

March 17, 1931.

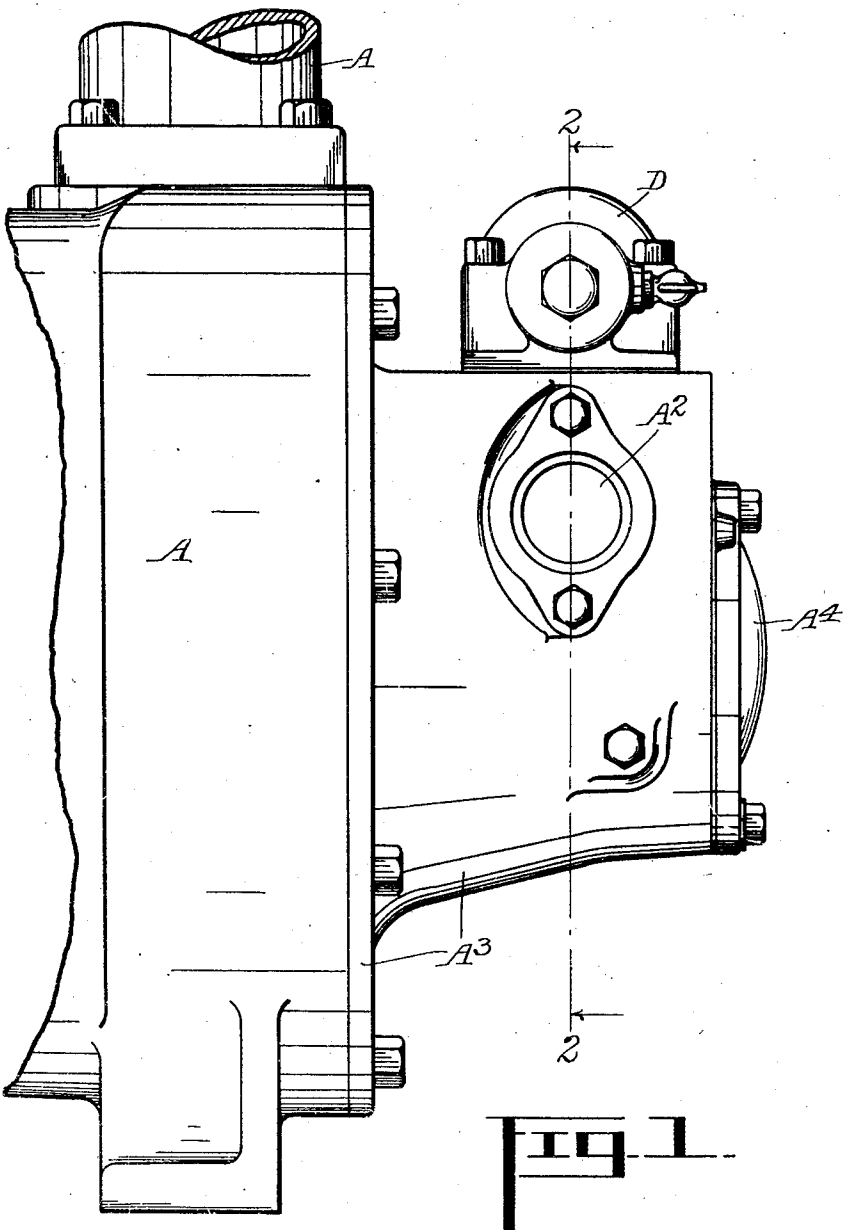
C. W. DAKE

1,796,508

AUTOMATIC STOP FOR STEAM TURBINES AND THE LIKE

Filed Oct. 7, 1927

4 Sheets-Sheet 1



INVENTOR
Charles W. Dake
BY
Parker & Carter
ATTORNEYS.

March 17, 1931.

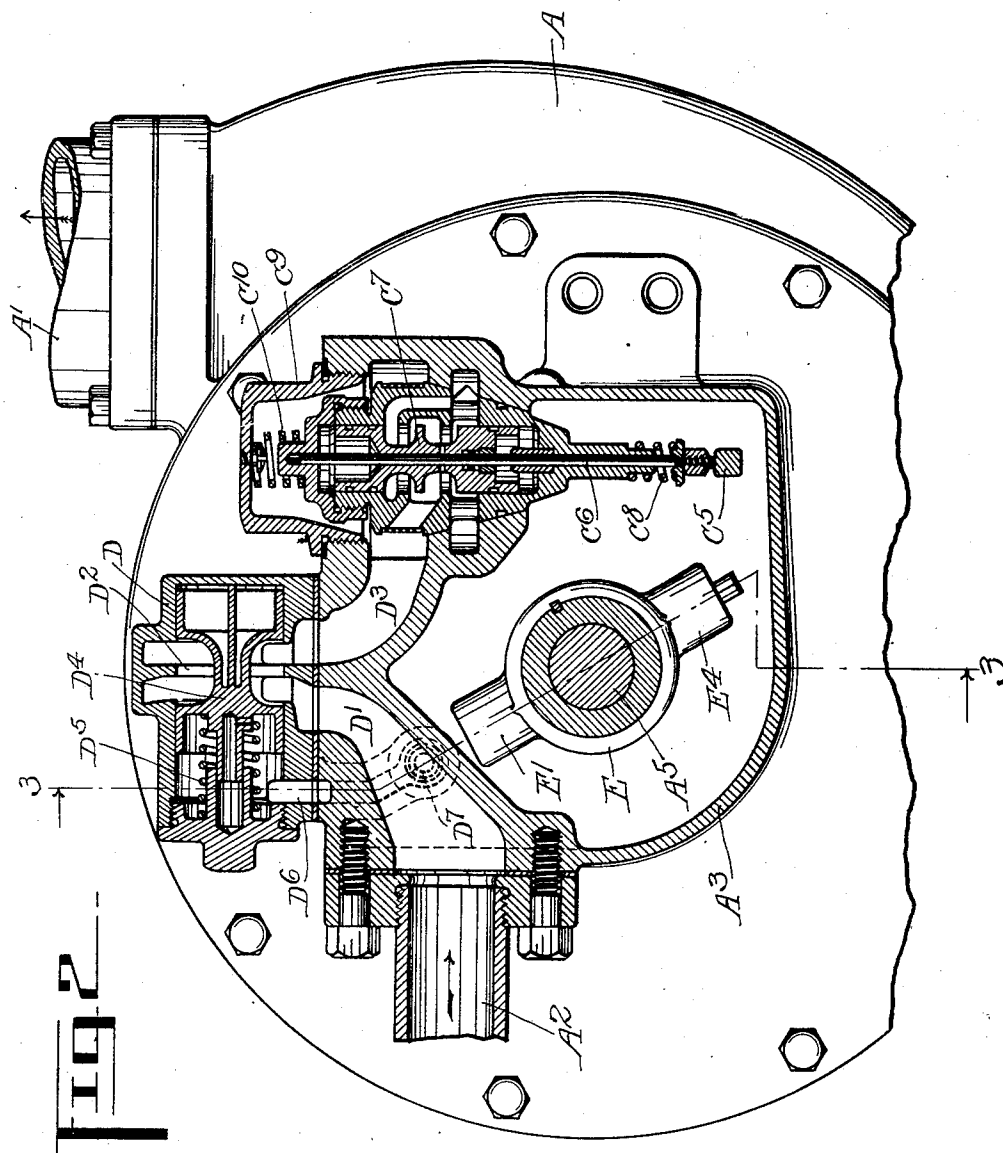
C. W. DAKE

1,796,508

AUTOMATIC STOP FOR STEAM TURBINES AND THE LIKE

Filed Oct. 7, 1927

4 Sheets-Sheet 2



INVENTOR
Charles W. Dake
BY
Parke & Carter
ATTORNEYS.

March 17, 1931.

C. W. DAKE

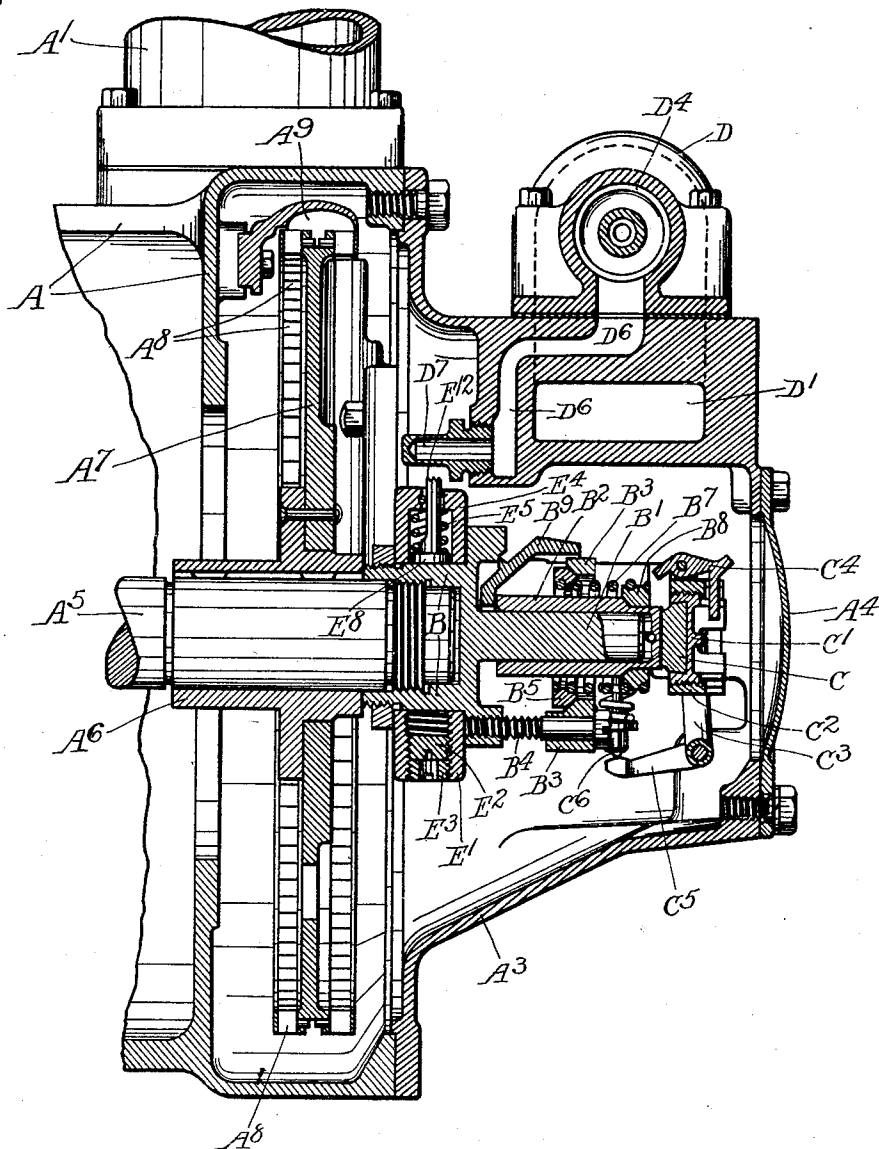
1,796,508

AUTOMATIC STOP FOR STEAM TURBINES AND THE LIKE

Filed Oct. 7, 1927

4 Sheets-Sheet 3

Fig. 3.



INVENTOR
Charles W. Dake
BY
Parks & Carter
ATTORNEYS.

March 17, 1931.

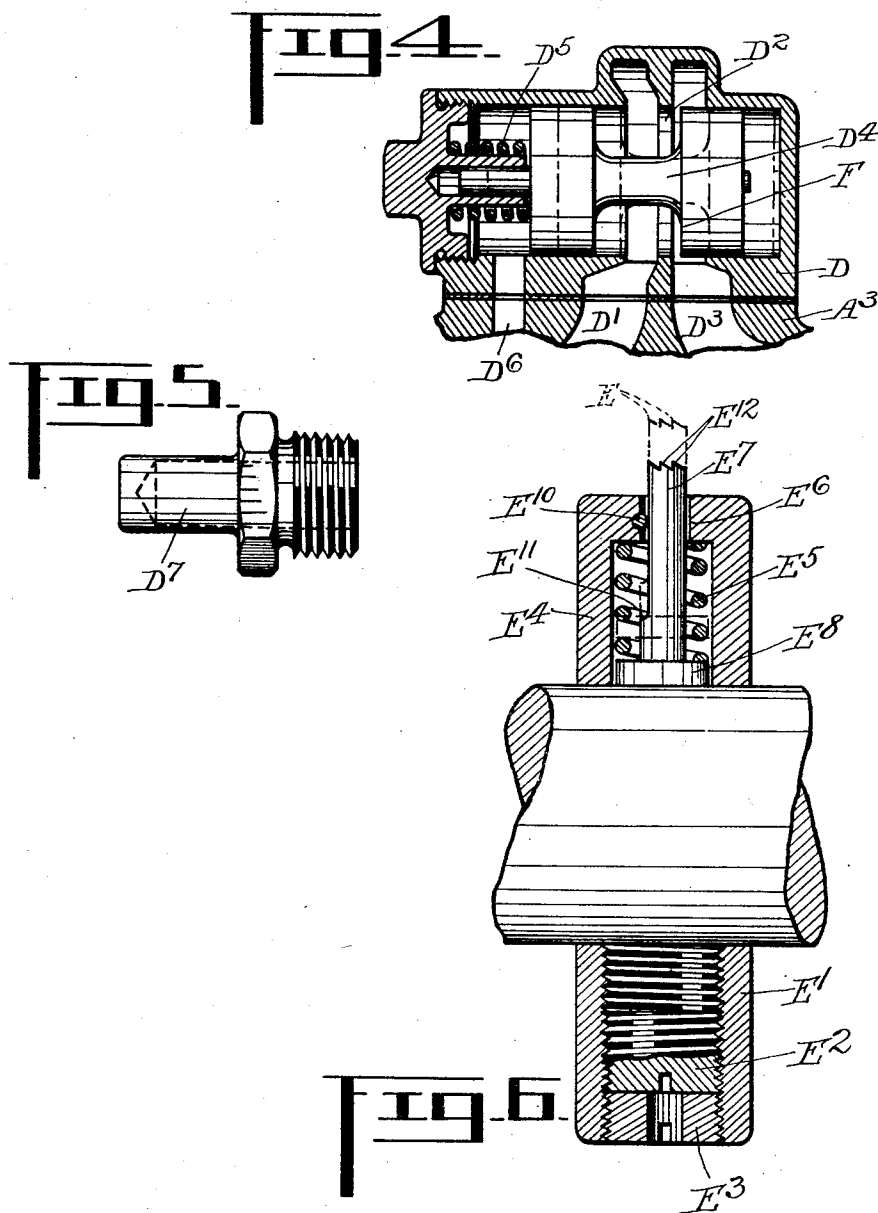
C. W. DAKE

1,796,508

AUTOMATIC STOP FOR STEAM TURBINES AND THE LIKE

Filed Oct. 7, 1927

4 Sheets-Sheet 4



INVENTOR
Charles W. Dake
BY
Parke & Carter
ATTORNEYS.

UNITED STATES PATENT OFFICE

CHARLES W. DAKE, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE PYLE NATIONAL COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF NEW JERSEY

AUTOMATIC STOP FOR STEAM TURBINES AND THE LIKE

Application filed October 7, 1927. Serial No. 224,592.

My invention relates to improvements in automatic stops for steam turbines and the like and has for one object to provide an automatic stop located within the turbine housing which will automatically break the steam line when the speed of the turbine exceeds a predetermined point and compel the operator to open the turbine before operation can be resumed. The purpose of this is, of course, to compel the operator to get at the inside of the turbine when it is comparatively easy to resist the governor to control the speed and thereby prevent long continued unauthorized operation of the turbine at improper high speeds. Other objects will appear from time to time in the specification and claims.

My invention is illustrated more or less diagrammatically in the accompanying drawings, wherein—

Figure 1 shows a side elevation of the governor end of a turbine;

Figure 2 shows a section along the line 2—2 of Figure 1;

Figure 3 is a section along the line 3—3 of Figure 2;

Figure 4 shows a detail on an enlarged scale of the cut off piston with the piston in elevation;

Figure 5 is an enlarged scale view in elevation of the shut off capsule;

Figure 6 is a section on an enlarged scale showing the centrifugally operated release member.

Like parts are indicated by like characters throughout the specification and drawings.

A is a turbine housing having an exhaust pipe A¹ and a steam supply pipe A². A³ is the governor housing removably bolted onto the turbine housing and closing one side thereof. A⁴ is a cover plate covering the opposed end of the governor housing. A⁵ is the turbine shaft, the bearings not being here shown. Mounted on the shaft is a turbine wheel comprising a hub A⁶, web A⁷ and buckets A⁸, the axle not being shown. A⁹ is a guide passage through which steam discharged from the buckets is returned thereto in the usual manner.

B is a governor cap threaded on the end of the turbine shaft. It terminates in a reduced shaft B¹ on which is slidably mounted a sleeve B². B³ is an anchor ring surrounding but out of contact with the sleeve and held on the governor cap by means of the screws B⁴. B⁵ is an abutment ring engaging the anchor ring B³ and attached to the inner end of the governor spring B⁷. The outer end of the spring B⁷ is attached to the holding ring B⁸ which ring engages a shoulder on the sleeve B² and tends to thrust the sleeve inwardly. B⁹ is a governor weight fulcrumed about a knife edge as shown on the cap B, the outer end being weighted, the inner end engaging the sleeve B². As the shaft rotates centrifugal force tends to throw the weighted ends out and move the sleeve toward the right as shown in Figure 3.

C is a wear plate engaging the end of the sleeve B². This wear plate is mounted in a socket C¹ threaded in a holding ring C² in the governor bell crank lever C³. C⁴ is a latch whereby the plug C can be moved toward and from the governor sleeve B² to adjust the speed of the turbine. The other end of the bell crank lever C⁵ engages the valve stem C⁶ to move the steam throttle valve C⁷ up and down on its seat to control the flow of steam. C⁸ is a spring resisting the movement of the governor stem and holding it against the lever C⁵. C⁹ is a cap closing the valve pocket and enclosing the removable socket therein which contains the valve. C¹⁰ is a spring seating the removable socket in its air pocket.

D is the housing for the automatic stop thereof. It is bolted onto the governor housing. Steam passes from the pipe A² through the passage D¹ through the port D², passage D³ to the valve C⁷, as long as the parts are in the position shown in Figure 2. D⁴ is a piston valve slidable in its seat in the housing D. D⁵ is a spring tending to yieldingly urge the valve in to the open unobstructed position. There is a certain amount of leakage around both sides of this valve so that the valve is to all intents and purposes a balanced valve, the pressure be-

ing balanced on both sides of the valve pistons permitting the spring to hold the valve open and permitting steam to flow without restriction to the governor controlled throttle valve. D⁶ is a passage leading from one side of the valve D⁴ to a threaded thimble or capsule D⁷. This thimble or capsule D⁷ extends out toward the valve wheel.

E is a stop ring mounted on the governor cap B. It has an arm E¹ adapted to contain a set screw E² and lock plug E³ whereby it may be held against rotation on the shaft or governor cap. E⁴ is the opposed arm containing a spring E⁵. This arm is apertured at E⁶. E⁷ is a cutter bar slidable in the hole E⁶ and terminating in a plunger E⁸. E⁹ is a spring interposed between the plunger E⁸ and the outer end of the arm E⁴ and holding it in the full line position. E¹⁰ is a stop pin, the shaft E⁷ being cut away and provided with a shoulder E¹¹ which will engage the stop pin when the shaft is on its outer position to limit its outward excursion. It will be noted that when the parts are in the full line position shown in Figure 6, the cutter blades E¹² do not come in contact with the capsule D⁷ but if the speed rises to such a point as to permit the spring to be overcome, the cutter blades are forced out and as the turbine rotates they engage the thin walls of the capsule D⁷ and break them open thus permitting steam to pass from the passage D⁶ out into the turbine without cutting through the nozzle. Since the turbine is at exhaust pressure no steam will pass through the nozzle and the turbine will stop because the reduction in pressure in the chamber and passage D⁶ down to exhaust will cause the pressure of steam in the passage D¹ to move the stop valve toward the left as shown in Figure 4 to or toward a position where the outer end of the valve at F will close the passage D² and completely cut off the steam. No matter what is done to the steam line all steam which passes through will immediately owing to the unbalanced condition of the stop valve cause that valve even though the spring may not return it when steam is off, to the starting position to shut off the steam before it reaches the governor. The only way the operator can start the turbine then is to take off the cover and screw a new capsule in and when he does this, since the governor mechanism is there at his hand, he will also make the proper adjustment because he knows it is easy to do this and if he does not do it the same thing will happen over again and he will have to put a new capsule in. This makes it impossible for an operator to operate a turbine with a dangerously improper adjustment as might be the case if it were possible to continue operation at excessive speeds.

It will be noted that the purpose of the arm opposed to the cutter blade carrying arm is merely to provide means for locking the stop member in position on the governor cap to balance the parts and to make it possible to easily assemble the device. For assembling the spring is put in the plunger and cutter bar is put in, dropped down to the bottom of the working arm and then threaded on the shaft. After that the set screw is put in place and the parts are in proper assembled position.

I claim:

1. The combination with a fluid turbine of a throttle valve, a speed governor adapted to control it, a motive fluid line controlled by the valve, a housing for the governor, a capsule communicating with the motive fluid line which furnishes the motive fluid to the motor located within the housing and means associated with the turbine for rupturing the capsule when a predetermined speed has been reached.

2. In combination with a steam turbine, a steam line, a governor throttle valve therefor, a stop valve in the steam line comprising a balanced piston, a housing for the governor, a capsule communicating with one side of the balanced valve and subject to the steam pressure, means associated with the turbine for rupturing the capsule when a predetermined speed has been reached, the capsule being renewable only by opening the governor containing housing.

Signed at Chicago, county of Cook and State of Illinois, this 5th day of October, 1927.

CHARLES W. DAKE.