tests at Branford on the rear of a high-speed truck and were able to make up a sample which would withstand this shock by adding 6" of tape to each gore seam and putting the shroud line eyelet through this tape. We then took several of these samples to Baldwin for tests which were conducted under the supervision of Lt. Comdr. Maher at Floyd Bennett Field. These tests proved satisfactory and the Navy then authorized us to make the change and rework all the lots on hand at their expense.

While this eliminated a great deal of our trouble, we still experienced rejections on Mark V Flares to such an extent that we stopped assembly and started experimental work to determine just where the trouble was. We found that the snubbers as specified did not begin acting until a load of 400 to 450 lbs. was placed on them. In our belief, this was much too great a load so we designed a new snubber which went into action at about 160 lbs. and gradually built up to 500 lbs.

We also found that the shroud lines specified were not adequate under the conditions and we found that a 90 lb. line should be used instead of a 40 lb. line.

We built up 50 inert flares incorporating the new snubber and part of them with heavier shroud lines and also using different methods of packing. We drove these to Dahlgren, Va., in our own truck and conducted tests there and found that our snubber eliminated all collapsing of 'chutes and that the heavier shroud line was of advantage. The Navy then authorized these changes at their expense and again we had to rework approximately 7,000 flares.

On the Mark VI Flare, we experienced trouble due to the slow fuse action and the flare hitting the ground burning. This was traced to the fact that the fuse specified, which was manufactured by the Ensign-Bickford Company and which called for a 60-second fuse. This was the fuse purchased but after being kept in storage for several months, it had a burning time of 72 seconds to the foot. This was causing the trouble in the Mark VI Flares and we conducted several tests both in Dahlgren, Va. and in Jefferson, Ind. We found a fuse which would meet the Navy's requirements and the final solution was to purchase a 55-second fuse and this, when aged, would give about the proper burning time. This also necessitated the reworking of several thousand flares.

PRODUCTION OF FLARES

1st order rec'd. for Mark V-VI April 8, 1942

Production

Contracts

Mark V

| | | | |
|------|--------------------|--------------------|-------------|
| 1942 | 7700 pcs. | 4/8/42 Cont. 3111A | 39,924 pcs. |
| 1943 | <u>32,224</u> pcs. | | |
| | 39,924 | | |

Mark VI

| | | | |
|------|-------------------|---------------------|--------------|
| 1942 | 600 pcs. | 4/8/42 Ord. 31-11-A | 10,770 pcs. |
| 1943 | 10,170 pcs. | " " | <u>7,574</u> |
| 1944 | <u>7,574</u> pcs. | | 18,344 |
| | 18,344 | | |

PROCUREMENT DIVISION

TREASURY DEPARTMENT

WASHINGTON, D. C.

VICTORY FANS A37V1 16" with Guard Wall and Bracket

VICTORY FANS A37V3 16" with Guard and Base

Early in 1942 we were asked by the Treasury Dept. to bid on a so called Victory Fan. Specifications were supplied to us by the Treasury Dept. but were influenced by instructions that were issued by the War Production Board. The main idea behind the Victory Fan was to cut down the use of metal. For example, they eliminated the use of metal blades and substituted a composition fibre board blade. We protested to both the Treasury Dept. and the War Production Board that the type of blade specified would not stand up. We knew that it was impracticable and that there would be further trouble, nevertheless, we were ordered to manufacture the fans according to specifications.

Within a few weeks after the first delivery of these fans trouble began to crop up by the fibre blades falling apart, and we began to receive urgent calls for replacement blades from all over the country. Finally we convinced the WPB that this type of blade was impracticable and they allowed us to manufacture a replacement blade out of steel.

All in all, this was not a profitable fan to us as we made replacements by the hundreds at no charge and in one instance we shipped 6,250 blades to Oakland, California for re-shipment to Pearl Harbor at no charge to the Government.

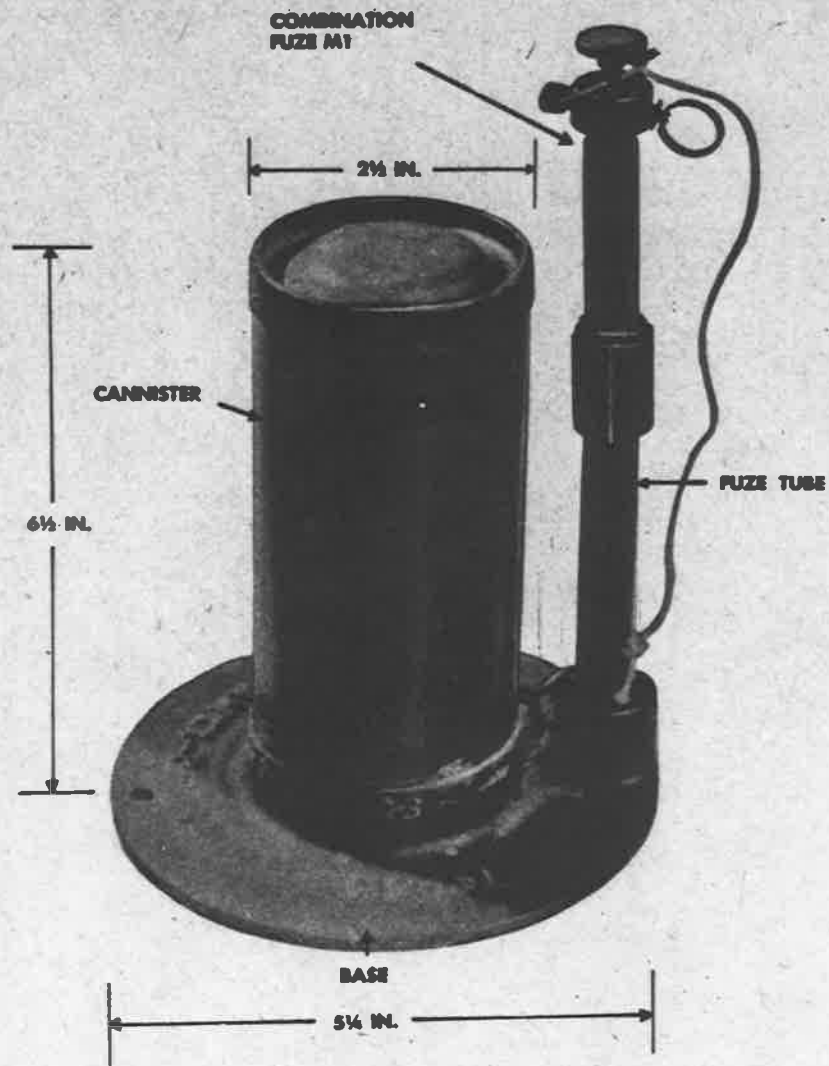
Below is quotation from a letter written by Lt. Commander E. R. Fenney, Naval Supply Depot, Oakland, California when our representative called regarding fan blade trouble. "Your continued interest in your products, the courtesy of your representative and your willingness to furnish replacement blade assemblies without charge, is very much appreciated".

We also had to send men to the Brooklyn Navy Yard to replace blades on fans which they had in their stock room.

| Production for A37V1 | | | Contracts | | |
|----------------------|--------------|------|-----------|-----------|-------------|
| 4/21/42 | 25,000 | pcs. | 4/21/42 | TPS-46024 | 25000 |
| 8/6/42 | <u>4,777</u> | " | 4/21/42 | " " | 5000 |
| | | | 8/6/42 | " " | 4777 |
| | | | 8/6/42 | " " | <u>2389</u> |
| Total | 29,777 | | | | 37166 |

| Production for A37V3 | |
|----------------------|--------------|
| 4/21/42 | 5,000 |
| 8/6/42 | <u>2,389</u> |
| Total | 7,389 |

U. S. ANTIPERSONNEL MINE M2A1



TYPE. Antipersonnel fragmentation

COLOR. Both tubes, olive-drab; base flange, black with yellow marking

CASE. Steel

WEIGHT OF SHELL. 3 pounds

EXPLOSIVE. 0.4 pound

EFFECT. Casualties to most personnel within 10 yards, dangerous to 150 yards.

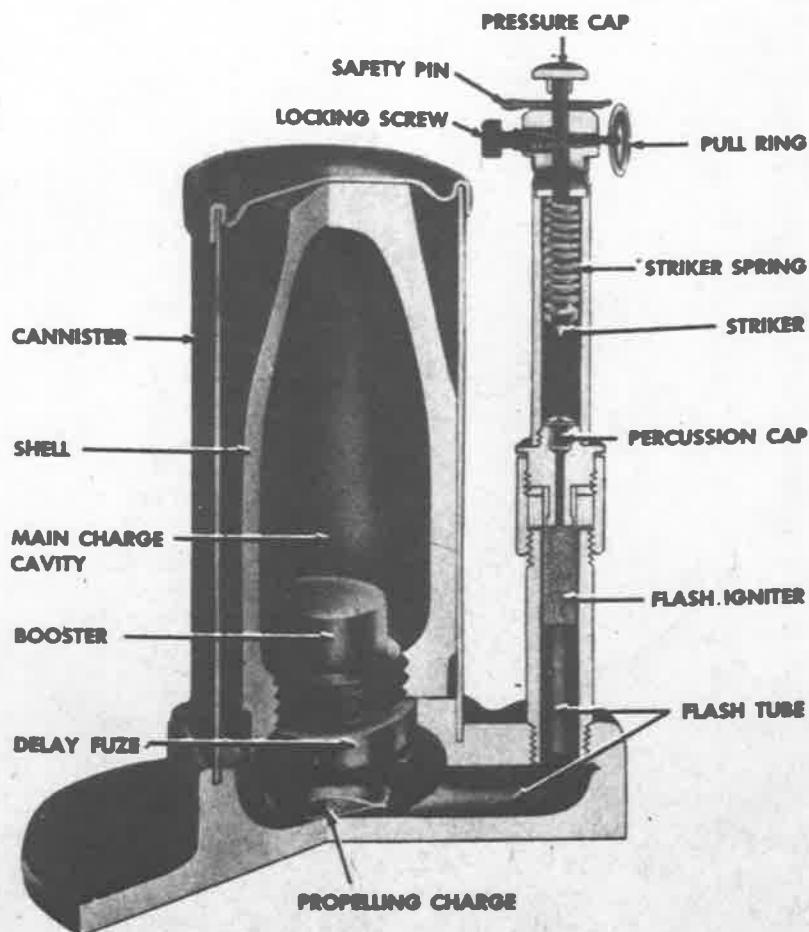
FM 5-31

1 NOV 1943

52.01-a

RESTRICTED

U. S. ANTIPERSONNEL MINE M2A1



FUNCTIONING

1. Pressure of 20 pounds on pressure cap, or pull of 3 to 6 pounds on pull ring, releases striker.
2. Striker, driven by spring, sets off percussion cap, which fires igniter, which sets off propelling charge.
3. Explosion of propelling charge ejects shell from tube and, at same time, ignites delay fuze in base of shell.
4. When shell is 6 to 8 feet from tube, delay fuze detonates explosive in shell, throwing fragments in all directions.

INSTALLING AND ARMING TO ASSEMBLE

1. Test fuze by testing safety pin for free movement when locking screw is removed.

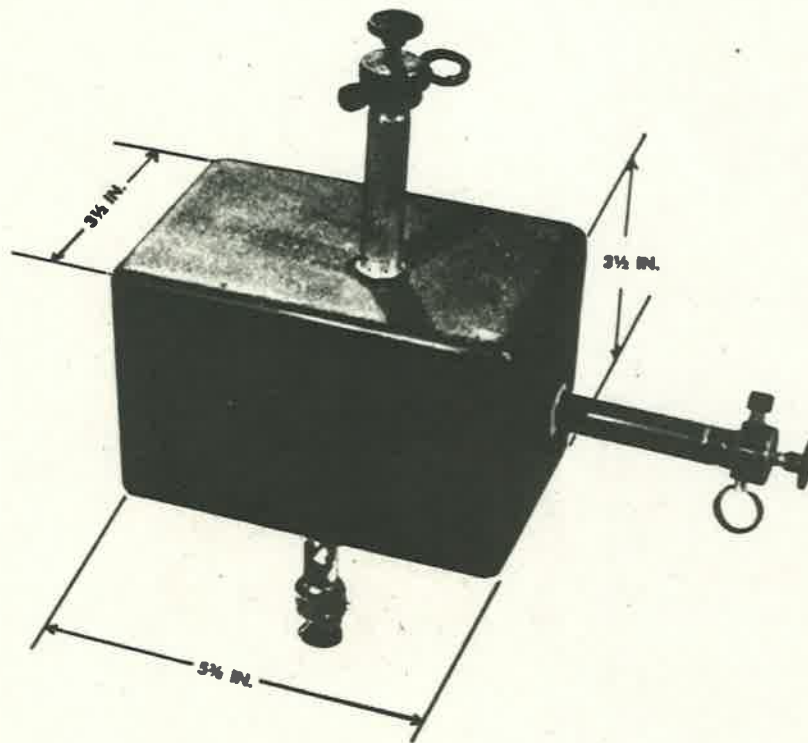
82.01-6

1 NOV 1943

FM 8-31

RESTRICTED

U. S. ANTIPERSONNEL MINE M3



TYPE. Antipersonnel

COLOR. Olive-drab

CASE. Cast iron

WEIGHT. 9.6 pounds

EXPLOSIVE. 0.9 pound flaked TNT

EFFECT. Casualties to all personnel within 10 yards. Dangerous up to 100 yards.

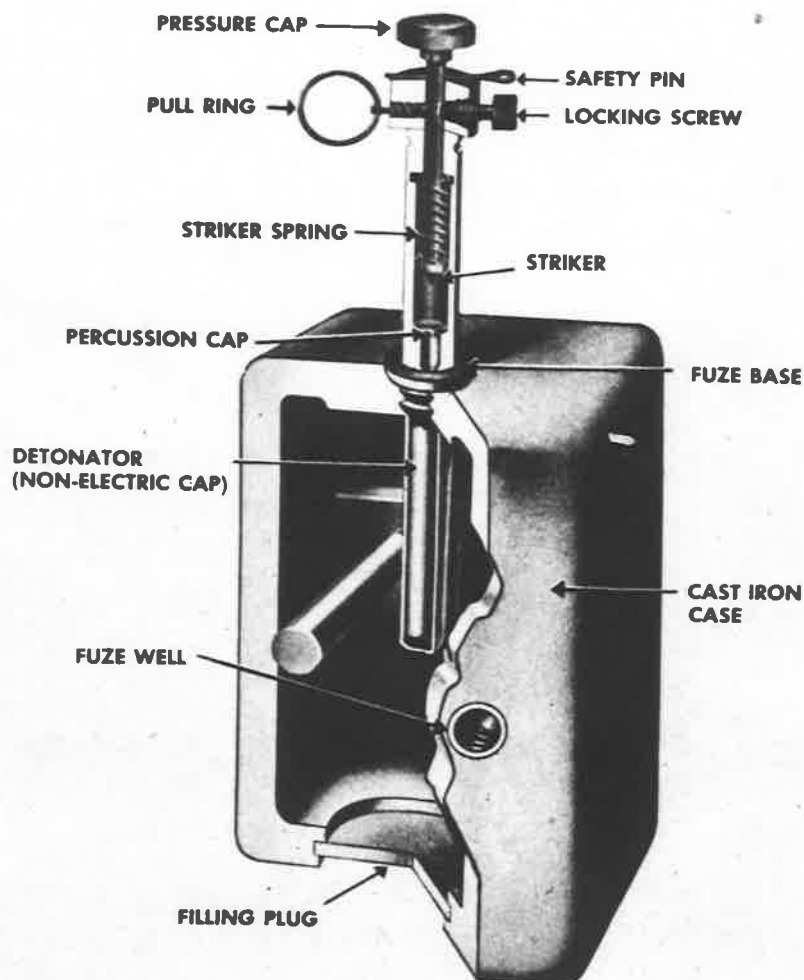
FM 5-31

1 NOV 1943

52.02-4

RESTRICTED

U. S. ANTIPERSONNEL MINE M3



FUNCTIONING

1. Pull of 3 to 6 pounds on pull ring, or pressure of 20 pounds on pressure cap, releases striker.
2. Striker, driven by spring, fires percussion cap.
3. Flash from percussion cap detonates nonelectric cap crimped on base of fuze.
4. Detonation of nonelectric cap explodes high-explosive filler in mine, throwing fragments in all directions.

THE ENGINEER BOARD

FT. BELVOIR, VA.

M1 COMBINATION FIRING DEVICE

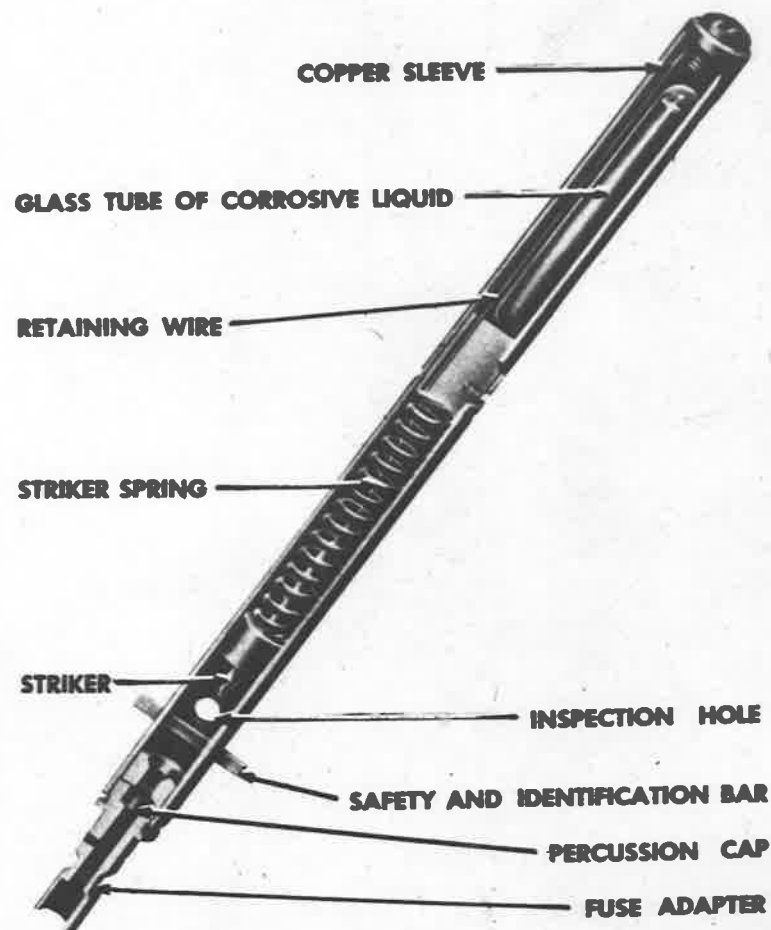
This is the first model of a firing device designed for use with the M2 Anti-personnel mine. This mine ejects a shell about six or eight feet into the air and then explodes, throwing fragments in all directions. This firing device was later known as Fuze Mine Anti-Personnel M2 and M3.

The device is worked by trip wire or by pressure, and the head swiveled so that trip wires in several directions could be used.

First pilot order received from Ft. Belvoir, May 9, 1942.

| | <u>Production</u> |
|------|-------------------|
| 1942 | 150,000 |

| | <u>Contract</u> | |
|--------|-----------------|---------|
| 5/9/42 | W145-Eng 411 | 150,000 |



TYPE. Delay fuze

SHAPE. Pencil

MATERIALS. Aluminum and copper

FUNCTIONING

1. Action starts when copper sleeve is crushed and ampoule broken.
2. Acid attacks and eats through wire.
3. Spring drives released striker against percussion cap.

RE-USE

If you can see through inspection holes, or insert a nail through them, the striker is cocked. If sleeve has been crimped, discard. If sleeve is intact, unscrew cap and see whether capsule is intact. If so, time pencil can be re-used.

FM 5-31

1 NOV 1943

63.08-a

RESTRICTED

O.S.S. SIGNAL RELAY

OFFICE OF STRATEGIC SERVICES

630 FIFTH AVENUE

NEW YORK, N. Y.

SIGNAL RELAYS

The signal relay is a time delay firing device which incorporates an ampule of chemical in the device. When the device is used, the ampule is broken causing the chemical to corrode through the retaining wire, detonating the explosive. The concentration of the chemical governed the time delay which varied from ten minutes to twenty hours. They were used by O.S.S. principally to drop behind enemy lines for use by saboteurs, or partisans in destroying enemy installations.

1st order rec'd May 28, 1942

| <u>PRODUCTION</u> | | <u>CONTRACTS</u> | |
|-------------------|-------------------|-------------------------------------|---------------|
| 1942 | 521,545 pcs. | 5/28/42 Blann | 1,750,220 |
| 1943 | 1,777,425 pcs. | 3/4/43 W1097-Eng. 3667OSS 6423 | 500,000 |
| 1944 | 4,941,780 pcs. | 10/7/43 W1400 - OSS 431 | 3,906,380 |
| | | 10/16/44 Ord. 37226 | 22,950 |
| 1945 | <u>5,200</u> pcs. | 9/30/43 OSS 397 | 48,750 |
| | | 9/9/43 W1400 - 397 | 974,250 |
| Total | 7,245,950 pcs. | On Misc. Orders #12164 and 20846 | <u>43,400</u> |
| | | | 7,245,950 |



A-358 Vultee Vengeance Dive Bomber

VULTEE AIRCRAFT

NASHVILLE, TENN.

Producers of such famous ships as the Attack Bomber, Vultee Fighter, the famous Catalina Flying Boat (PBY), B24 Liberator.

To Vultee we supplied the following B7000V Motors

1st. order received 6/2/42

PRODUCTION

| | | |
|------|----------|------|
| 1942 | 922 | pcs. |
| 1943 | 5,128 | pcs. |
| 1944 | .7 | pcs. |
| 1945 | <u>4</u> | pcs. |
| | 6,061 | |

CONTRACTS

| <u>Date</u> | <u>Order #</u> | <u>Pcs.</u> |
|-------------|----------------|-------------|
| 6/2/42 | P22625 | 1 |
| 7/2/42 | " | 1 |
| 7/21/42 | P23696 | 920 |
| 12/8/42 | P31115 | 810 |
| 12/8/42 | " | 440 |
| 12/26/42 | P33545 | 2,090 |
| 1/20/43 | P36428 | 330 |
| 2/26/43 | P38506 | 328 |
| 2/26/43 | " | 72 |
| 2/26/43 | " | 182 |
| 2/26/43 | " | 90 |
| 2/26/43 | " | 18 |
| 2/26/43 | " | 60 |
| 7/24/43 | ND 45211 | 473 |
| 10/19/43 | ND 52762 | 235 |
| 6/1/44 | 25894 | 2 |
| 11/20/44 | 228515 | 5 |
| 1/9/45 | 229000 | <u>4</u> |
| | | 6,061 |

WAR DEPARTMENT
SPRINGFIELD ORDNANCE DIST.
95 State Street
Springfield, Mass.

M1 Combination Firing Device

This is the first model of a firing device designed for use with the M2 Anti-Personnel mine. This mine ejects a shell about six or eight feet into the air and then explodes, throwing fragments in all directions.

This firing device was later known as Fuze Mine Anti-Personnel M2 and M3.

The device worked by trip wire or by pressure and the head swiveled so that trip wires in several directions could be used.

| | <u>PRODUCTION</u> | <u>CONTRACTS</u> |
|------|--------------------------|---------------------------------|
| 7/28 | 1942 307,210 pcs. | 7/28/42 W478 Ord. 2152 7,360 |
| | | 7/31/42 " " 2175 600,100 |
| | 1943 <u>800,250</u> pcs. | 9/18/42 " " 2410 <u>500,000</u> |
| | 1,107,460 | 1,107,460 |

BROWN LIPE CHAPIN

SYRACUSE, N. Y.

OIL BUFFER SPRING GUIDE KEY

PARTS FOR 50 CALIBER MACHINE GUN

| <u>Date Order</u> | <u>Order No.</u> | <u>Amount Order</u> | <u>Production</u> | | | |
|-------------------|------------------|---------------------|-------------------|-------------|-------------|-------------|
| | | | <u>1942</u> | <u>1943</u> | <u>1944</u> | <u>1945</u> |
| 10/17/42 | W374-Ord 2730 | 45,020 | 365 | 44,655 | | |
| 8/11/43 | 21530X | 24,000 | | 1,500 | 22,500 | |
| 3/8/44 | 31501X | 22,000 | | | 22,000 | |
| 6/1/44 | 35033X | 19,600 | | | 19,600 | |
| 10/30/44 | 40271X | 15,000 | | | 5,000 | 10,000 |
| 11/10/44 | 40636X | <u>8,000</u> | | | | 8,000 |
| | | 133,620 | | | | |
| | Totals - | | 365 | 46,155 | 69,100 | 18,000 |
| | Grand Total | 133,620 | | | | |

U. S. ENGINEER PROC. DIST.

120 WALL STREET

NEW YORK CITY

M1 PRESSURE FIRING DEVICE

This device is used in connection with anti-personnel mines or booby traps. For example, this device is screwed into an explosive charge and concealed so that anybody stepping on it will detonate the charge.

CONTRACT

10/18/42 - W1128 - Eng 424-NY 4066

685,350 pcs.

2/25/43 NY 6336 - Req. 11262 W1097 - Eng-3641

685,350 pcs.

4/21/43 - W1098 - Eng 3721 Nad 1080

583,000 pcs.

1,953,700

PRODUCTION

1st Order rec'd 10/19/42

1942 685,350 pcs.

1943 1,268,350 "

1,953,700

U. S. ENGINEER PROC. DIST.

120 WALL STREET
NEW YORK CITY

M1 PULL FIRING DEVICE

This device is used with anti-personnel mines and booby traps. It is screwed into an explosive charge and a trip wire is attached. Tripping over this wire or moving the object to which the wire is attached will detonate the charge.

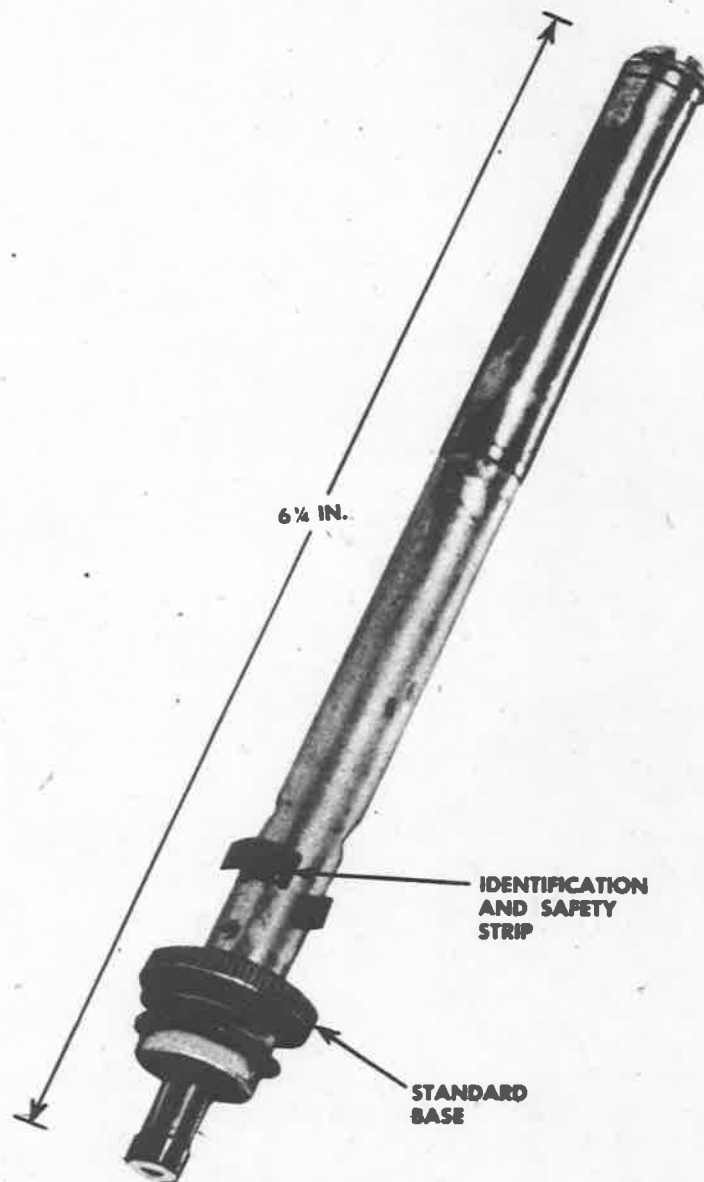
1st. order 10/19/42

| | | | | | |
|----------|---|---------|---|-------------------|----------------|
| 10/19/42 | - | W1128 | - | ENG 424-NY-4066 | 685,350 |
| 2/25/43 | - | W1097 | - | ENG 3641-NY-6336 | 685,350 |
| 4/21/43 | - | W1098 | - | ENG 3721-NAD 1080 | 707,000 |
| 8/20/43 | - | W30-082 | - | ENG 893-NAD 3993 | <u>917,420</u> |
| | | | | | 2,995,120 |

PRODUCTION

| | | |
|------|---|----------------|
| 1942 | - | 685,350 |
| 1943 | - | 1,392,350 |
| 1944 | - | <u>917,420</u> |
| | | 2,995,120 |

U. S. DELAY FUZE M1



TYPE. Chemical delay fuze.

COLOR. Unpainted except for safety tab.

CASE. Upper half copper, lower half brass.

EMPLOYMENT. Delayed-action fuze for firing a delayed-action mine.

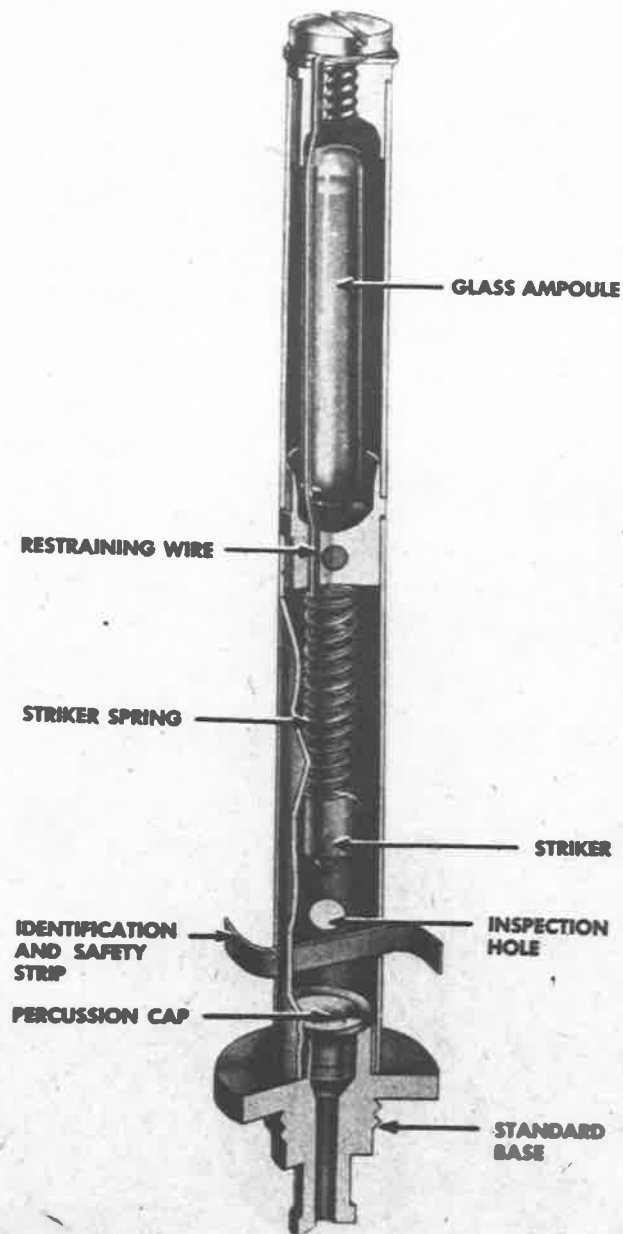
FM 5-31

1 NOV 1943

53.04-a

RESTRICTED

U. S. DELAY FUZE M1



FUNCTIONING

1. When glass ampoule is crushed, corrosive liquid is released.
2. Corrosive liquid eats through restraining wire, releasing firing pin.
3. Firing pin, driven by spring, fires percussion cap.

53.04-b

1 NOV 1943

FM 5-31

RESTRICTED

ENGINEERS PROC. DIST.

120 Wall St.

New York, N. Y.

M1 CHEMICAL DELAY FIRING DEVICE

The chemical delay firing device was the same as the Signal Relay except that it used the Corps of Engineer's base instead of the spring snout. The signal relay is a time delay firing device which incorporates an ampule of chemical in the device. When the device is used, the ampule is broken causing the chemical to corrode through the retaining wire, and detonating the explosive. The concentration of the chemical governed the time delay which varied from ten minutes to twenty hours.

Order received 10/26/42

| PRODUCTION | | CONTRACT | |
|------------|-----------------------|-----------|-----------------------------------|
| 1943 | 1,600,000 pcs. | 10/26/42 | W1128 Eng 438 NY 4182 - 1,600,000 |
| | | CONTRACTS | |
| 1943 | <u>1,120,000</u> pcs. | 1/28/43 | W1097 Eng 3453 |
| Total | 2,720,000 pcs. | | NY 5665 200,000 |
| | | 4/21/43 | W1098 Eng 3721 |
| | | | Nad 1080 <u>920,000</u> |
| | | | 2,720,000 |

THE ENGINEER BOARD

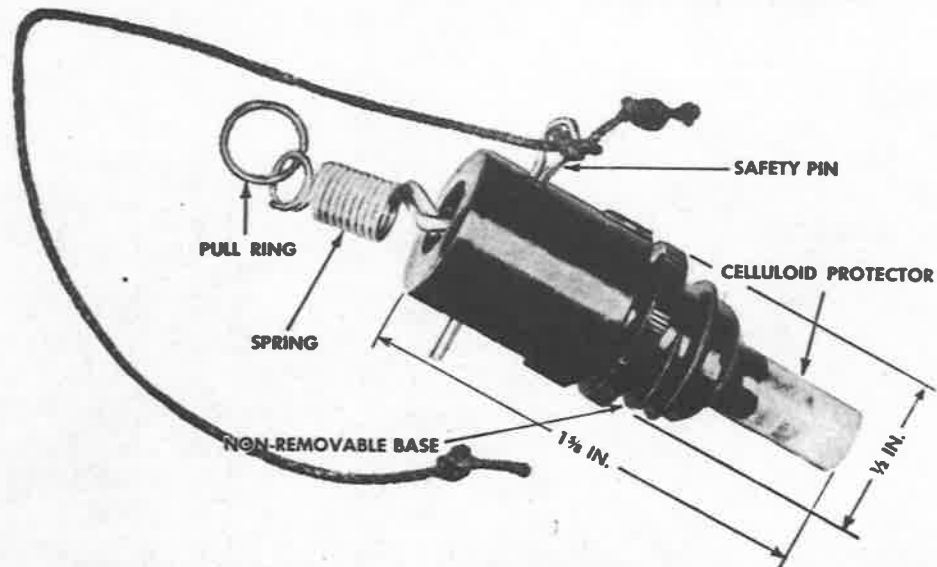
FT. BELVOIR, VA.

M1 DELAY FIRING DEVICE

The chemical delay firing device was the same as the Signal Relay except that it used the Corps of Engineer's base instead of the spring snout. The signal relay is a time delay firing device which incorporates an ampule of chemical in the device. When the device is used, the ampule is broken causing the chemical to corrode through the retaining wire, and detonating the explosive. The concentration of the chemical governed the time delay which varied from ten minutes to twenty hours.

| <u>PRODUCTION</u> | | | <u>CONTRACTS</u> | | |
|-------------------|-------------|------|------------------|------------|-----------|
| 1942 | 1000 | pcs. | 10/30/42 | Ord. 20335 | 1000 pcs. |
| 1943 | <u>7400</u> | pcs. | 4/19/43 | " 24888 | 2000 " |
| Total | 8400 | pcs. | 6/29/43 | " 27115 | 5000 " |
| | | | 9/4/43 | " 28236 | 400 " |
| | | | | | <hr/> |
| | | | | Total | 8400 pcs. |

U. S. PULL-FRICTION FUZE M2

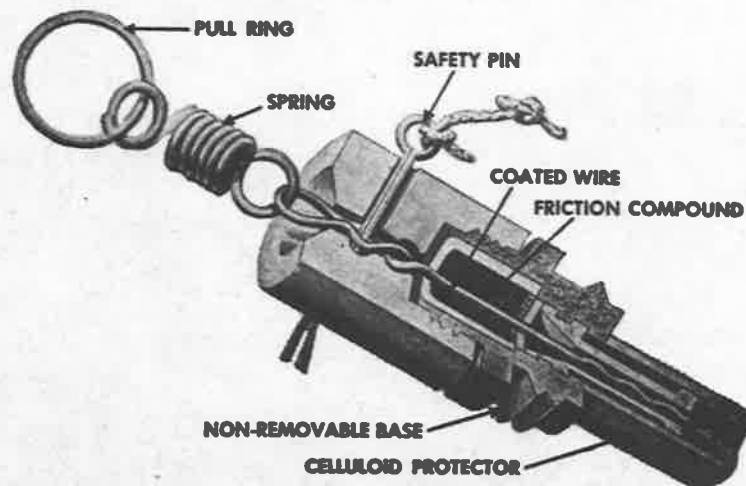


TYPE. Friction type pull fuze.

COLOR. Black.

CASE. Bakelite.

EMPLOYMENT. In antipersonnel mines and booby traps.



FUNCTIONING

1. Pull of 3 to 9 pounds stretches spring and draws the coated wire through the friction compound.
2. Friction compound ignites and shoots flame out open end of base.

FM 5-31

8 MAR 1944

53.07-a

RESTRICTED

THE ENGINEER BOARD

FORT BELVOIR, VA.

T2 PULL FIRING DEVICE

The T2 Pull Firing Device is a friction ignited device, non-metallic, to be used with Anti-Personnel Mines and Booby Traps. It is used the same as the M1 Pull but is much smaller and having no large metallic parts, is difficult to detect

Order received 11/4/42

PRODUCTION

1943 - 10,000 pcs.

CONTRACT

11/4/42 - W145-Eng-420 10,000 pcs.

PRATT & WHITNEY

HARTFORD, CONN.

MANUFACTURERS OF SUCH FAMOUS AIRCRAFT ENGINES AS WASP - HORNET

We did some engineering for Pratt & Whitney on a piston plug. This consisted of a silver disc which was braised into a steel cup and was used to cover the head of the wrist pin and was supposed to prevent cylinder wall damage.

1st. Order 7/30/42

PRODUCTION

| | |
|------|-----------|
| 1942 | 117 pcs. |
| 1943 | 2365 pcs. |

CONTRACTS APPLYING ON ABOVE

| <u>Date</u> | <u>Order No.</u> | <u>Pcs.</u> |
|-------------|------------------|-------------|
| 11/10/42 | F45925 | 48 |
| 11/9/42 | F45924 | 58 |
| 11/11/42 | F47020 | 45 |
| " | F47021 | 55 |
| 12/23/42 | F61257 | 42 |
| 7/30/42 | F15635 | 525 |
| " | F15815 | 595 |
| 8/4/42 | F16567 | 1039 |
| 4/29/43 | F95893 | <u>75</u> |
| | | 2482 |

REVIEW OF OUR

1942 OPERATIONS

1. The A. C. Gilbert Company has been in business a little over thirty years in the manufacturing of Educational, Engineering and Scientific types of Toys, such as Erector, Chemistry Experimental Sets, Microscope Sets, Electrical Experimental Sets and many other educational Gilbert Toys and later added Scale Model American Flyer Trains and hobby kits. We also made the nationally known line of Polar Cub and Gilbert Electrical Appliances and Fans. In our electric motored division we manufactured electric power Drills and kitchen and household appliances.
2. We secured and made shipments on the following prime and sub-contracts:
 - a. Army prime contracts

Firing Devices - Restricted - Mechanical and Chemical
Firing Pins
M26 Flares
 - b. Navy prime contracts

Range Indicators - Restricted
Mk. 5 and Mk. 6 Parachute Flares
 - c. Sub-contracts
 1. Electric Trim Tab Motors for Airplanes
for Curtiss-Wright, Vultee and Grumman
 2. Mechanical Trim Tab Motors for Airplanes
for Republic Aviation Corporation
 3. Parts for Sperry Gyroscope from Waterbury
Clock Co.
 4. Gun Parts for
High Standard Mfg. Co.
Colt's Patent Fire Arms Mfg. Co.
Winchester Repeating Arms Co.

3. Quality, Achievement and Efficiency in production.

FIRING DEVICES FOR ACTUATING LAND AND WATER MINES - BOOBY TRAPS
AND INCENDIARIES

These items are all secretive, restricted, confidential
and classified

The A. C. Gilbert Company were the first in America to manufacture, in quantities, devices of these types for the U. S. Army Engineers and for Lend-Lease. Some of these devices were copies of British and 90% of them were re-designed and engineered by The A. C. Gilbert Company, while others were of our origin and design and all have met with critical military tests.

The features which are incorporated in these devices are:

- a. Safety in setting out by the Soldier with explosives.
- b. Simple construction but fool-proof.
- c. Elimination of critical materials.
- d. Reduction of weight where practical and reduction in cubic inches per item.
- e. Simple and fewer parts to increase man hour production.
- f. Construction and design to lend itself to our present set-up and machinery.

Out of the 5-1/2 million devices which we have manufactured there has not been one single piece rejected by any branch of the Government. This has taken skilled and trained personnel and engineers to develop. Our Engineering section is working on many other devices at this time which may or may not be accepted. Production obstacles have been overcome and the best proof is that we have not been shut down a single day since we started making Firing Devices. Whether the problem involved material or labor it is our policy to rush expeditors to any part of the United States where there is a bottleneck.

PULL TYPE FIRING DEVICE M-1
PRESSURE TYPE FIRING DEVICE M-1

In the early part of 1942 we were invited to bid on 10,000 each of these devices thru Capt. Erhardt of the Engineer Board, Fort Belvoir, Va. The drawings from which we were to work were of British origin and the devices were to be made entirely of brass. We revamped both the Pressure and Pull type by changing the firing mechanism. This was submitted to The Engineer Board and the changes were accepted by them. These devices were delivered within the time limit set by The Engineer Board. We then received an additional order for 660,000 of each. During the manufacture of the above devices, in order to save critical materials, we engineered and designed both the Pull and Pressure type Firing Devices to Zinc die castings instead of using brass. By re-designing, we saved material and many hours of production. We cut down the cubic content of the shipping cartons and the weight per piece.

Our first order for this die-cast device was for 685,000 each of the devices. Many special features have been added to these devices over the old type of Firing Device such as additional safety features, also the device has been engineered to fire under water by introducing the waterproofing of the base. At this particular time we are contemplating on doubling our production.

COMBINATION FIRING DEVICE M-1

Sketches of a Firing Device were submitted to us by The Engineer Board. This device was designed to be used only as a Pull Firing Device and it was to actuate a M-2 Personnel Mine. Thru our engineering efforts we made up a sample of a so called Combination Firing Device which could be fired either by a Trip Wire or by the pressure method of stepping on it or other means of pressure. This was submitted to The Engineer Board at Fort Belvoir and was accepted by them. This particular device was made entirely of brass. Our first order thru The Engineer Board was for 500 pieces which were sent to the Picatinny Arsenal for try-out with the M-2 Personnel Mine. This was followed by 150,000 more devices thru The Engineer Board. This entire quantity was delivered and during the time that we were in production on this quantity we re-designed it so that it could be made out of zinc die cast alloy and steel, eliminating the use of brass. This reduced the price and also made it possible to increase production per man hour and subsequently, thru the Springfield Ordnance District, we were invited to bid and received an order for 1,100,000 devices. At this particular time we are on schedule and nearly ready to start on the third contract from the Springfield Ordnance District for 400,000 devices.

PULL TYPE FIRING DEVICE T-2

We have engineered and designed, in collaboration with The Engineer Board, a T-2 Pull Type Firing Device which is made entirely from plastic and steel, eliminating many of the critical war materials. The other features are that it is an item small, compact and is very light in weight. Another feature is that this device cannot be picked out by detectors on the Mine Fields. A complete set of tools have been built on this device and we have received a trial order for 10,000 of these units which have been built and the Engineer Board is now carrying out tests and experiments on these devices. This device does not use a regular primer cap but is actuated by pulling a wire coated with red phosphorus thru a powder pellet and igniting of same.

PULL AND RELEASE TYPE FIRING DEVICE T-3

At the request of The Engineer Board we have designed and built samples of the Release and Pull Type Devices of which we have built six samples and submitted them to The Engineer Board where further tests were made. We received an order from them to build 1000 pieces and also a complete set of production dies. This device has been designed to be made of zinc die cast alloy and steel. This particular device is very confidential and has great possibilities.

PRESSURE TYPE FIRING DEVICE T-2

The Engineer Board submitted samples of a British Firing Device and asked that we modify and refine and also build samples for them. The first nine samples were hand made by our model makers and were submitted to The Engineer Board at Fort Belvoir. In general, we re-designed the entire firing mechanism and designed the device so that they could be made at a lower price and also to eliminate man hours. The device was constructed of zinc die cast metal and steel. We have made a complete set of production tools, have delivered the first 200 and are waiting for tests and experiments at The Engineer Board, Fort Belvoir.

IMPULSE ACTUATED SELECTIVE DELAY FIRING DEVICE

We were asked by Major P. L. Christensen, Chief of Ordnance, Technical Division, Ammunition Branch, Pentagon Building, Washington, D. C. to build one 30 Impulse Firing Device. This sample has been engineered and produced by us and submitted to Major Christensen. He was very much pleased with this device and its operation and he has also taken it to Capt. Erhardt and several others for their criticism and extensive tests.

A-1 No. 6 PRESSURE SWITCH

We are building, at present, production tools for this device which has been modified from a British device. We have a sample order for 10,000 pieces thru The Engineer Board, 270 Broadway, New York, N. Y. We are supplying the device so as to cut out the rivets and using parts of the metal case which are embossed out. All of these changes were done by the approval and cooperation of Major Sam Lucy of O.S.S.

A-1 No. 6 RELEASE SWITCH

We have received an order for 10,000 pieces from The Engineer Board, 270 Broadway, New York. We are building the complete set of production tools and the device will be put thru into production at the required time.

IMPULSE FIRING DEVICE

We were invited by Capt. F. L. Fritsche of The Engineer Board, Fort Belvoir, Va. to build a very confidential, secretive Firing Device which is to be actuated under water. This was engineered and designed by our Engineering Dept. in three days and we have an order to produce five other devices, all of which have to be shipped by Air Mail, Special Delivery to Fort Pierce, Fla. Wednesday, April 28th. This, in itself, is an engineering feat, as other concerns have been working on this item for several weeks with no results.

CHEMICAL DELAY FIRING DEVICE M-1

We were asked by Capt. Erhardt of Fort Belvoir to build samples similar to the Signal Relay and convert them to the United States Engineering Standards. These samples were to have the standard base which holds a primer so they could be used on all standard explosives by the U. S. Army. Samples were submitted to Fort Belvoir, were accepted and we were invited to bid on 1,500,000 pieces. To date we have produced 900,000 of these devices and our daily production is 10,000 per day.

FUZE IGNITER FOR BOSTON CHEMICAL WARFARE

We were asked by Dr. Herschberg of the Chemical Laboratory, Harvard University to build samples of a Fuze Igniter, 600 pieces in all. This is a take over on the O.S.S. Chemical Delay M-1. These 600 pieces were engineered and manufactured by us in three weeks. The devices were tested by Dr. Herschberg and turned over to the Chemical Warfare Service of Boston who in turn placed an order with The A. C. Gilbert Co. for 400,000 pieces. On the first of March, J. L. White of the Boston Chemical Warfare discussed with us the possibilities of producing 25,000 of the devices in March. By getting out of the warehouses in and around Connecticut and by borrowing some of our parts made for other devices and by improvising some of our tools we were able to meet these requirements. At the present time we are almost thru with our original order and expect to have it completed in May.

SPECIAL TIME DELAY UNIT

On April 13th, Dr. Herschberg of Harvard discussed with us the possibilities of engineering and producing 16,000 special devices. This we agreed that we could do and have them ready for him by May 1st. The purpose of this device is to cut down the use of critical materials and lessen the weight yet to perform its so called duty. We are, at the present time, completing the necessary tools and shall have, in the next few days, finished devices for his laboratory. This device is still in its experimental stages and is very confidential.

All inventions or features made by The A. C. Gilbert Co. in connection with Firing Devices that may be patentable, have been offered to the Government Free without seeking patents.

SUMMARY - FIRING DEVICES

| <u>MECHANICAL</u> | <u>ORDERS</u> | <u>DELIVERED</u> | <u>REJECTS</u> |
|-------------------|------------------|------------------|----------------|
| Fort Belvoir | 1,601,600 | 1,601,600 | 0 |
| Springfield | 7,360 | 7,360 | 0 |
| " | 600,000 | 481,100 | 0 |
| " | 500,000 | 480,000 | 0 |
| " | 400,000 | 0 | 0 |
| Engineers, N.Y. | 685,350 | 307,050 | 0 |
| " " " | 685,350 | 307,050 | 0 |
| | <u>4,479,660</u> | <u>3,184,160</u> | |
| New York | 583,000 | | |
| W-1098-3721 | 707,000 | | |
| | <u>5,769,660</u> | | |

| <u>CHEMICAL</u> | <u>ORDERS</u> | <u>DELIVERED</u> | <u>REJECTS</u> |
|---------------------------|------------------|------------------|----------------|
| Fort Belvoir | 1,000 | 1,000 | 0 |
| Engineers, N.Y. | 1,600,000 | 601,150 | 0 |
| " " " | 200,000 | 100,000 | 0 |
| | <u>1,801,000</u> | <u>702,150</u> | |
| Eng.N.Y. W-1097-Eng.-3667 | 500,000 | | |
| " " " W-1098-Eng.-3721 | 920,000 | | |
| | <u>3,221,000</u> | | |

PRICE REDUCTIONS - FIRING DEVICES

| <u>MECHANICAL</u> | <u>PRESSURE</u> | <u>PULL</u> |
|-------------------|-----------------|-------------|
| 1st Order | \$1.018 ea. | \$1.057 ea. |
| 2nd Order | .84-3/4 | .92-1/4 |
| 3rd Order | | .73 |
| 4th Order | .373 and .397 | .503 |
| 5th Order | .34 | .44 |
| 6th Order | .32 & .333 | .42 & .433 |

| <u>COMBINATIONS</u> | | <u>CHEMICAL TYPE</u> | |
|---------------------|-------------|----------------------|---------------|
| 1st Order | \$.88 ea. | 1st Order | \$.50 ea. |
| 2nd Order | .88-3/4 ea. | 2nd Order | .47 ea. |
| 3rd Order | .63 & .648 | 3rd Order | .46 ea. |
| 4th Order | .63 & .644 | 4th Order | .38 ea. |
| 5th Order | .55-2/3 | 5th Order | .39 & .39 1/2 |
| | | | (Change). |

FIRING PINS - for Boston Chemical Warfare Service

| | <u>ORDERS</u> | <u>DELIVERED</u> | <u>REJECTS</u> |
|--------------------------|---------------|------------------|----------------|
| Cont. No. W-1302-CWS-368 | 2,000,000 | 2,000,000 | 0 |
| " W-1302-CWS-368 | 1,000,000 | 1,000,000 | 0 |
| Amend. No. 1 | | | |

M26 FLARE for Army

Samples and production, as made per specifications, when tested at Aberdeen, Md. showed some unsatisfactory results, not alone the samples and production by The A. C. Gilbert Company, but by contemporary manufacturers making the same devices and making them to the same specifications as were furnished by the War Department. The A. C. Gilbert Company, in their own Engineering Dept., did make improvements and important changes which solved the problem, and when samples were sent to Aberdeen again for test, they proved satisfactory and ultimately mandatory changes came through, based on the changes we originated, to ourselves and all other manufacturers of the M26, which in effect adopted the suggestions that we made. This statement can be confirmed by consulting with Mr. Robinson of the Picatinny Arsenal.

To stop premature shade opening, we recommended, and it was approved, the use of four pins in the closing cover at the bottom of the candle, instead of two. This later became a mandatory change.

We also recommended the addition of a support disc at the bottom of the candle, which was later made a mandatory change.

We recommended and are using, a different method for the fastening of the suspension cable to the spool and igniter block. A wedge is used to insure the fraying of the wires before soldering. This eliminates the chance of the wire coming free from the base block or spool, and causes the chute to leave the candle.

In the manufacture of the Flare it was found that the sleeve was far from satisfactory, inasmuch as it would not properly check the fall of the Flare, and in many cases tore loose when the Flare was released from the plane.

This caused the Flare to fall at terrific speed and when the chute was expelled from the case, it could not stand the strain and would tear and break away from the candle. This trouble was encountered by all of the manufacturers of the M26.

In collaboration with Mr. Robinson of Picatinny Arsenal, in our Eng. Dept., we experimented with various types of sleeves to overcome the above mentioned difficulty. We designed an entirely different sleeve of stronger construction and 450 lb. shroud line was used instead of the 90 lb. shroud line called for on original specifications. We designed an entirely different sleeve after much experimentation, tests and trials. We then built 75 samples which were sent to Aberdeen and found to be a great improvement, and have now become a mandatory change.

| <u>M26 FLARES</u> | <u>ORDERED</u> | <u>DELIVERED</u> | <u>PRICE REDUCTIONS</u> |
|----------------------|-----------------|------------------|-------------------------|
| Cont. W-478-Ord-1376 | 7500 | 7440 | \$54,4705 ea. |
| " W-478-Ord-1479 | 25000 | 24783 | 48.9201 ea. |
| " W-478-Ord-1896 | 70000 | | 46.83 ea. |
| | (cut to 11,494) | 7968 | No change |
| " W-478-Ord-3731 | 11000 | 0 | \$37.53 |

340 Flares rejected for Retest or Rework, representing 14,103 Flares

ANTI-AIRCRAFT RANGE INDICATOR FOR NAVY. Restricted

This device was never made in America previously. There was an English design. In collaboration with the Navy we designed a new Range Indicator, so that it was suitable for use in our Navy. In this re-designing we saved the United States Government approximately \$8.00 to \$10.00 per device as against what they expected to pay. These accomplishments can be checked with Lt. Comdr. Rose of the Navy Department in Washington.

Excerpt from report of our representative in Washington:

"The Officers of the Ordnance Section of the Navy as well as Engineers in the Technical Division, are most gratified and have commended us on the appearance, as well as the mechanism of the Range Indicators."

| <u>RANGE INDICATORS</u> | <u>ORDERED</u> | <u>DELIVERED</u> | <u>REJECTED</u> | <u>PRICE REDUCTIONS</u> |
|-------------------------|----------------|------------------|-----------------|-------------------------|
| Contract No. 99726 | 5000 | 5000 | 0 | \$ 2.98 |
| " " 99726 (Reorder) | 5000 | 5000 | 0 | 2.85 |
| " " NXs 16539 | 100,000 | 15397 | 0 | 2.54 |

MARK V and VI PARACHUTE FLARES for NAVY

We were the first manufacturers to produce Mark V Flares with an all rayon 'chute. This 'chute gave us considerable trouble due to the fact that it was not as strong as the original silk one which was being used by other manufacturers. After building approximately 37 lots, it was found necessary to re-design this 'chute so as to eliminate tearing of the cloth. We made several tests at Branford on the rear of a high-speed truck and were able to make up a sample which would withstand this shock by adding 6" of tape to each gore seam and putting the shroud line eyelet through this tape. We then took several of these samples to Baldwin for tests which were conducted under the supervision of Lt. Comdr. Maher at Floyd Bennet Field. These tests proved satisfactory and the Navy then authorized us to make the change and rework all the lots on hand at their expense.

While this eliminated a great deal of our trouble, we still experienced rejections on Mark V Flares to such an extent that we stopped assembly and started experimental work to determine just where the trouble was. We found that the snubbers as specified did not begin acting until a load of 400 to 450 lbs. was placed on them. In our belief, this was much too great a load so we designed a new snubber which went into action at about 160 lbs. and gradually built up to 500 lbs.

We also found that the shroud lines specified were not adequate under the conditions and we found that a 90 lb. line should be used instead of a 40 lb. line.

We built up 50 inert flares incorporating the new snubber and part of them with heavier shroud lines and also using different methods of packing. We drove these to Dahlgren, Va., in our own truck and conducted tests there and found that our snubber eliminated all collapsing of 'chutes and that the heavier shroud line was of advantage. The Navy then authorized these changes at their expense and again we had to rework approximately 7,000 flares. From all indications, they are now passing the Navy's requirements in good shape.

On the Mark VI Flare, we experienced trouble due to the slow fuse action and the flare hitting the ground burning. This was traced to the fact that the fuse specified, which was manufactured by the Ensign-Bickford Co. and which called for a 60-second fuse. This was the fuse purchased but after being kept in storage for several months it had a burning time of 72 seconds to the foot. This was causing the trouble in the Mark VI Flares and we conducted several tests both in Dahlgren, Va. and in Jefferson, Ind. We found a fuse which would meet the Navy's requirements and the final solution was to purchase a 55-second fuse and this, when aged, would give about the proper burning time. This also necessitated the reworking of several thousand flares.

As you can see from the above statements, we have been in a very bad position due to the quantity of flares which have had to be reworked. This was caused by the long delay between the production period and the testing. This delay usually is a 3-week long interval. If something creeps into the design, or the manufacture of this item, we do not know it for at least three weeks during which time our production is going on in high gear. If there is something wrong, it means that the plant must shut down and the help let go and when it has been straightened out, new help must be broken in.

We have made every effort, as our Navy Inspectors will verify, to conform to the Navy Department's specifications on these two items, but due to its complexity, the delay in testing and the Naval changes in design, it has been extremely difficult to meet our schedules.

When this contract was given us, we were told that arrangements would be made for testing facilities near at hand. This, however, did not materialize. If these testing facilities were near at hand, we would have been in a much better position to iron out the required changes.

| <u>MARK V NAVY FLARES</u> | <u>ORDERED</u> | <u>DELIVERED</u> | <u>REJECTIONS FOR REWORK OR RETEST</u> | <u>PRICES</u> |
|---------------------------|----------------|------------------|--|---------------------------|
| Contract 3111A | 40,000 | 14,243 | 146 representing 4600 Flares | \$46.71 45.16 45.62 |

| <u>MARK VI NAVY FLARES</u> | <u>ORDERED</u> | <u>DELIVERED</u> | <u>REJECTIONS FOR REWORK OR RETEST</u> | <u>PRICES</u> |
|----------------------------|----------------|------------------|--|---------------|
| Contract 3111A | 40,000 | 3588 | 110 representing 1900 Flares | \$60.64 |

ELECTRIC TRIM TAB MOTORS FOR AIRPLAINES for Curtiss Wright

In early December 1941 we received a telephone call from Mr. Coleman of Curtiss Wright of Buffalo, asking us if we could make an electric motor to operate a trim tab on a P-40 Curtiss Wright Fighter. He had been experimenting with motors for a period of time and they did not function correctly. We immediately sent our Chief Engineer, Mr. Frisbie, by plane to Buffalo, who analyzed their problem and returned to the factory. Within 72 hours we designed and perfected, working day and night, a motor which Mr. Frisbie flew back to Buffalo with and, after putting the motor through vigorous tests, it was approved as being perfect for the job intended. Within five weeks we tooled up the job, our expeditors got the material in the plant, put the job into production, and started deliveries.

Since then this motor has been adopted by Grumman, and Vultee and with slight changes a total of 15,480 have been manufactured to date; 41 have been rejected.

MECHANICAL TRIM TAB for Republic Aviation Corp.

After completing the dies and fixtures on this job, we submitted the first samples to Republic for approval. While these were built in exact accordance with the drawings and specifications, they did not meet their approval due to the fact that they had not allowed close enough tolerances on certain parts. It was, therefore, necessary for us to hand fit many of the pieces which we had planned to assemble directly from the machining. This hand fitting proved to be such a laborious job that it was impossible for us to meet the production requirements.

We then proceeded with an experimental model incorporating our own ideas which eliminated the hand work. This was very acceptable to them and the tool changes, due to the new design, were made at their expense.

Due to inherent troubles with the plane on which this unit was to be used, they required extremely accurate pointer calibration which was impossible to obtain with the tolerances allowed on the specifications. We again went to work and designed a spring take-up on this pointer which entirely eliminated the objectionable backlash. This change has just recently been put into effect.

This job has been an extremely difficult one due to the exacting requirements of Republic and the Air Corps and it was necessary for us to keep at least one of our top engineers constantly on this job.

Due to an error in cores on the housing casting, we had to do hand salvage operations which were not originally figured in the first cost. We have proposed changes in this cast housing which are now being put through but which have not as yet come through in production.

ORDERED

SHIPPED

REJECTED

3720

1744

22

PARTS FOR SPERRY GYROSCOPE. (Waterbury Clock Co.)

On these parts, they tried to get other concerns in Connecticut to do this work without success. We finally took it over and made these parts successfully and in large quantities and met the schedules as outlined by them.

GUN PARTS. For High Standard Mfg. Co.

Of the many small parts we make for High Standard, we started to supply these parts from the very beginning and have been, since that time, the only source of supply.

| <u>PCS. ORDERED</u> | <u>PCS. SHIPPED</u> | <u>PCS. REJECTED</u> |
|---------------------|---------------------|----------------------|
| 4,111,616 | 2,996,278 | 51,089 |

GUN PARTS. For Colt's Patent Fire Arms Mfg. Co.

| <u>PCS. ORDERED</u> | <u>PCS. SHIPPED</u> | <u>PCS. REJECTED</u> |
|---------------------|---------------------|----------------------|
| 677,500 | 583,416 | 11,388 |

GUN PARTS. For Winchester Repeating Arms Co.

| <u>PCS. ORDERED</u> | <u>PCS. SHIPPED</u> | <u>PCS. REJECTED</u> |
|---------------------|---------------------|----------------------|
| 838,000 | 849,007 | 0 |

4. Accomplishments which we believe qualify us for being considered a valuable supplier to the United States Government.

(a) Price reductions and comparative prices. (See summary after each prime contract and sub-contract).

(b) Efficiency in Reducing Costs

- (1) Rewards to individuals for suggestions
- (2) Formanship pay based on
 - (a) Indirect labor saving per dollar of direct labor
 - (b) Materials saved
 - (c) Percentage of operators on piece work
 - (d) Cost of tool and machinery repairs
 - (e) Savings in cost of new tools and repairs by reducing average hourly operating rate through bonus incentive

- (3) Supervisors' bonus pay based on volume of production
- (4) Individual and group bonuses
- (5) Mass production methods on conveyors, groups of machines, and unit assemblies.
- (6) Redesigning of firing devices, flares, mechanical trim tabs and other units has meant not only a greater saving in materials, but man hours.
- (7) See description of each individual prime and sub-contract for results where determined.

(c) Economy in the use of raw materials. (Refer to description of prime and sub-contracts, where reference to material savings is made, but we do want you to know that on the following orders for M-1 Combination, M-1 Pull and M-1 Pressure Firing Devices, when we changed specifications, a saving of 2,494,930 pounds of brass has been made to date, as of April 26th.

(d) Efficiency in the use of facilities and in the conservation of manpower.

- (1) We have used most of our regular peace time machinery and equipment for our war work.
- (2) Some has been utilized only after somewhat costly changes.
- (3) Combination dies, ingenious assembly fixtures, special jigs and mass conveyor methods with incentives for every operator for greater production has brought down costs and manpower to the minimum.
- (4) I feel that the biggest achievement of The A. C. Gilbert Company has been in the training of women to take the place of men. We were farsighted enough to see the acute shortage of manpower, and very early in our conversion from civilian to war work, started an intensive program of teaching women to operate drill presses, lathes, power presses, large welding machines, screw machines, and do other mechanical work. Women are doing most of the trucking and handling of materials. We point with pride to the fact that there are now employed in this important war work approximately 1300 employees - 975 female, 329 male.
- (5) We were the first in our State to use women for Military Police.

(e) Character and extent of sub-contracting.

Following are listed the principal sub-contractors we have used for production on various war items including Flares, Firing Devices, Signal Relays, Range Indicators, etc.

| <u>COMPANY</u> | <u>PART</u> | <u>CONTRACTUAL OBLIGATIONS</u> |
|---------------------------|---------------------|--------------------------------|
| Armstrong Cork Co. | Flare Parts | \$ 6,884.00 |
| Farley & Loetscher Co. | " " | 7,750.00 |
| Bogert & Hopper | Packing Boxes | 93,971.00 |
| Norquist Products | " " | 21,825.00 |
| Richard Shook Corp. | " " | 34,400.00 |
| J. W. Dearborn | Screw Machine Parts | 11,218.50 |
| Ramsdell Tool Co. | " " " | 16,200.35 |
| H. P. & E. Day Co. | " " " | 73,822.00 |
| Carroll, Dunham, Smith | Firing Device " | 45,530.50 |
| American Steel & Wire Co. | " " " | 26,814.00 |
| Humason Mfg. Co. | Springs | 39,327.46 |
| Wallace Metal Co. | Screw Machine " | 104,129.20 |
| M. Backus & Sons | Flare Parts | 101,325.00 |
| Berger Bros. | " " | 546,150.00 |
| Cheney Bros. | " " | 228,000.00 |
| McAleer Mfg. Co. | " " | 331,326.58 |
| | | <u>\$ 1,688,073.59</u> |

We point with pride that we have, through our expeditors and various ones in this organization, found many small concerns that have been helpful to us, and we helpful to them. As an illustration, in 1942 we discovered that the H. P. & E. Day Company, who has been making fountain pens for the past fifty years or so, was on the verge of closing down through lack of obtaining materials, but had a trained organization of employees. We made arrangements to give them orders on a sub-contracting basis for parts for firing devices. We have simply used this as an illustration and we could supply you with indefinite data and information on many smaller concerns to whom we feel we have been helpful and who have been helpful to us.

(f) Quality of production.

Refer to footnotes on each individual prime and sub-contract giving quantity of production and rejections to determine quality of our production.

(g) Complexity of manufacturing technique.

On our Gyroscope parts, Center Arbors and Hand Center Units for 208 Fuses and other delicate pieces of mechanism, we have had to work to tolerances not over half a thousandth. This has required the use of many special gauges, instruments and extreme accuracy in workmanship and inspection. Our fixtures and tools for this close work had to be expertly designed, accurately built and now carefully checked daily for any variance. Our whole manufacturing personnel had to train themselves from toy and electrical appliance manufacturing tolerances to government work of extreme accuracy.

(h) Rate of delivery.

We are up to delivery requirements on all except three contracts, one of which requires further engineering and the other insufficient material.

(i) Inventive and developmental contribution with respect to important war contracts.

Refer to description of prime and sub-contracts for inventive and developmental contributions, and we particularly call attention to the fact that we have made no application for patents.

(j) Unusual risks incident to the performance of certain prime contracts.

We direct your attention to three important prime contracts - one for M26 Flare for the army, one for Mark 5 and one for Mark 6 Flare for the Navy, which carry extraordinary financial hazards. The reason for this is, all other prime and sub-contracts we have, inspection can be completed in the factory, and if anything does go wrong, it can, in a reasonable period of time, be corrected without serious financial loss.

The three contracts referred to above, even though all the parts have been passed by our inspectors, Army and Navy Inspectors, and specifications are lived up to one hundred percent, they call for a spot test on the proving grounds - in the case of M26 at Jefferson Proving Grounds, Madison, Indiana, the Mark 5 and Mark 6 at the Naval Proving Grounds at Dahlgren, Virginia. In view of the fact these tests are subject to weather conditions, on account of the necessity of releasing flares from planes, they are sometimes held up for long periods of time, and we have had, in the past, some very unfortunate experiences.

For your convenience, so you can appreciate this problem, we are enclosing herewith a photostat of our chart showing the condition of Navy Flares Mark 5 and Mark 6, as of April 19th, 1943. On that date there were 22 lots, a total of 4100 Mark 5 Flares, value \$227,042.00 waiting for test; and 11 lots of Mark 6 Flares, a total of 1500, value \$90,960.00 waiting for test. We find ourselves involved to the extent of \$318,002.00 on these two flares.

I don't believe it is necessary for us to accentuate the tremendous hazard and risk involved, due to the nature of these particular three important contracts. We could very easily and very simply lose an entire year's profit.