

April 24, 1928.

1,667,081

J. C. RAPER

METALLIC ROLLING SHUTTER

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2 Sheets-Sheet 1

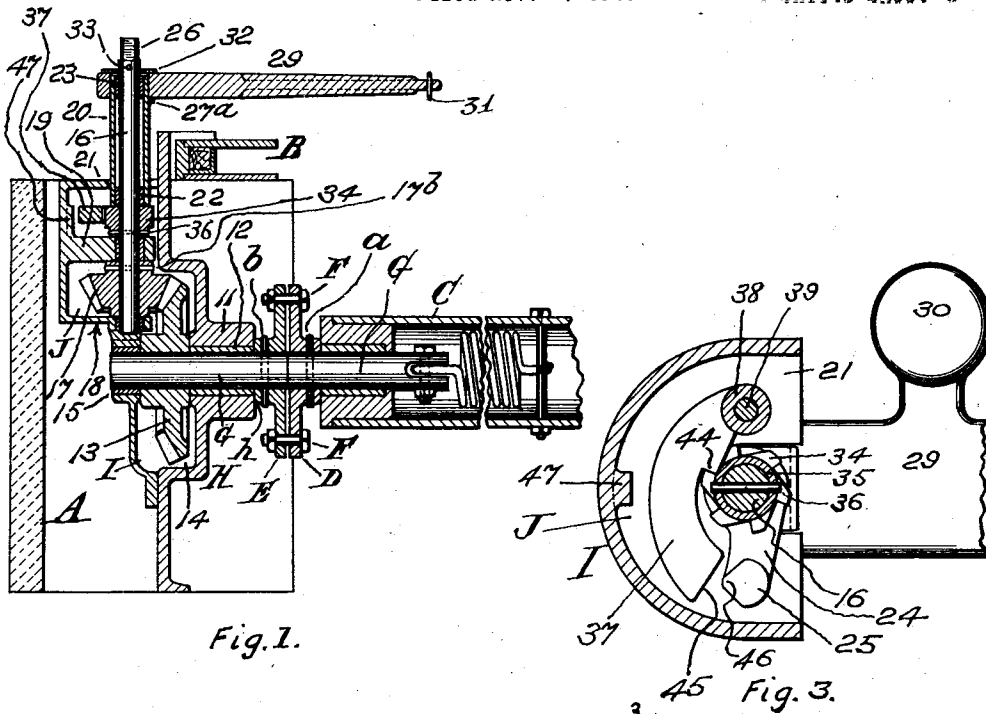


Fig. 1.

Fig. 3.

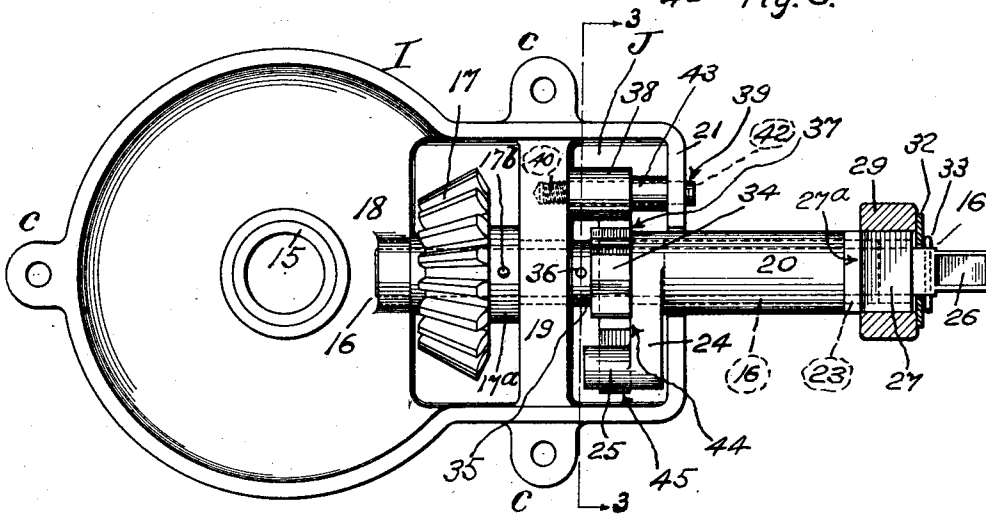


Fig. 2.

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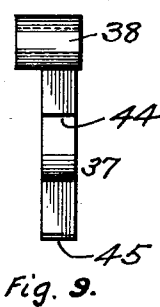
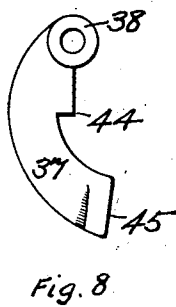
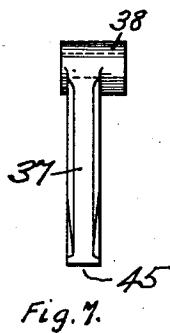
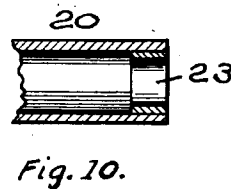
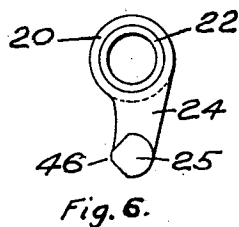
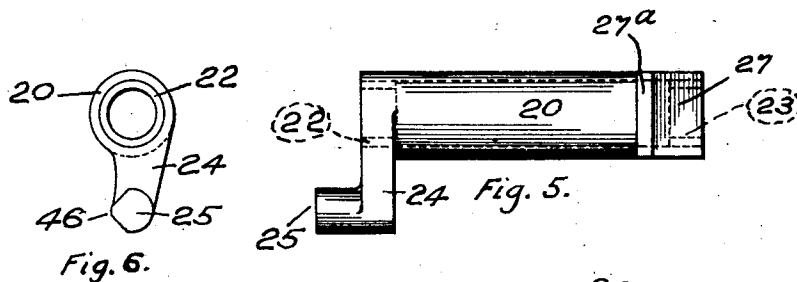
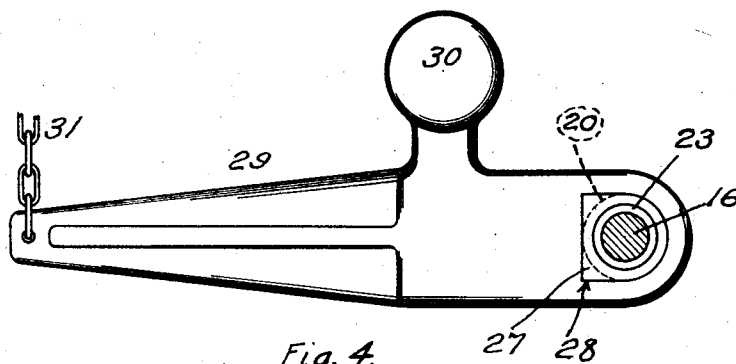
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METALLIC ROLLING SHUTTER

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

JOSEPH C. RAPER, OF COVINGTON, KENTUCKY.

METALLIC ROLLING SHUTTER.

Application filed November 4, 1926. Serial No. 146,271.

This invention relates to metallic rolling shutters, and, more particularly, to the release or trip devices used in connection with metallic, self-winding and spring-controlled, rolling fire doors or shutters for buildings, whereby any undue increase in temperature in the building to a fire-danger stage serves to dissolve or actuate thermostatic-inserts that normally hold together the release-mechanism that comes into action and operates automatically when the said thermostatic-inserts become actuated and the weight of the said fire doors or shutters causes them to then instantly drop into closing-position in the doorway or other opening they are provided to protect.

The so-called "Kicker" release or trip device herein is one of very material simplicity and accuracy or certainty in structure and action, and its details will be fully hereinafter described in connection with the accompanying several sheets of drawings, in which—

Figure 1 is a horizontal axial-section of the self-winding roller and automatic-release devices showing the spring-roller broken off and with my invention herein in its normal state, ready for emergency action; Fig. 2, an inside elevation of my release device, along the parting of the sectional casing or shell thereof, the inner mounting end of the trip weight carrier arm being shown in section on the outer end of the transverse release-shaft; Fig. 3, a sectional elevation of my improved automatic-release device, taken on the dotted line 3, 3, of Fig. 2 and including a broken-off portion of the aforesaid trip weight carrier arm; Fig. 4, a longitudinal elevation of the aforesaid trip weight-carrier arm, showing its mounting-shaft in cross section and with a short length of the chain of the release devices used in supporting the said weight arm, awaiting any undue heat actuating a thermostatic insert in said chain and severing or parting the latter for the instant dropping of the weight-arm and the accompanying or consequent release of the spring-roller for the simultaneous dropping of the fire door or shutter into closing protective position; Fig. 5, a longitudinal elevation of the trip carrier-sleeve on whose outer end the said weight-arm is to be mounted for use; Fig. 6, a left-hand end view of Fig. 5; Fig. 7, a rear-edge elevation of the gravitating pawl used in connection with and forming a com-

ponent part of my improved automatic-release device herein; Fig. 8, a side elevation of the said pawl seen in Fig. 7; Fig. 9, a fore-edge view of said pawl; and Fig. 10, a fragmentary longitudinal section of the right-hand end of the carrier-sleeve that is seen in Fig. 5, (located above it).

In the sectional plan, seen in Fig. 1, I have but incidentally shown the side wall A and the runway B for one of the opposite ends of the duly connected slatted members of the fire-door, the latter not being deemed necessary to display herein. In this view (Fig. 1) I also show an improved or quite universal form of self-winding and spring-controlled roller-mechanism C that has at its left-hand end a hubbed coupler-disk D adapted for co-engagement with a like hubbed coupler-disk E by means of the connecting-bolts F. A two-part shaft G extends outwardly from the left end of the said roller, beyond the coupler-disk E, and pins *a* and *b* are respectively used in the hubs of the disks D and E for fastening them on the said shaft G and thus uniting the two parts of the latter in proper aligned relation.

H indicates, taken as a whole, a casing or housing that has a hub-member 11 bushed at 12 on the outer member or section of the said shaft G and in contact with the outer end of the hub *h* on the disk E.

A bevel gear 13 is mounted on the said outer member of said two-part shaft G within the expanded chamber-portion 14 of the hub-member 11, and the extreme outer end of the said shaft G is mounted in a bushed part 15 of an irregularly formed plate I that extends rearwardly to form a casing or chamber J for accommodating an auxiliary, horizontal, lateral shaft 16 on whose outer end is mounted a bevel pinion 17 that is of lesser diameter than that of the said companion gear 13 with which it meshes for use in winding the spring-roller and controlling the same. The said pinion 17 has a hub 17^a and a pin 17^b for securing it on the said auxiliary shaft 16.

Orificed lugs or ears *c*, *c*, *c*, are provided on the plate I for the reception of the bolts or screws (not shown) used in fastening the so-called "Kicker" devices herein on the roller-shutter box or casing for instant emergency use in the event of threatened dangerous fire in the premises where the shutter is located.

The inner end of the said auxiliary shaft 16 is bushed in the near wall 18 of the chamber J, and it is also bushed in a middle partition 19 located in said chamber J. The outer end of the lateral auxiliary shaft 16 extends through a sleeve 20 beyond the far wall 21 of said chamber J, suitable bushes or bearing-inserts 22 and 23 being provided in the opposite ends of the sleeve for reducing the friction and unnecessary thickness of the said auxiliary shaft in the surrounding sleeve and, otherwise, further providing for the free and easy, independent rocking movement of the sleeve that carries at its inner end a so-called "Kicker" arm 24, the latter having a lateral striking or thrusting crank arm or lug 25, as best seen in Figs. 2, 3 and 5.

The extreme end 26 of said outer end of the shaft 16 is square in cross-section for the convenient use of a hand-crank in turning the shaft forward when winding the spring-roller through the medium of the gears 13 and 17.

The outer end of the sleeve 20 is flat-faced at 27 and adjacently shouldered at 27^a for the rigid stop reception of the single square walled orifice 28 at the inner end of the arm 29 that carries a weight 30 on its upper edge, as best seen in Figs. 2, 3 and 4.

A section of chain 31, ordinarily used in the automatic-release devices of fire-shutters, is shown in Fig. 4 at the outer end of the said weight-arm 29. A washer 32 and cotter-pin 33 are used in the said outer end of the shaft 16 to hold the weight-arm 29 in removable place thereon, as best seen in Figs. 1 and 2.

A ratchet-wheel 34 that has a hub 35 is mounted on the auxiliary shaft 16 and secured in place by means of a pin 36, as best seen in Figs. 2 and 3, with one face in contact with the inner "Kicker" end of the sleeve 20 and with the end of the hub 35 in contact with the slightly projecting end of the bushing in the partition 19 of the chamber J to reduce friction as much as possible and still avoid undue looseness or play on the ratchet part of the auxiliary shaft 16, and, also, to maintain or preserve the proper alignment of the said ratchet for accurate and dependable duty in connection with a swinging pawl 37 whose mounting-hub 38 has a free gravitating bearing on the pin 39, the latter being in the nature of a short shaft that has a threaded inner end 40 for removable-mounting in the said partition 19 and the outer wall 41, and the outer end of such short shaft or screw-pin 39 protruding slightly beyond said wall 21 for ready insertion of a screw-driver in a cross-slot (dotted at 42 in Fig. 2) when the pin 39 is to be inserted or removed. A spacer-tubing 43 is provided on the screw-pin 39 for preventing endwise-play of the swinging-pawl hub 38 and to thereby preserve

or maintain the proper alignment of the said pawl 38 in due operative relation to the ratchet 34 and the crank-arm 25 of the said "Kicker" arm 24, all as best seen in Fig. 2.

The pawl 38 has a shoulder 44 in its inner edge for the successive engagement of the teeth of the ratchet 34, and the lower flat end 45 of the said pawl is of ample area to receive any and all of the thrusts of the tapered end 46 of the crank-arm 25 of the so-called "Kicker" 24 when the release devices are brought into action by the automatic severing of the thermostatic chain element 31, occasioned by undue heat conditions.

The outer edge of the pawl 38 is convex-rounded and thus well adapted to impinge or strike against the short rib or lug 47 that projects from the inner face of the wall I of chamber J and thereby forms a back-stop to limit the rearward movement or play of the said pawl away from the zoning edge of the circular path of the teeth of the ratchet 34 when the "Kicker" has depressed the said pawl on the severing of the chain 31 in the reverse movement of the said ratchet in the then intended protective use or emergency service of the roller shutter herein.

It will be observed that the pawl 38 is in normal active engagement with the ratchet 34 when the shutter is in wound condition on the spring-roller and that when the chain 31 has become severed or parted, by the automatic thermostatic action of undue heat on its fusible link or links, the gravitating heft of the rocker weight-arm 29, at the outer end of the rock-sleeve 20, instantly and simultaneously causes the so-called "Kicker" at the inner end of the rock-sleeve 20 to advance toward the lower flat end 45 of the pawl 38 and strike with a sharp and decisive blow or thrust, whereby the pawl is simultaneously released from holding or detaining engagement with the ratchet 34 and the consequent simultaneous automatic-release of the auxiliary shaft 16 whose pinion 17 engaged with the gear 13 has normally held the spring roller and the shutter in regular duly wound condition preparatory to said undue heat controlling and abnormal conditions necessitating the dropping of the roller-shutter in the opening it is designed to close and protect against damaging fire communication. Thus, the independent action of the said so-called "Kicker" sleeve and crank arm in relation to the auxiliary shaft 16, that is concentrically encased by the said sleeve, assures the positive unhindered working of the said "Kicker" in connection with the retarding pawl 38 for effecting the instant dropping of the shutter from its wound place on the spring roller the instant when danger threatens. The said pawl rides free from contact with the ratchet-teeth when the said "Kicker" is in active advance

position under the heft of the chain-released weight arm 29 and rests in firm contact with the lug 47 in the rear of chamber J, and thus the shutter is free to drop into closing position in the opening or passage-way to be protected, fully and amply, by its presence.

I claim:

1. In a device of the character described, the combination with a spring-wound shutter-roller having a longitudinally-aligned central axis or shaft, a release-mechanism box or receptacle in which said shafts is journaled, a transverse auxiliary shaft having miter gear connection with said roller shaft in said receptacle, a ratchet wheel mounted to turn with said auxiliary shaft, in said receptacle, a rock sleeve concentrically mounted on the said auxiliary shaft and extending beyond the said receptacle, a strike-arm at the inner end of said rock sleeve and vertically below the said ratchet wheel, a swinging or gravitating pawl mounted on a shaft that lies parallel to said auxiliary shaft in the receptacle and with said pawl suspended in alignment with said strike-arm, a weighted arm extending from the outer end of said rock-sleeve and adapted to more positively or effectively hold a notched or shouldered part of said pawl in engagement with the respective teeth of said ratchet-wheel as well as to impart striking-heft adapted to cause said strike-arm to impart a quick and decisive blow to said pawl when the release mechanism herein has been brought into action, and a thermostatic frangible chain extending from the outer end of said weighted arm to a roller door or shutter mounting for automatic parting action when dangerous fire heat conditions occur in the opening that is to be closed and protected by said door, substantially as shown and described.

2. In a device of the character described, the combination with a spring-wound shutter-roller having a longitudinally aligned and extended shaft of two disk-connected members, a release-mechanism box or receptacle in which the said shaft is journaled, a transverse auxiliary shaft having miter-gear connection with the said roller-shaft in said receptacle, a ratchet-wheel rigidly mounted on said auxiliary shaft and to turn therewith, a rock-sleeve of larger diameter than said auxiliary shaft on which it is concentrically mounted with bush-bearings intervening and extending outwardly at one end beyond the said receptacle, an arm extending downwardly from the inner end of said rock-sleeve and adjacent the said ratchet-wheel and having a lateral strike arm at its lower end that projects in a line beneath the said ratchet-wheel, a gravitating pawl mounted to freely swing on a short shaft located in said receptacle and parallel to said sleeve and auxiliary shaft and with the said pawl suspended in rear alignment with the said lateral strike arm, a shoulder or notch in the edge of said pawl facing the ratchet-wheel with which the teeth of the latter may successively engage, a weighted arm extending from the outer end of said rock-sleeve, a stop-lug on the inner face of the receptacle for limiting the rear movement of the said pawl, and a frangible thermostatic-controlled chain adapted to connect the outer end of said weighted arm with a roller-shutter mounting device in the opening or doorway to be protected by the shutter in fire emergency, substantially as shown and described.

In testimony whereof I have hereunto affixed my signature.

JOSEPH C. RAPER.