

Chapter 20

HISPANO-SUIZA AIRCRAFT CANNON DEVELOPMENT IN SWITZERLAND AND GREAT BRITAIN

SECTION 1. DEVELOPMENT BY THE PARENT HISPANO-SUIZA CO.

History and Background

The Hispano-Suiza Co. of Geneva, Switzerland, has had great international influence on the development of aircraft armament. Founded early in the century as an automobile plant with factories in Switzerland, Spain, and France, it branched into aircraft engine and automatic weapon design. The story of the development of the Hispano-Suiza type 404 aircraft gun and its adoption as a basic weapon by Great Britain and the United States in World War II is given in *The Machine Gun*, volume I, chapter 14, pages 562-590. Since World War II, the firm has centered its research activities in its Swiss headquarters.

Post-World War II Weapon Design

After World War II the outstanding machine gun design of the parent Hispano-Suiza Co. was the 20-mm Hispano (Birkigt) type 404 aircraft gun.

Postwar development work included not only refinement of standard models and the usual pursuit of the new patentable ideas but also an intent perusal of captured German documents for ideas that might be used in future development. For example, the Rheinmetall MG-151 attracted the interest of the Hispano-Suiza Co. as well as of American ordnance engineers. Both the Hispano-Suiza Co. and the United States armed services developed weapons bearing a close resemblance to the German gun.

20-mm Hispano-Suiza Type 804

The following description of this weapon was taken from a brochure of the Hispano-Suiza Co.

The AA cannon type 804 is a weapon of automatic fire with mechanical locking of the breech. The recoil is taken up by the whole of the weapon. Before starting to fire, the breechblock must be

pulled to the rear and is then held back with the sear. The return spring is thus compressed. When starting to fire and as soon as the trigger is moved, the breechblock with its percussion and locking system incorporated in it is driven forward by the return spring and starts the cartridge toward the chamber. At the moment of locking, the locking pieces move downward and release the unlocking slides, driving the firing pin forward. Continued movement of the firing pin with respect to the now stationary breechblock stops the locking pieces and locks the breech. Ignition is produced at the end of the movement by the unlocking plates. During the interval when the projectile is in the barrel, the recoil of the rearward traveling mass is checked by a heavy spring which also assures the return into position of the weapon. An oil cushion checks the last movement forward and thus avoids abnormally heavy shocks. The moment the projectile leaves the gun barrel, a powerful muzzle brake absorbs a great part of the kinetic energy of the recoiling mass. A gas piston unlocks the breechblock. The remaining gas pressure drives it to the rear at high speed, the cartridge case then driving the breechblock rearward. The ejection of the cartridge case takes place during the recoil of the breechblock as the rim of the case strikes the ejector. The recoil of the breechblock is checked in part by the return spring, and at the end of the travel by the large buffer spring. The accumulated energy in the spring alters the movement of the breechblock and drives it at very great speed forward with the aid of the driving spring. This is a very important feature in connection with obtaining a high rate of fire with the weapon. The magazine or feeder fixed on the weapon does not recoil with the action. The interrupted threaded

joint of the barrel permits the latter being changed rapidly.

20-mm Hispano-Suiza Type 820

Engineers of the Hispano-Suiza Co. developed a more powerful cartridge for a 20-mm cannon and a more rugged mechanism to fire it, giving this version the official designation type 820. It was based, however, on the same principle as the well known and thoroughly seasoned original Hispano-Suiza action. The most important features on the refined weapon are an initial velocity of 3,400 foot per second and a rate of fire in the neighborhood of 1,000 rounds a minute. These improvements were obtained with little increase in weight, the new gun weighing 112 pounds or 20 pounds more than the original model.

The barrel is 85 calibers long and weighs 52 pounds, and with certain exceptions it is possible to change the length of the barrel and to adapt the gun to different needs of aircraft. The weapon can be fed either from a magazine or by belt of the disintegrating link type with the aid of a powered belt-feed mechanism.

The Hispano-Suiza Co. improved considerably the striking effect of the 20-mm ammunition intended for use in type 820. The original ammunition (standard) can also be used in the British Mark V, the French 404, and the American M3 gun. New types of projectiles included (1) high-explosive incendiary with high-blast effect, (2) double-effect shell incendiary type Mark IDA, and (3) incendiary and armor piercing incendiary shell type Mark ORC.

General Data: 20-mm French Hispano-Suiza Type 804

Gun length: 100 inches. Gun weight, without magazine: 99.2 pounds. Rate of fire: 750-800 rounds/minute. Muzzle velocity: 2,785 feet/second. System of operation: Retarded blowback. System of locking: Swinging lock. System of feeding: Drum, or spring-actuated feed employing links. Method of headspace: None. Location of feed opening: Top of receiver. Location ejection opening: Bottom of receiver. Method of charging: Pneumatic, manual. Method of cooling: Air.	Barrel length, with muzzle brake: 87 inches. Barrel weight: 53 pounds. Rate control: None. Barrel removal: Quick disconnect. Bore: Number of grooves: 12. Groove depth: 0.015 inch. Groove width: 0.205 inch. Pitch: 7° (equals 1 turn in 25.587 calibers and 1 turn in 20.137 inches). Direction of twist: Right hand. Form of twist: Constant. Length of rifling: 80 inches.
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General Data: 20-mm French Hispano-Suiza Type 820

Gun length: 98 inches. Gun weight: 112 pounds. Rate of fire: 1,000 rounds/minute. Muzzle velocity: 3,280 feet/second. System of operation: Gas and retarded blowback. System of locking: Swinging lock. System of feeding: Drum or spring-actuated continuous feed. Method of headspace: None in weapon design. Location of feed opening: Top of receiver. Location of ejection opening: Bottom of receiver. Method of charging: Pneumatic. Method of cooling: Air.	Barrel length: 68 inches. Barrel weight: 52 pounds. Rate control: None. Barrel removal: Quick disconnect. Bore: Number of grooves: 9. Groove depth: 0.015 inch. Groove width: 0.205 inch. Pitch: 7° (equals 1 turn in 25.587 calibers and 1 turn in 20.137 inches). Direction of twist: Right hand. Form of twist: Constant.
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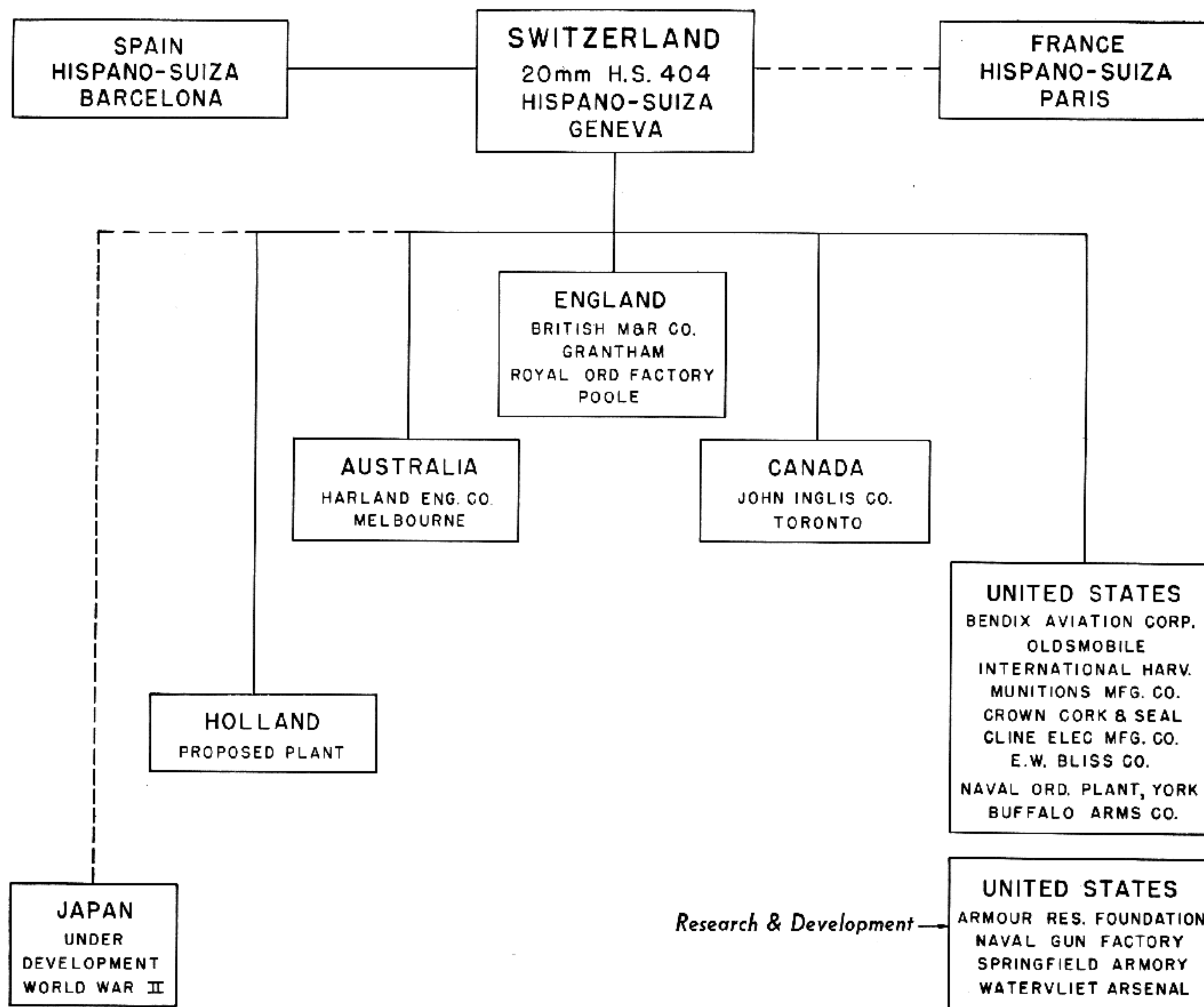


Figure 20-1. Facilities for manufacture of Hispano-Suiza Guns.

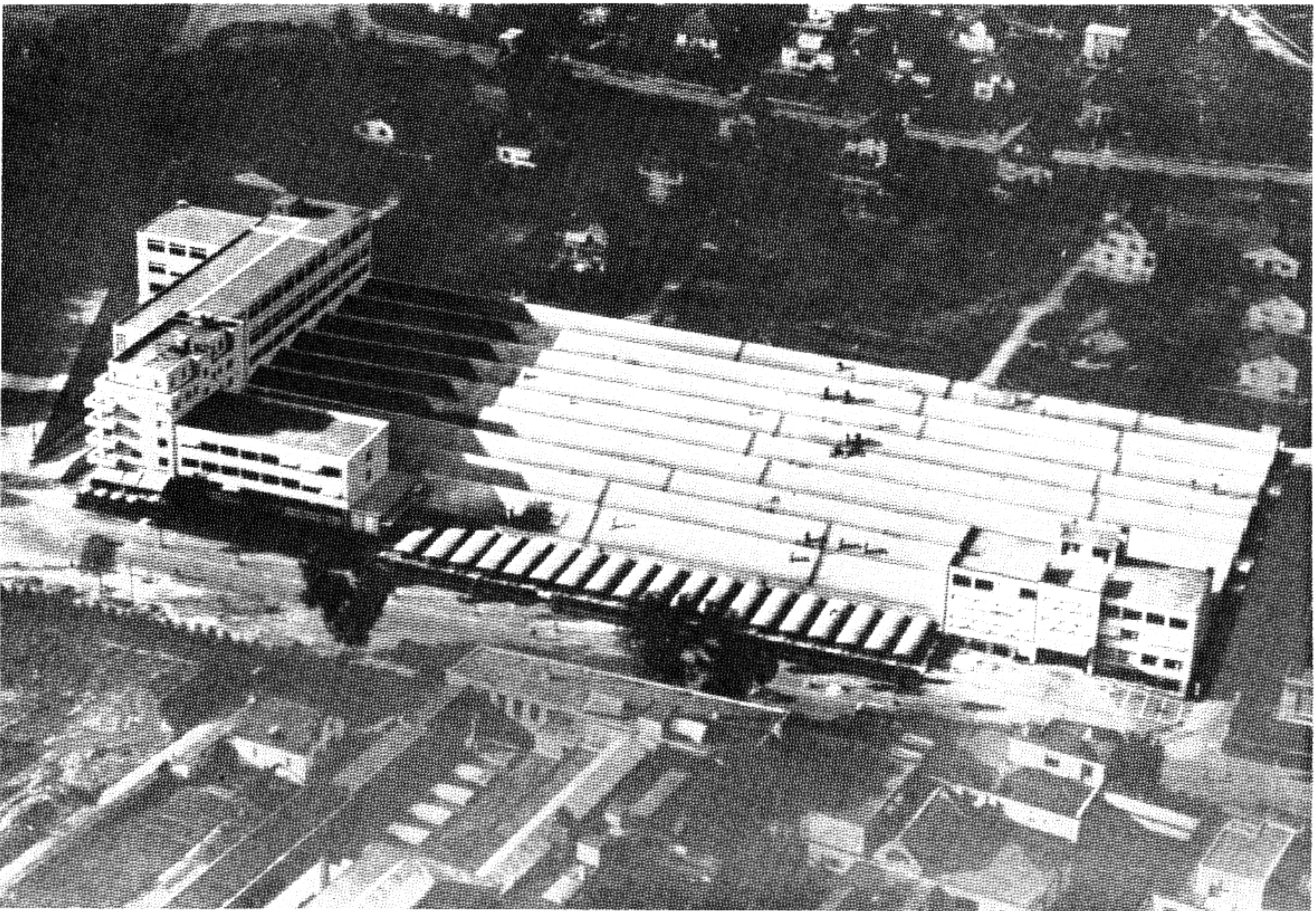


Figure 20-2. Aerial view of the Hispano-Suiza factory in Switzerland.

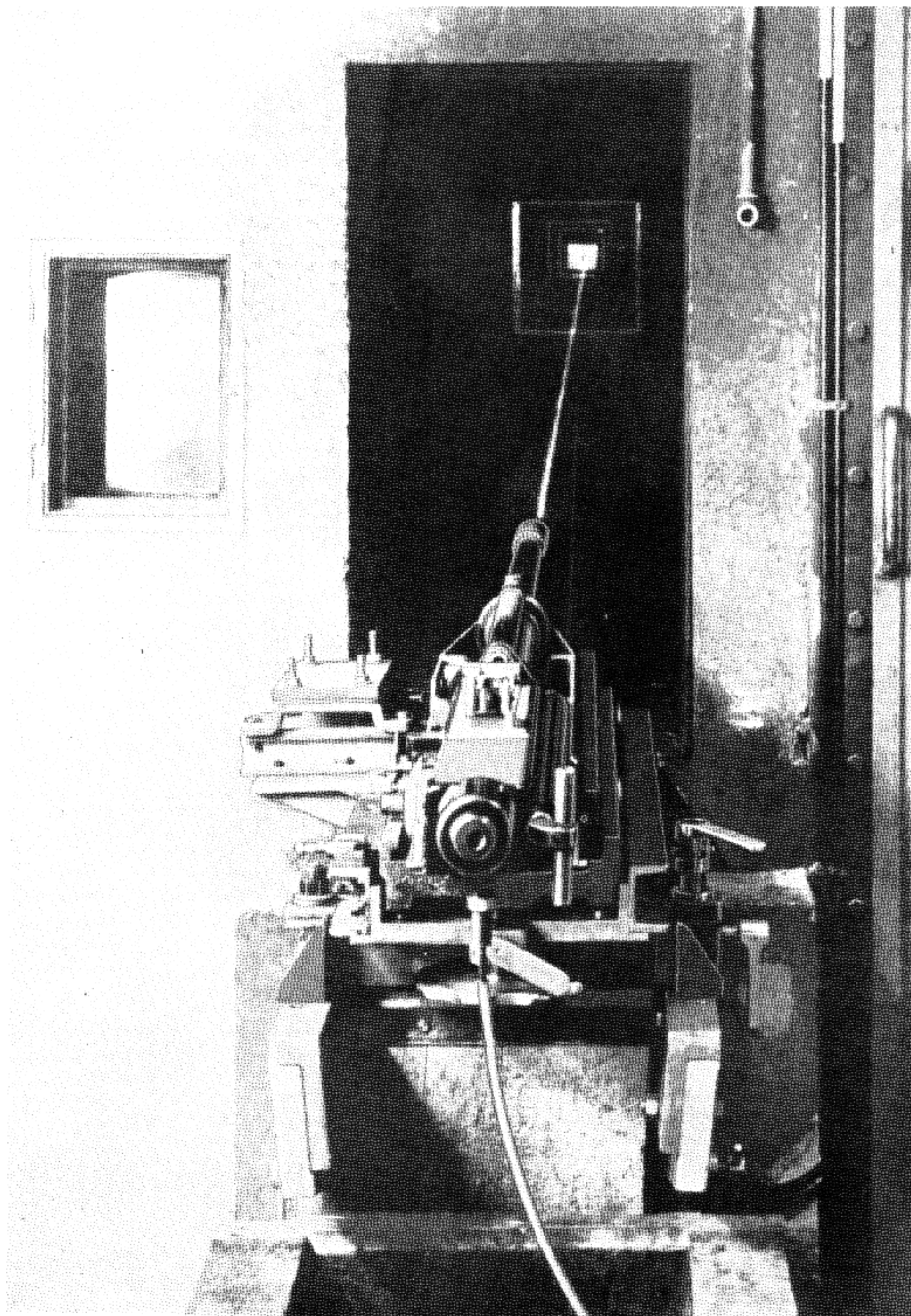


Figure 20-3. Automatic cannon undergoing proof testing at the Hispano-Suiza factory in Switzerland.

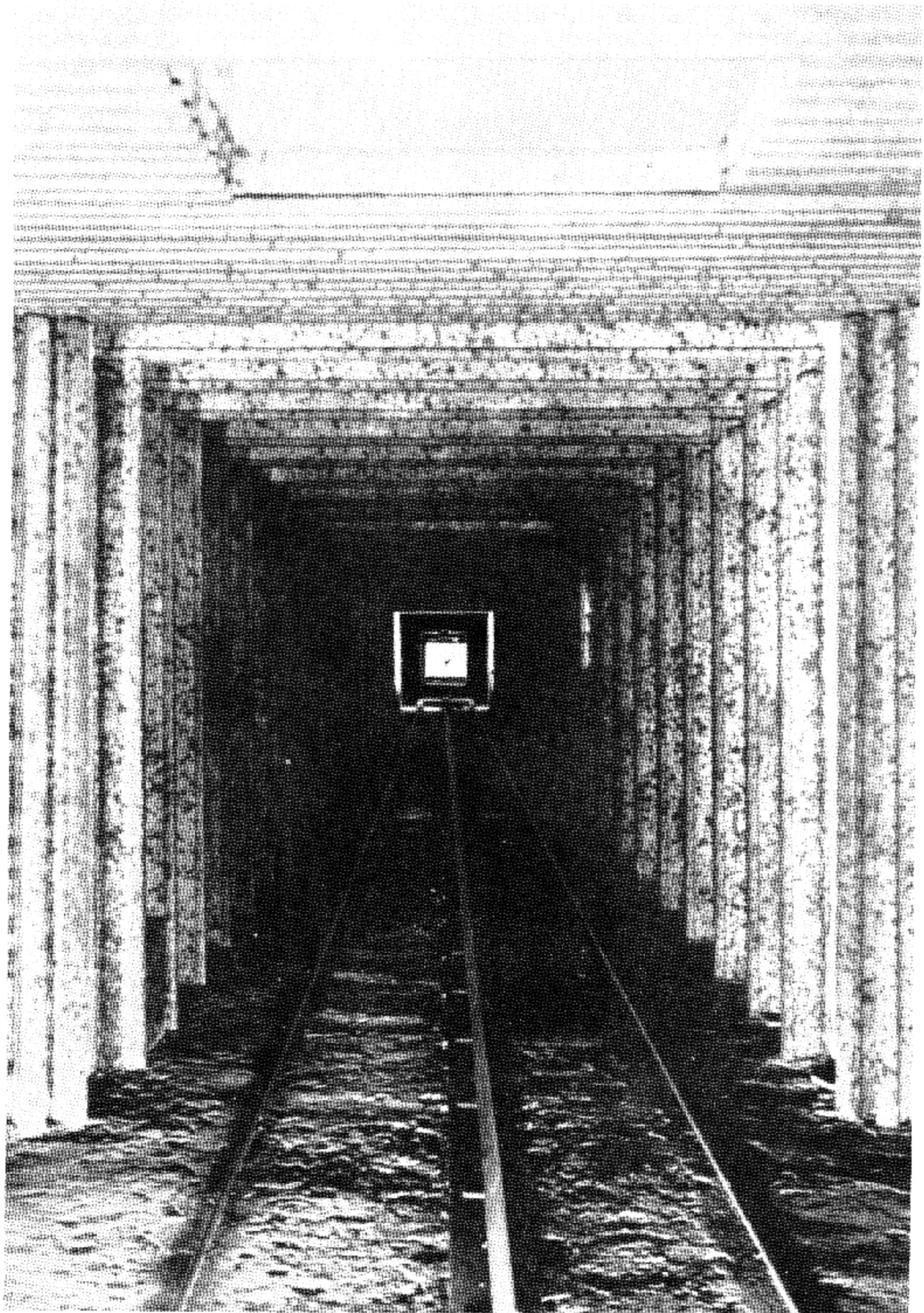


Figure 20-4. Firing tunnel at the Hispano-Suiza factory.

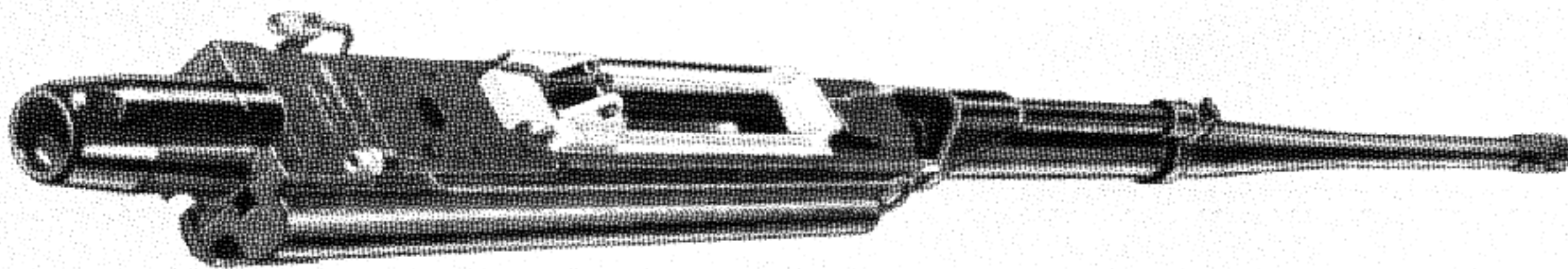


Figure 20-5. 20-mm Hispano-Suiza Aircraft Cannon Type 804. This is a wing gun with pneumatic charging.



Figure 20-6. 20-mm Hispano-Suiza Antiaircraft Cannon Type 804.

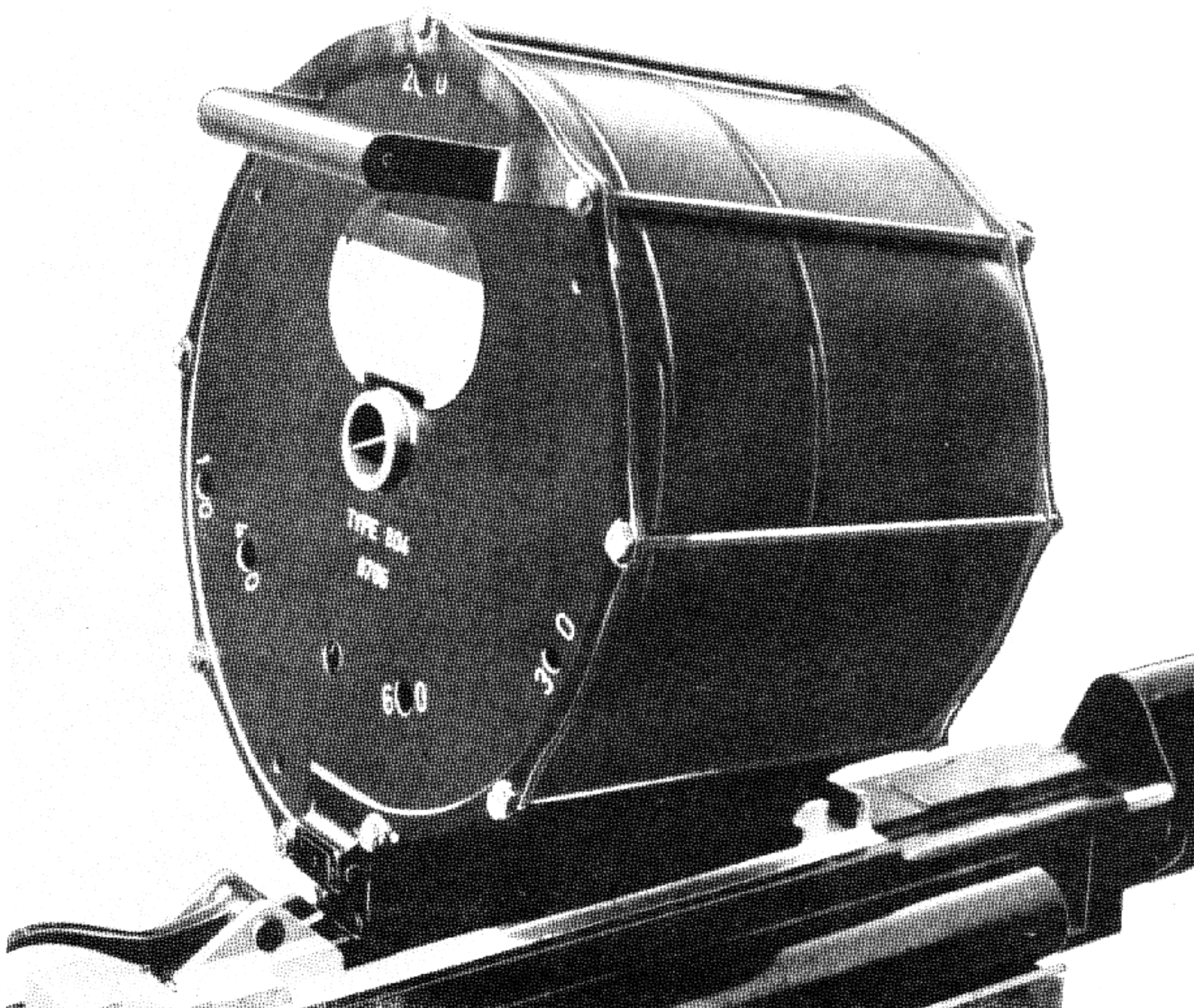


Figure 20-7. 20-mm Hispano-Suiza Aircraft Cannon Type 804 with drum feed attached. Closeup view.

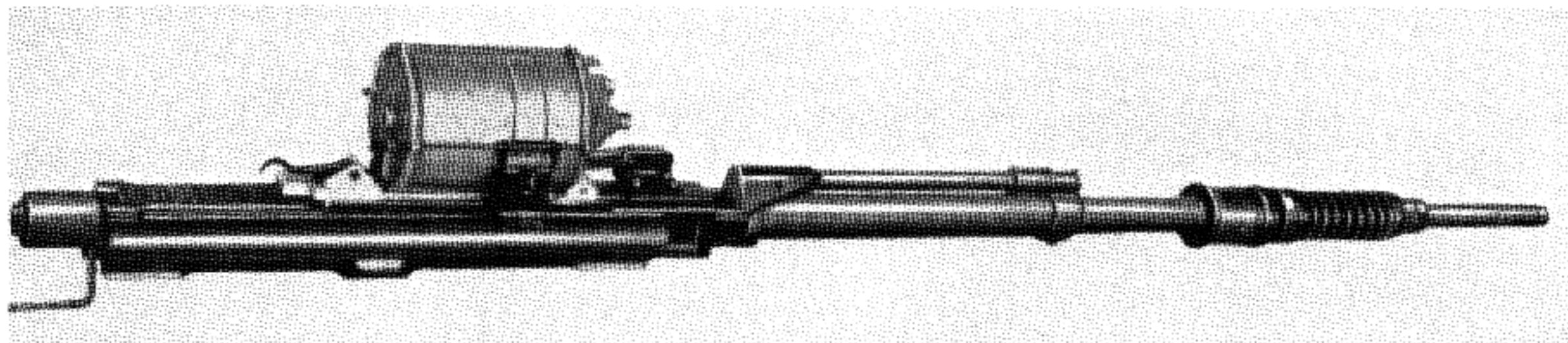


Figure 20-8. 20-mm Hispano-Suiza Aircraft Cannon Type 804. Barrel length, 65 calibers with manual charger.

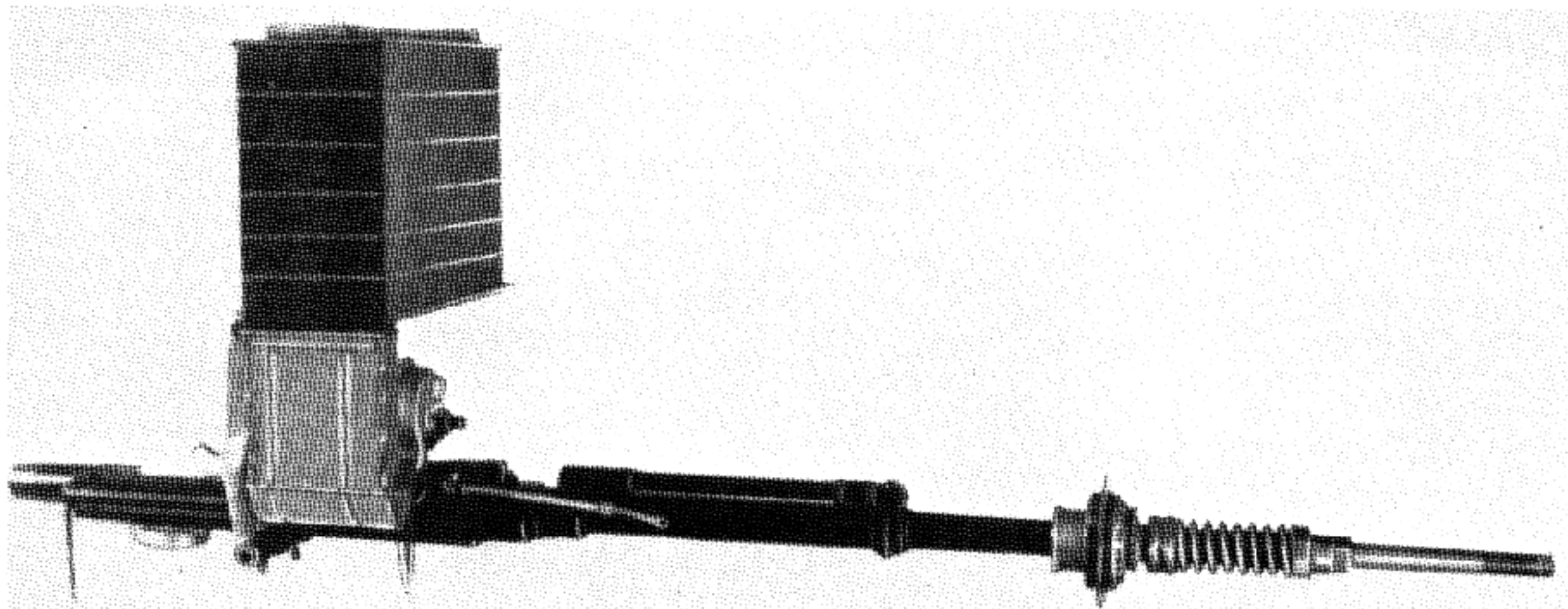


Figure 20-9. 20-mm Hispano-Suiza Aircraft Cannon Type 804. Barrel length, 70 calibers with feeder.

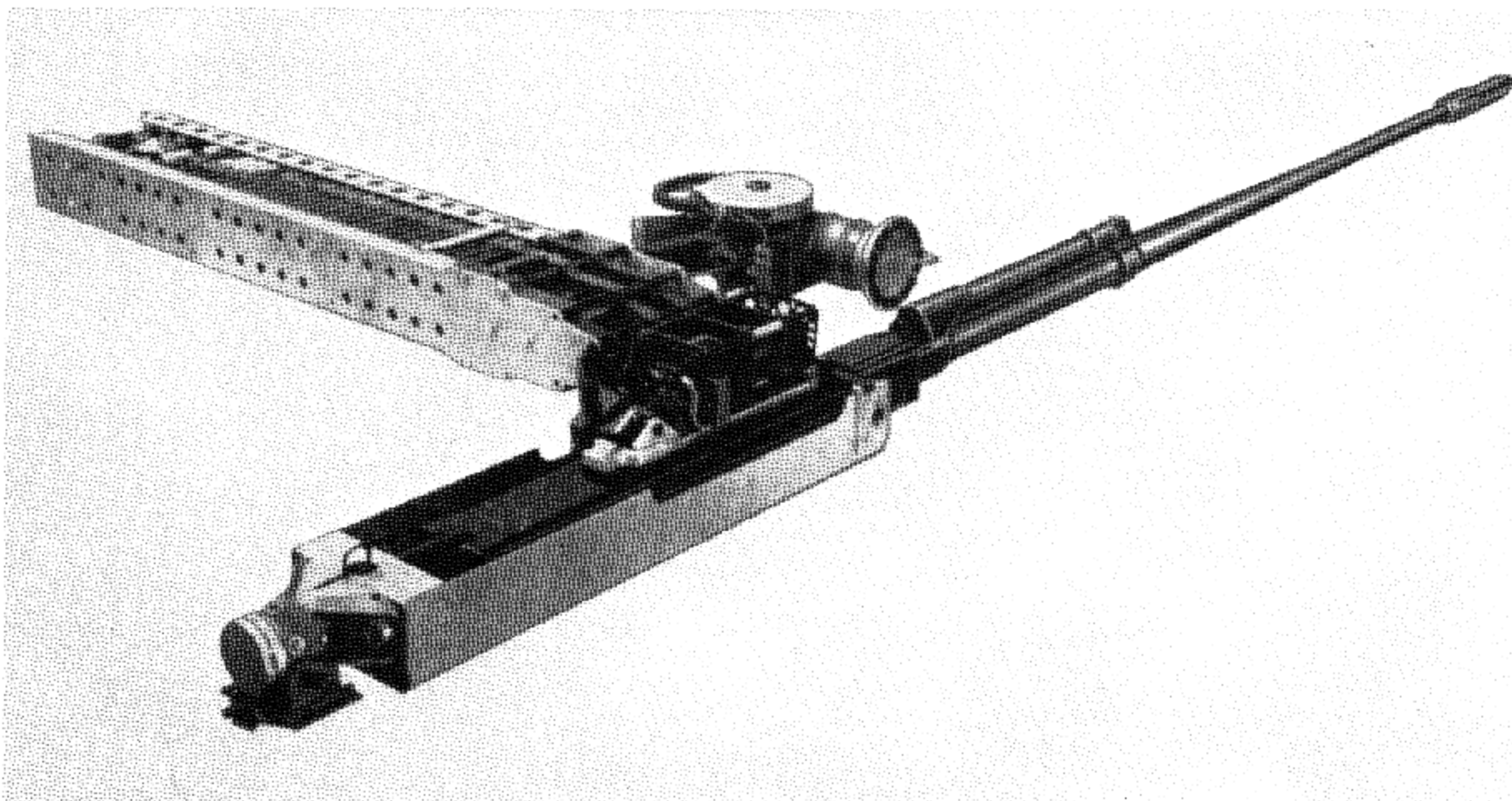


Figure 20-10. Wing magazine holding 200 rounds for 20-mm Hispano-Suiza Automatic Gun Type 804.

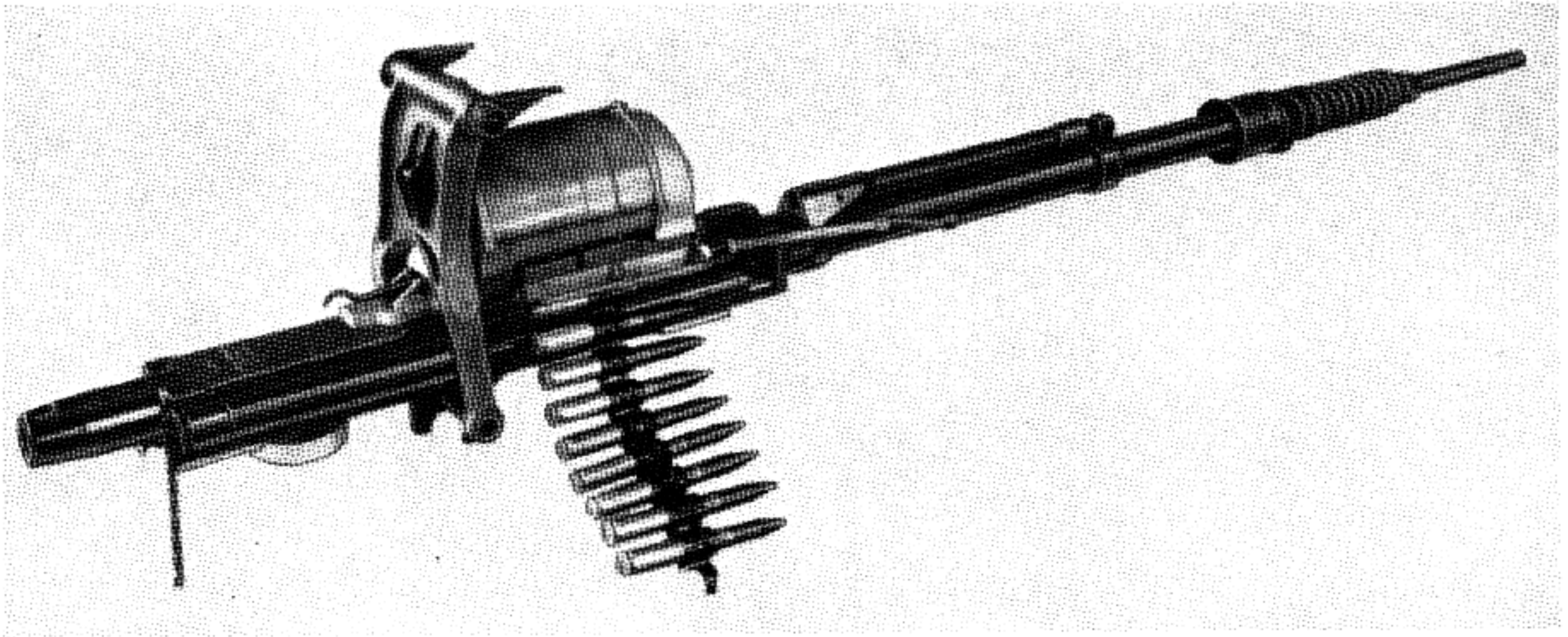


Figure 20-11. 20-mm Hispano-Suiza Aircraft Cannon Type 804, showing front and rear mountings.

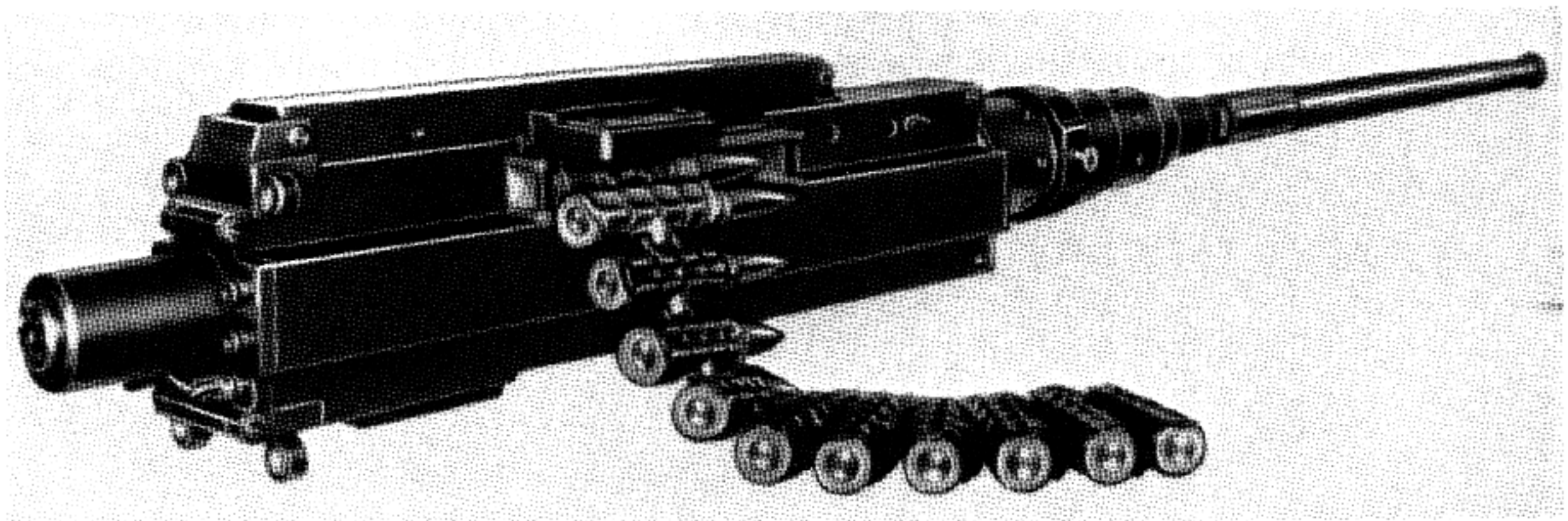


Figure 20-12. 37-mm Hispano-Suiza Automatic Cannon Type 606.

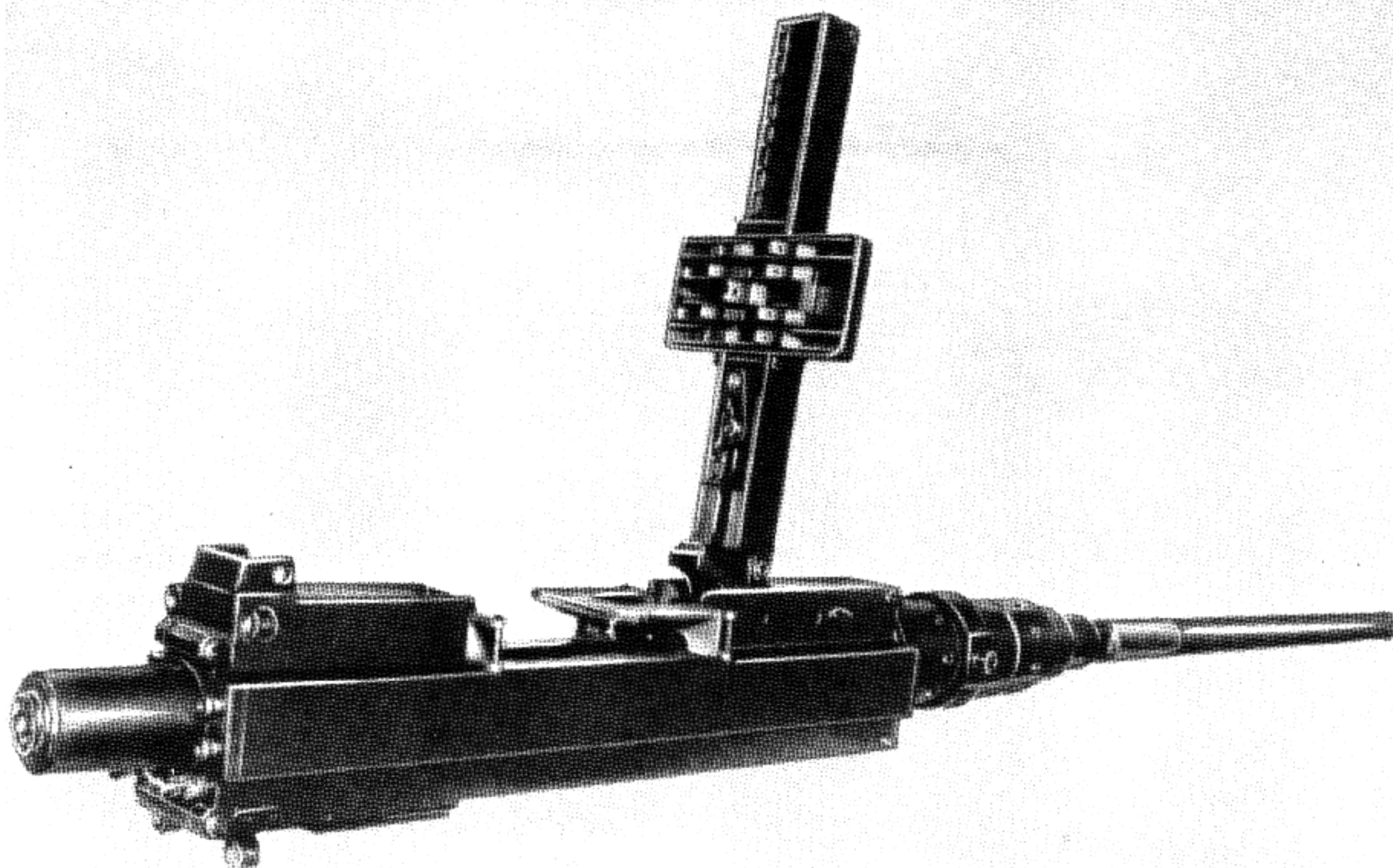


Figure 20-13. 37-mm Hispano-Suiza Automatic Cannon Type 606, with cover open.

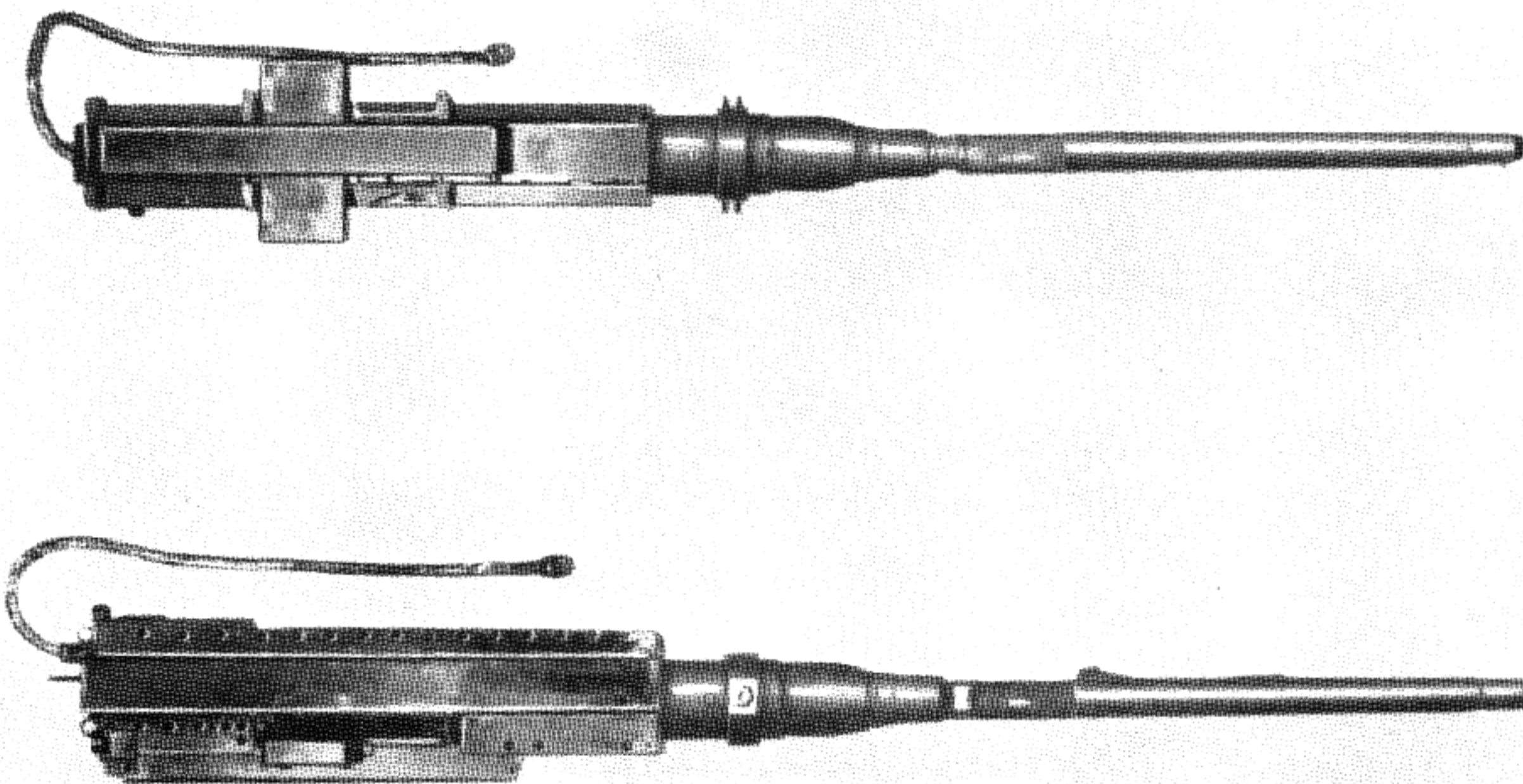


Figure 20-14. 30-mm Hispano-Suiza Automatic Cannon Type 603.

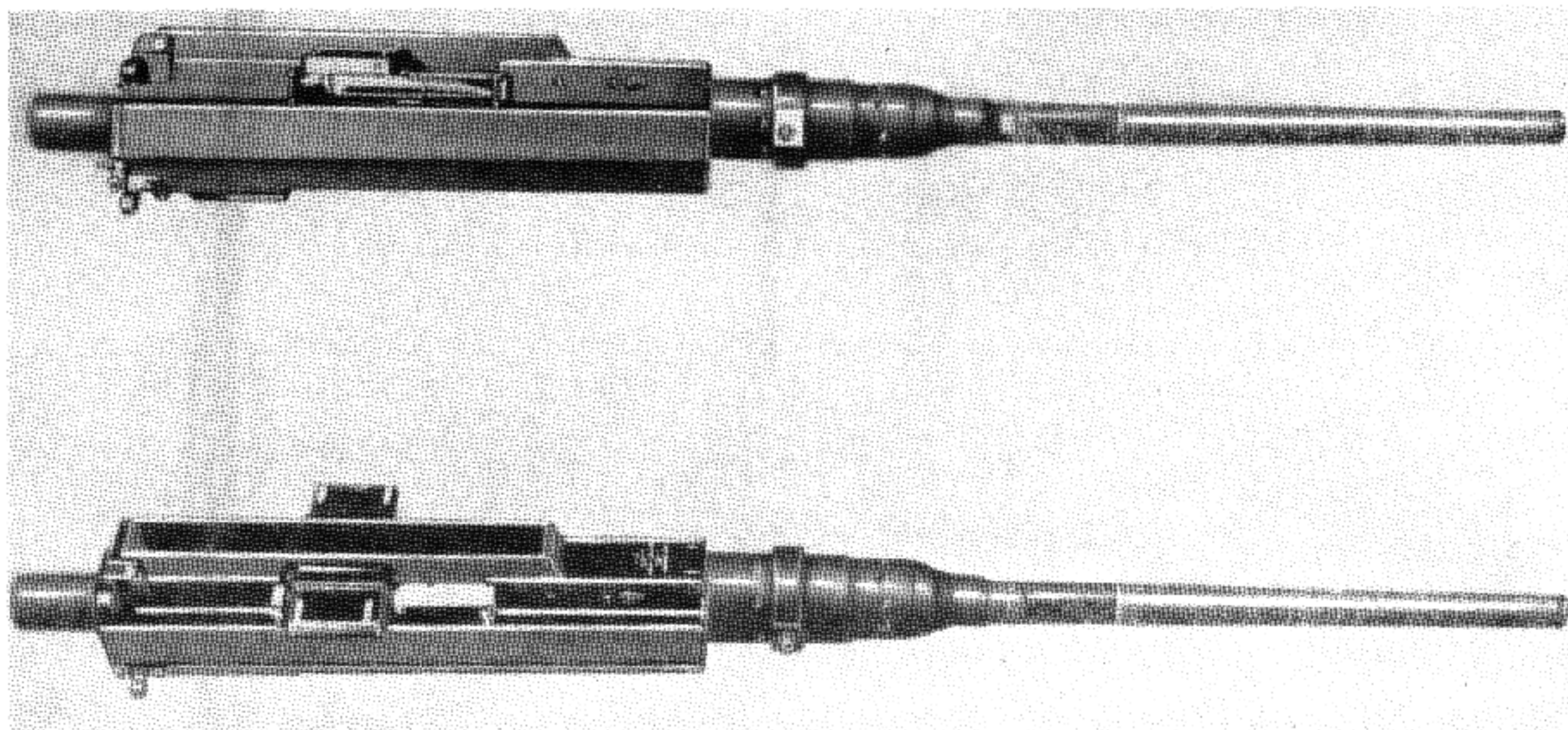


Figure 20-15. 30-mm Hispano-Suiza Automatic Cannon Type 603.

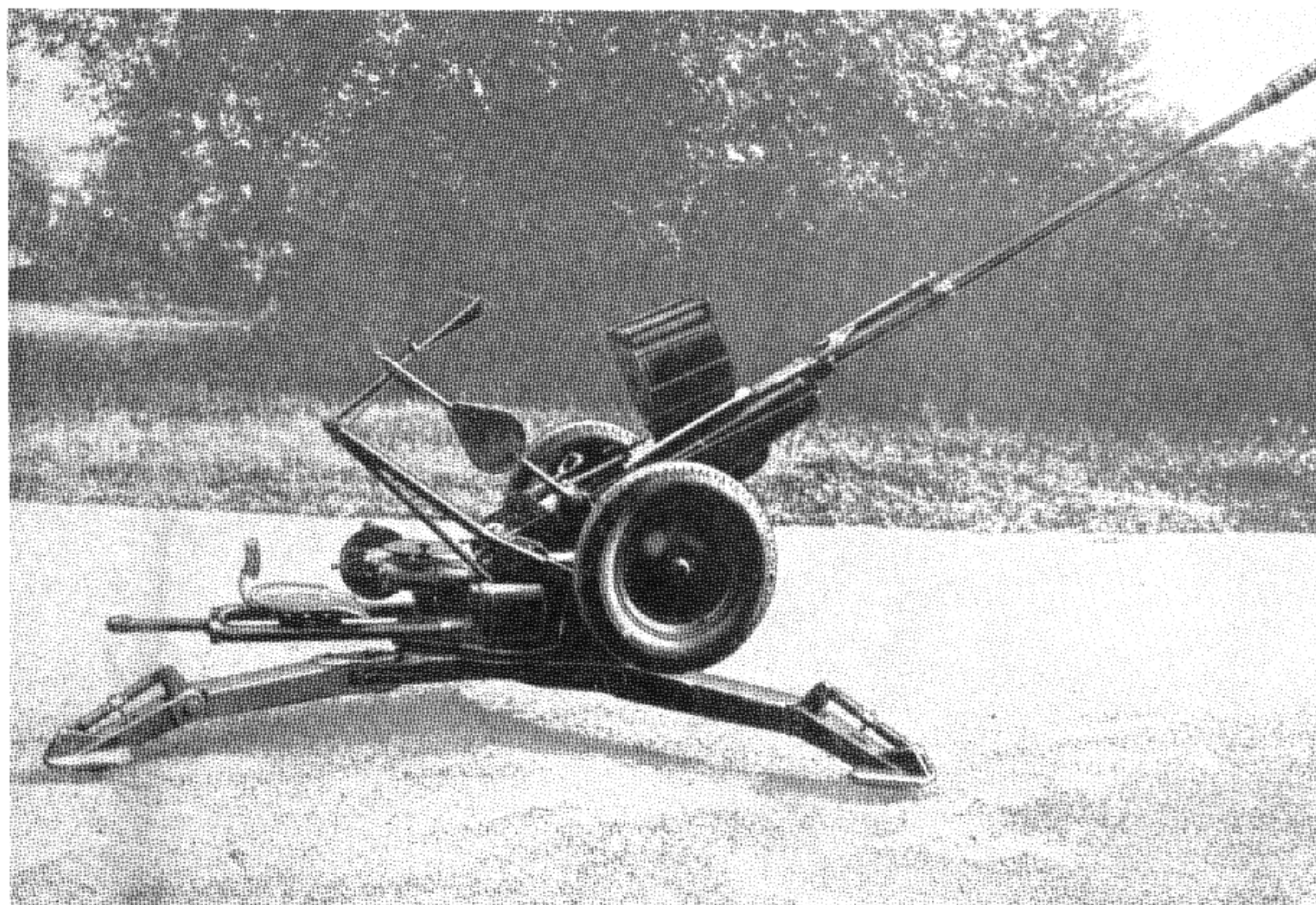


Figure 20-16. 30-mm Hispano-Suiza AA Cannon Type 830.

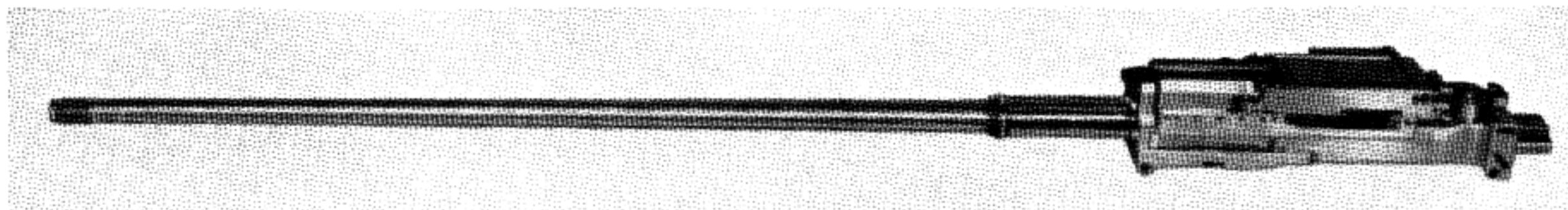


Figure 20-17. 30-mm Hispano-Suiza Aircraft Cannon Type 825. Left side view.

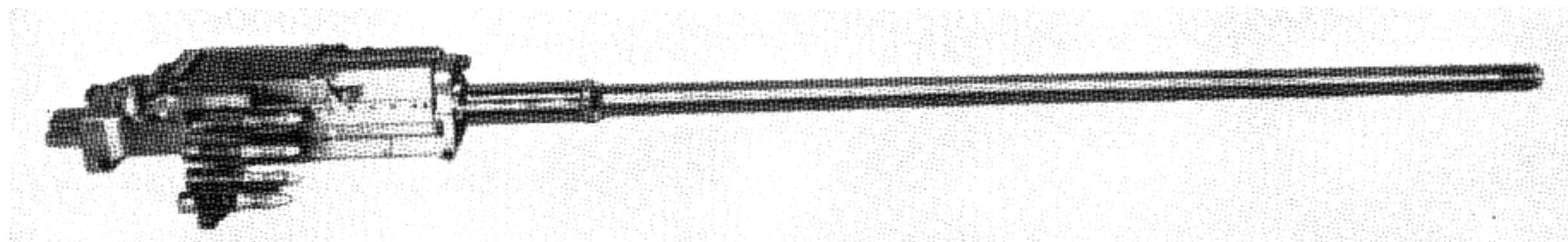


Figure 20-18. 30-mm Hispano-Suiza Aircraft Cannon Type 825. Right side view.

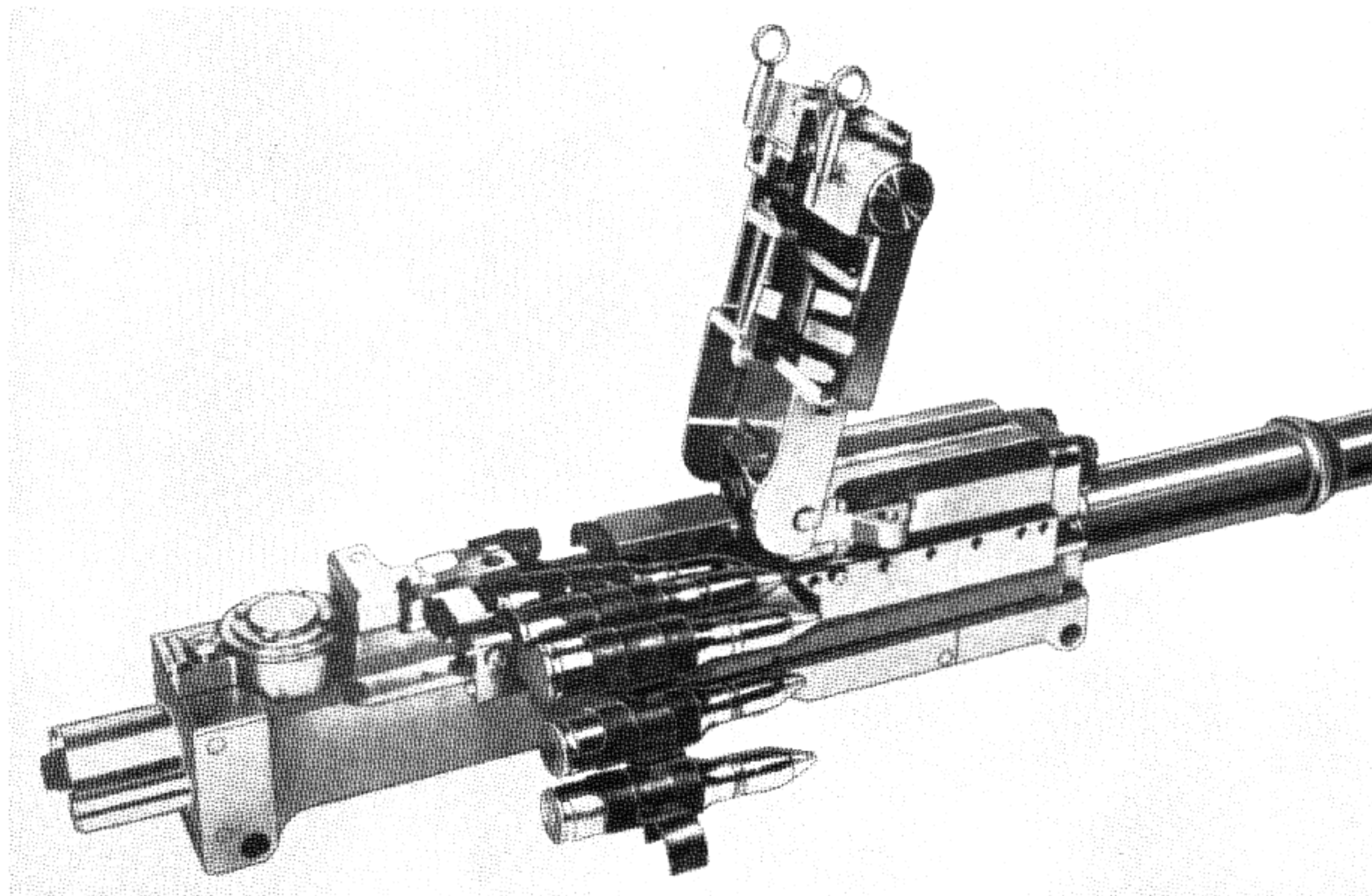


Figure 20-19. 30-mm Hispano-Suiza Automatic Cannon Type 825. Closeup of feedway.

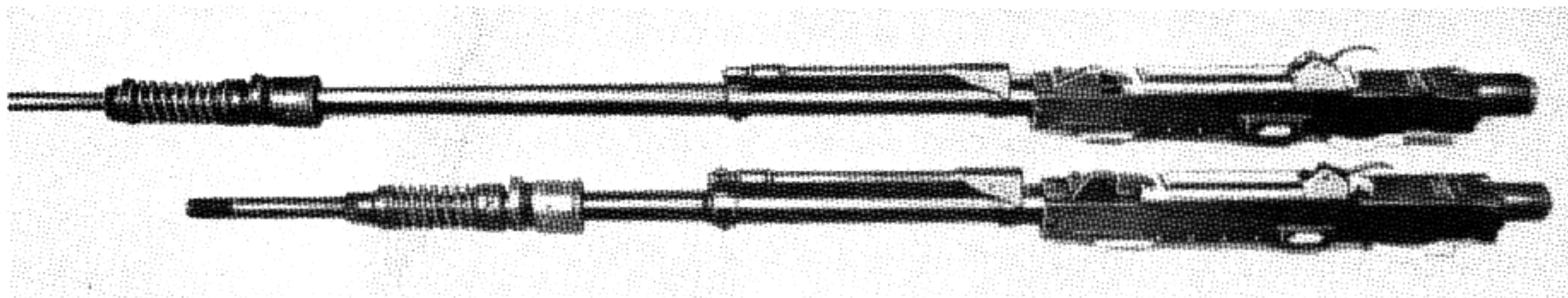


Figure 20-20. 20-mm Hispano-Suiza Type 820 Aviation Gun (above) and 20-mm Hispano-Suiza Type 804 (below).



Figure 20-21. The basic 20-mm Hispano-Suiza Type 820 Gun (above) and the basic 20-mm Hispano-Suiza Type 804 Gun.

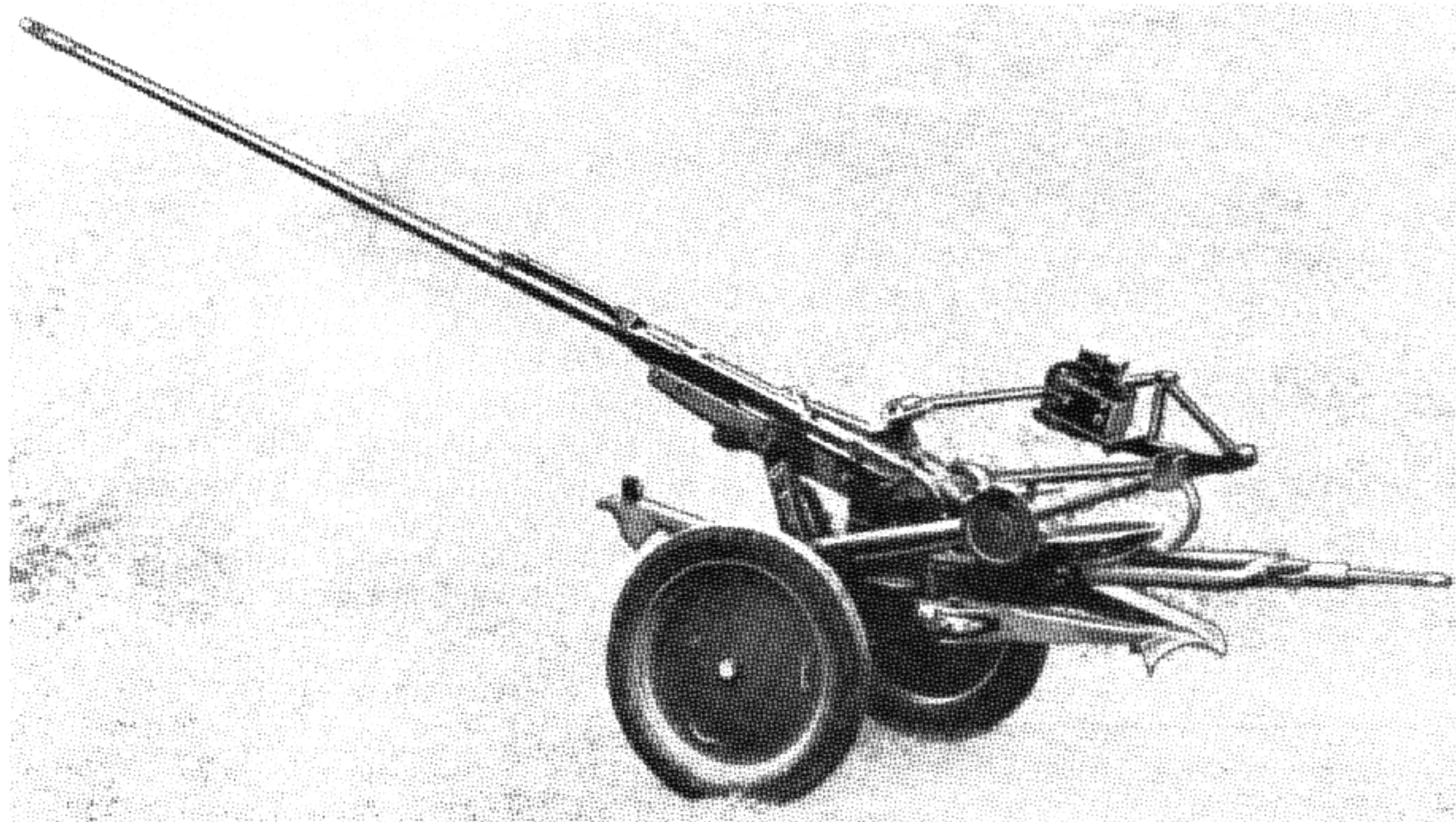


Figure 20-22. 20-mm Hispano-Suiza Type 820 Gun in traveling position.

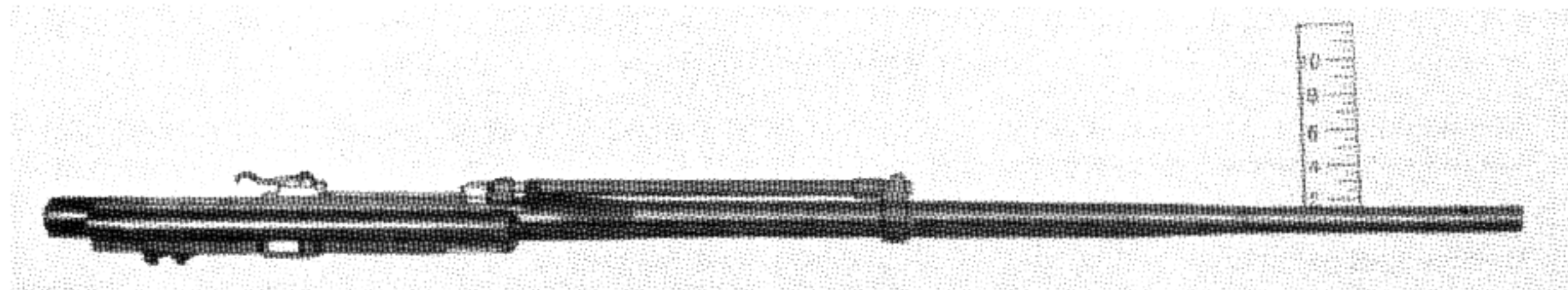


Figure 20-23. 20-mm Hispano-Suiza Cannon Type 404, manufactured for the French Government in World War II.