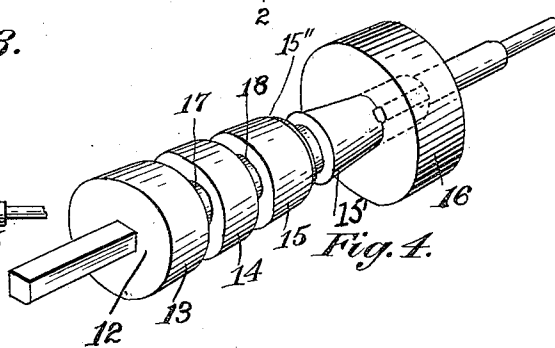
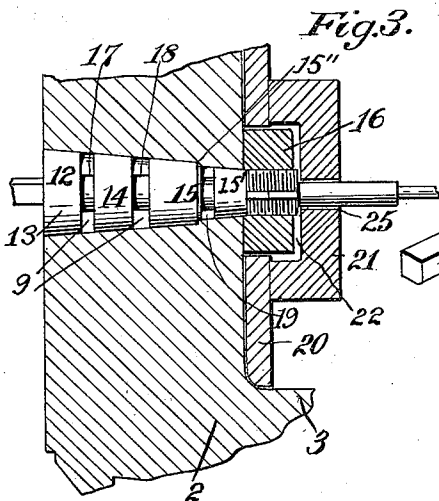
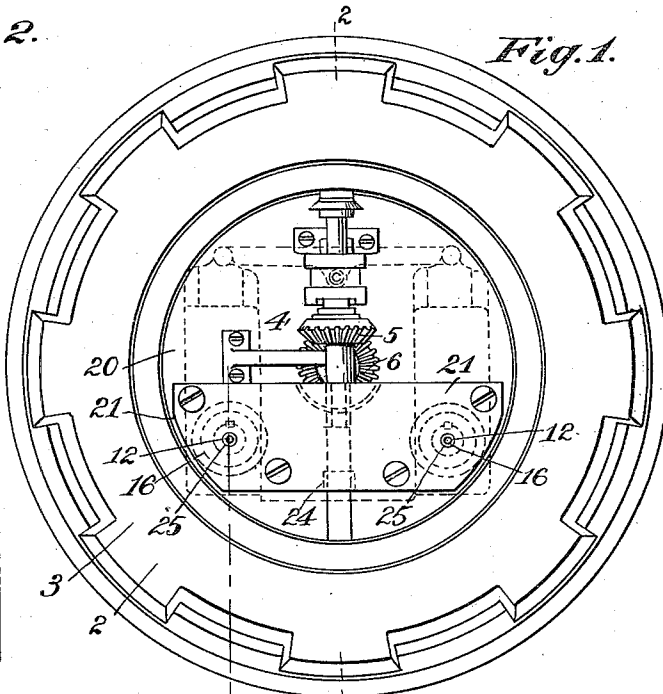
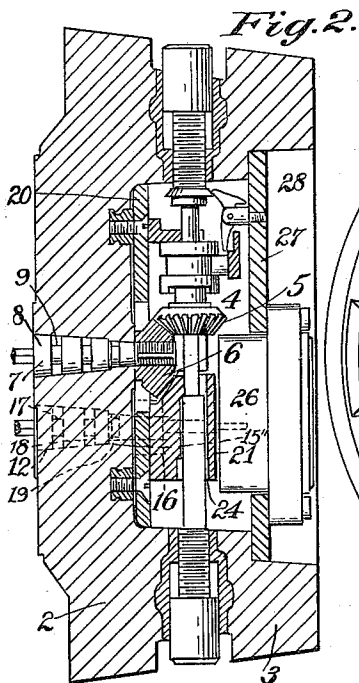


S. W. FISH.
SAFE OR VAULT DOOR.
APPLICATION FILED DEC. 7, 1909.

997,794.

Patented July 11, 1911.



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SAFE OR VAULT DOOR.

997,794.

Specification of Letters Patent. Patented July 11, 1911.

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To all whom it may concern:

Be it known that I, SAMUEL W. FISH, a citizen of the United States, residing at Plainfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Safe or Vault Doors, of which the following is a specification.

This invention relates to safe or vault doors, an object of the invention being to provide means that will make it impossible to retract the locking bolts on a rotary-lug-door safe provided with spindles for combination locks and bolting mechanism should a spindle be removed.

A further object of the invention is the provision of an improved door spindle.

It is reasonable to assume that since the door holding lugs shown herein are so strong that there remains no possibility of the safe door, when locked, ever being forced out by explosives, the next point to which a burglar would direct an attack would be the means for locking the door against rotation, and since nothing can be gained by detaching the entire locking and bolt-operating mechanisms by heavy continuous explosives on the outside, as the door is lug locked, the attack would naturally be directed to one of the combination-lock spindles with the idea of getting the spindle out by pulling it through the locking nut on the inner end without disarranging the rest of the bolting mechanism, and then with a proper tool inserted through the spindle hole to drive off the combination lock, and as the sliding clutch, which makes and breaks the connection between the bolting spindles and locking bolts on the operation of the combination locks, would then be free to slide into engagement with the clutch on the face of the gear if the safe were turned on its side, (if other mechanism was not disarranged or mutilated), the bolts could then be retracted and the safe door rotated and opened. While it is believed that it is impossible to gain access to the interior of the safe in this way, still of course the weakest point of the spindle is not ordinarily outside of the shoulder thereof, but inside of it. To strengthen the ta-

pered spindle usually used would mean the making of a spindle of larger diameter, which for various reasons is not desirable.

In the imaginary case outlined above, to gain access to the safe I have assumed that the spindle would come out and leave a clear opening in the door that would allow a burglar to drive off the combination lock without interfering with the rest of the mechanism, and in fact to be successful this mechanism must be kept in working order, so that after the lock was off and the clutch engaged the mechanism, being in working order, could be operated by the crank on the bolting spindle and the bolts be retracted.

Therefore, the object of this invention is to provide means that will guarantee the disarrangement of the bolting mechanism if a spindle is ever taken out or driven in by force.

As the end of the old style spindle from the shoulder to the outer face of the door was larger than the nut end, and therefore stronger, if a fracture occurred during prolonged attack, it is reasonable to suppose that the weaker would give and the spindle come out, either by stripping the threads or being stretched by repeated explosives under the shoulder so as to reduce its diameter in the nut and pull it through the nut. It is to overcome the possibility of pulling the spindle out of the spindle hole completely and allowing a clear hole through the door that this improved spindle is devised.

In the drawings accompanying and forming part of this specification, Figure 1 is a rear view of a safe door; Fig. 2 is a cross-sectional view taken in line 2-2, Fig. 1; Fig. 3 is a detail sectional view of a part of the door, with one of the spindles in position; and Fig. 4 is a perspective view of one of these improved spindles.

Similar characters of reference indicate corresponding parts throughout the figures of the drawings.

In practice any desired number of spindles may be used, as found desirable. In the present instance, however, three are shown, in view of the fact that two combination locks are used, one of these spindles

controlling the bolting mechanism and two the combination locks.

The door, which is shown made up of a body 2 and a rearwardly extending flange 3 of the usual construction, is provided with some suitable bolting mechanism 4, which in the present instance is shown operated by means of a bevel gear 5 in mesh with a bevel gear 6 secured to the inner end of one of the spindles 7 and which bevel gear 6 is keyed on such end to prevent the rotation thereof independently of the spindle, the inner end of the spindle being threaded for the reception of such bevel gear. As stated, to increase the strength of the tapered spindles heretofore used would necessitate increasing the diameter thereof, and this of course would require a larger opening through the body of the door, which is not desirable. Therefore, in order to increase the resisting effectiveness of the spindle, I have made it at certain parts weaker, and for this purpose each of the spindles, two for the combination locks and one for the bolting mechanism, is grooved or cut away at certain parts thereof, so that each spindle is made up of a series of sections, enlargements or heads 8 separated from each other by weakened portions or necks 9. In the present instance each spindle comprises a series of these sections or heads, shown as four in number, connected with each other by parts of smaller diameter, these heads being tapered to form a tight joint surface with the tapered wall of the spindle opening. The bevel gear on the inner end of the bolting spindle constitutes the holding means to prevent its withdrawal. The portion of the spindle carrying the gear is materially stronger than the decreased portions 9 between the heads or sections and also materially stronger than the next adjacent neck of the spindle.

For holding the spindle and preventing the withdrawal of each of the combination-lock spindles 12, each of which is also provided with four sections or heads 13, 14, 15 and 15', the inner end portion of the spindle is formed and threaded in the same manner that the inner end of the bolting spindle 7 is formed and threaded, and on this threaded end is secured a nut 16 which is also keyed on the spindle to prevent turning thereof, the connection between this nut and the inner end portion of the spindle being materially stronger than the decreased portions 17, 18 and 19 of the spindle, as this inner end portion is enlarged as compared with the smaller or weakened portions of the spindle and will in practice be of substantially the same diameter at least as that of one or a portion of one, of such enlarged portions or sections of the spindle. Between the two inner portions of the spindle a shoulder 15'' is formed so as to prevent the tapered formation of the spindle interfering with the free

turning of the spindle. Secured to the inner face or wall of the body of the door is a suitable supporting plate 20, and secured to this plate, either by means of bolts as in the present instance or integral therewith, as may be preferred, is a bridge or guard plate 21 which has chambers or recesses 22 therein fitting over the nuts on the combination lock spindles and also partly overlapping the bevel gear of the bolting spindle, and through this plate an opening 24 is provided for the passage of the shanks of the locking bolts, which in the present instance are shown as rotary bolts, for securing the door in the jamb seat. Each combination-lock spindle has its inner end projecting through an opening 25 and into engagement with the combination lock 26 secured to a plate 27 carried in the chamber 28 formed by the flange of the door. Thus it will be observed that by forming a groove at the point 19 of the spindle this point will be weaker than the threaded end in the nut 16, thus insuring in any case the nut remaining on the inner end of the spindle and a portion of the inner tapered part of the spindle remaining in the nut. By forming the grooves 17 and 18 at the points shown, the opening of the joint back to the shoulder 15'' by peening on one side of such joint is prevented. As the spindle is made in sections, the groove stops the door metal from flowing when the spindle is peened to one side to get into the opening, the spindle only forcing the metal over that is in contact with the first section.

If it were possible to get an opening between the side of the first section and the door, and explosives were run in and then fired, the result would no doubt be the blowing out of the first section 13 and forcing the next section 14 so tightly into the door that it would not be possible to get more liquid explosive between the door and the side of this section into the chamber made by the groove 18. Then again, the section is so far from the exterior face of the door that an opening can no longer be forced by flowing the metal to one side with a hammer. But, supposing it is possible to get explosives past the second section 14 and into the groove 18 and exploded, the result would be to break off the second section 14 and merely drive the third section 15 tighter into the door. Then again, supposing it is possible, after the first two sections 13 and 14 are out, to get explosives in past the shoulder 15'' and into the chamber formed by the groove 19 and there exploded, the result would be simply to blow off the remaining outer section 15, so that the tapered portion 15' remaining would be jammed securely in its hole, perhaps forced inwardly slightly. Thus far the mechanism inside of the door we assume is uninjured and in working condition. There only remains one

thing that can now be done with the stub of the broken off spindle, and that is to drive this remaining portion of it in, as it cannot be taken out on account of not having anything left to pull on. The burglar, therefore, decides to drive it in, and he drives off the combination lock at the same time. It is at this point that the bridge block or guard 21 becomes effective. This block is, as stated, over the inner end of the combination spindles and covers the nuts which engage the inner wall of the door body, so that as the remaining part of the spindle projecting into the body of the door from the nut is forced into the door, the nut forces the end of the bridge block or guard inwardly, taking with it the inner end of the locking bolts, the back plate and locks, and in fact all the mechanism but the bolting spindle gear, and thus disconnecting or unmeshing the bevel gears between the spindle and the bolts and thereby preventing the turning of the bolts by means of the bolt turning spindle 7, since the pushing in of this guard block 21 would carry the bevel gear located on the bolt shanks away from the bevel gear located on the bolt-operating spindle and so prevent any possible manipulation of the bolts which secure the door in the jamb. This guard 21 also prevents the possible slippage of the keys from the nuts on the combination-lock spindles. This guard 21 could also be so constructed, if desired, as to prevent the slippage of the key from the bolt-operating spindle.

The inner groove 19 is placed as near the exterior face of the door as the shoulder 15" will permit, to insure complete disarrangement of the interior mechanism before the spindle leaves the hole. Thus, it can readily be seen that it is not possible to get a spindle out without driving a portion of it in, and that if any of it is driven in the mechanism is so disarranged that the gears will not mesh, and if the spindle is driven in so that there is a clear hole through the door the whole mechanism will be forced from the door, thus leaving the locking bolts which lock the door against rotation screwed out and their inner ends bent to such an extent that the bolts cannot be revolved as the bent ends would strike the inner face of the door. Thus, it will be observed, that by weakening instead of strengthening certain portions of the spindle I am able to materially increase the resisting effectiveness thereof, while at the same time materially prolonging the time required by a burglar in any attempt to remove or withdraw the spindles; and not only this, but by reason of the present improvement the continuous tampering with the spindles would simply render it impossible to operate the bolts by the bolting spindle, so that even should the spindle be removed the opening of the safe would still

be impossible, for even though nitro-glycerine was then inserted through the spindles it would run down into the interior of the safe, where it would be difficult to explode; and not only that, but it would injure and mutilate the contents, and it is well known that a burglar will not take mutilated contents because of the risk of discovery.

I claim as my invention:

1. A safe or vault door having a tapered spindle opening therethrough and a tapered spindle having a plurality of separated portions and intermediate thereof a weakened portion located wholly within the metal of the door, the inner portion of such spindle constructed to receive spindle holding means and having greater resisting strength than such weakened portion.

2. A safe or vault door having a tapered spindle opening therethrough and a tapered spindle located therein and having a plurality of enlarged portions and intermediate thereof a weakened portion located wholly within the metal of the door and having at its inner end a portion of substantially the same diameter at least as that of one of such enlarged portions, and spindle holding means carried by said portion whereby the inner end of the spindle is of greater strength than the weakened portion thereof.

3. A safe or vault door having a tapered spindle opening therethrough and a tapered spindle having a plurality of enlarged portions and one or more weakened portions therebetween located wholly within the metal of the door, and means carried adjacent to the inner end of the spindle for preventing the withdrawal of the spindle and having greater strength than any of such weakened portions.

4. A safe or vault door having a tapered spindle opening therethrough and a spindle therein having a plurality of tapered sections spaced apart by a plurality of weakened portions located wholly within the metal of the door, said spindle having a portion adjacent to its inner end of substantially the same diameter at least as that of the smallest tapered portion of the spindle for the reception of holding means whereby the inner end of the spindle is of greater strength than the weakened portions thereby to prevent the withdrawal of the spindle.

5. A safe or vault door having a tapered spindle opening therethrough and a tapered spindle therein having a plurality of enlarged portions and one or more weakened portions therebetween located wholly within the metal of the door, said spindle having a threaded portion adjacent to its inner end and threaded means secured thereon whereby by reason of the threaded portion the inner end of the spindle has greater resisting effectiveness than the weakened portion or portions of such spindle.

6. A tapered spindle for safe or vault doors, having a series of three spaced apart sections, one having a shoulder, and intermediate thereof weakened portions, and having
5 a threaded portion at its end of substantially the same diameter at least as that of the smallest tapered section of the spindle whereby it is of greater strength than the weakened portions.

10 7. A tapered spindle for safe or vault doors, having a plurality of enlarged portions and intermediate thereof one or more weakened portions and having a portion at its inner end for the reception of spindle
15 holding means, said portion having substantially the same diameter at least as that of one of such enlarged portions.

8. A tapered spindle for safe or vault doors, having a plurality of enlarged portions and intermediate thereof one or more
20 weakened portions and having a threaded portion at its inner end of substantially the same diameter at least as that of the smallest enlarged portion of the spindle.

25 9. A tapered spindle for safe or vault doors, having a plurality of enlarged portions one having a shoulder, and intermediate such enlarged portions a weakened portion, and having at its end a threaded
30 portion.

10. A tapered spindle for safe or vault doors, having a plurality of enlarged portions connected together by one or more
35 integral portions of less diameter than such enlarged portions and having at its inner end a threaded portion of substantially the same diameter at least as that of one of such enlarged portions, a threaded device thereon and a key for securing said device on the
40 threaded end of the spindle.

11. A safe or vault door having a tapered spindle opening therethrough, a spindle located therein and provided with tapered sections spaced apart and secured together by
45 one or more portions of less diameter than such sections and located wholly within the metal of the door, and means carried by the inner end of the spindle for preventing the withdrawal of the spindle and having in
50 conjunction with the inner end of such spindle increased strength as compared with the portion or portions of small diameter between the sections.

12. A safe or vault door having a tapered
55 spindle opening therethrough, a spindle located therein and provided with tapered sections spaced apart and secured together by one or more portions of less diameter than such sections and located wholly within the metal of the door, and means carried
60 by the inner end of the spindle for preventing the withdrawal of the spindle and having in conjunction with the inner end of such spindle increased strength as compared with
65 the portion or portions of small diameter

between the sections, said means comprising an integral threaded portion on the spindle and a threaded device located thereon.

13. A safe or vault door having a body provided with a tapered spindle opening
70 therethrough, bolting mechanism carried by the door, a block secured to the door and through which the shanks of the bolts of the bolting mechanism pass, a tapered spindle located within the spindle opening and hav-
75 ing one or more enlargements, and means for preventing the withdrawal of the spindle and of increased strength as compared with parts of the spindle.

14. A safe or vault door having a body
80 provided with a tapered spindle opening therethrough, bolting mechanism carried by the door, a block secured to the door and through which the shanks of the bolts of the bolting mechanism pass, a tapered spindle
85 located within the spindle opening and having one or more enlargements, and means for preventing the withdrawal of the spindle and of increased strength as compared with parts of the spindle, said spindle also pass-
90 ing through said block.

15. A safe or vault door having a tapered spindle opening therethrough, a tapered spindle located in said opening and having
95 one or more weakened portions, means for preventing the withdrawal of said spindle, said means having greater resisting effectiveness than the weakened portion of said spindle, bolting mechanism carried by the door, and means in juxtaposition to said
100 bolting mechanism and operative to dislocate the door locking mechanism on the forcing inward of the spindle.

16. A safe or vault door having a tapered spindle opening therethrough, a tapered and
105 weakened spindle located in said opening, means for preventing the withdrawal of said spindle, bolting mechanism carried by the door, and means in position to render inoperative the bolting mechanism on the forcing
110 inward of the spindle and into which a part of the bolting mechanism extends.

17. A safe or vault door having means for holding it within its jamb, a tapered and
115 weakened spindle projecting through the door, and means cooperating with the spindle and with the door holding means and into which a part of such door holding means extends and effective to render such door holding means inoperative on the forcing in-
120 ward of the spindle.

18. A safe or vault door having bolting mechanism comprising bolts, a gear encircling one of said bolts, a spindle carried
125 by the door and having a gear in mesh with the bolt gear, means secured to the door and in juxtaposition to the bolting mechanism for disengaging said gears, a spindle carried by the door, and means secured thereto for preventing the withdrawal thereof and in jux-
130

taposition to the means for disengaging the gears so that the forcing in of the last mentioned spindle will effect disengagement of the gears.

5 19. A safe or vault door having bolting mechanism comprising bolts, a gear encircling one of said bolts, a spindle carried by the door and having a gear in mesh with the bolt gear, means secured to the door and
10 in juxtaposition to the bolting mechanism for disengaging said gears, a spindle carried by the door, and means secured thereto for preventing the withdrawal thereof and in juxtaposition to the means for disengaging
15 the gears so that the forcing in of the last mentioned spindle will effect disengagement of the gears, each of said spindles having a weakened portion.

20 20. A safe or vault door having bolting mechanism comprising bolts, a gear encircling one of said bolts, a spindle carried by the door and having a gear in mesh with the bolt gear, means secured to the door and in juxtaposition to the bolting mechanism
25 for disengaging said gears, a spindle carried by the door, and means secured thereto for preventing the withdrawal thereof and in juxtaposition to the means for disengaging the gears so that the forcing in of the last
30 mentioned spindle will effect disengagement of the gears, each of said spindles having a plurality of portions of increased strength as compared with other portions thereof.

35 21. A safe or vault door having a plurality of tapered spindle openings therethrough, bolting mechanism comprising bolts carried by the door, a bevel gear encircling one of the bolts, tapered spindles located in said spindle openings, operating
40 mechanism connecting one of said spindles with the bolts, a combination lock connected with the other of the spindles, and one or both of said spindles having weakened portions.

45 22. A safe or vault door having a plurality of tapered spindle openings therethrough, bolting mechanism comprising bolts carried by the door, a bevel gear encircling one of the bolts, tapered spindles
50 located in said spindle openings, operating mechanism connecting one of said spindles with the bolts, a combination lock connected with the other of the spindles, each of said spindles having weakened portions, and
55 means secured to said spindles for preventing the withdrawal thereof, said means having increased strength as compared with the weakened portions of the spindles.

60 23. A safe or vault door having a plurality of tapered spindle openings therethrough, bolting mechanism comprising bolts carried by the door, a bevel gear encircling one of the bolts, tapered spindles located in said spindle openings, operating
65 mechanism connecting one of said spindles

with the bolts, a combination lock connected with the other of the spindles, each of said spindles having weakened portions, means secured to said spindles for preventing the withdrawal thereof, said means having in- 70 creased strength as compared with the weakened portions of the spindles, and means in juxtaposition to one of the spindles and effective to dislocate a part of the door locking mechanism on the forcing in of the 75 combination-lock spindle.

24. A safe or vault door having a tapered spindle opening therethrough, bolt mechanism for the door, a gear carried by the bolt mechanism, a spindle located in the spindle 80 opening, a gear on the spindle for engagement with the gear connected with the bolt mechanism, said spindle having a weakened portion, and the connection between said gear and spindle being of increased strength 85 as compared with the weakened portion of the spindle.

25. A safe or vault door having a tapered spindle opening therethrough, bolt mechanism for the door, a bevel gear carried by the bolt mechanism, a spindle located in the spindle opening, a bevel gear on the spindle for engagement with the bevel gear connected with the bolt mechanism, said spindle having a weakened portion, the connection 95 between said bevel gear and spindle being of increased strength as compared with the weakened portions of the spindle, a combination lock carried by the door, and a similarly formed spindle projecting there- 100 through and in engagement with the lock.

26. A safe or vault door having a tapered spindle opening therethrough, bolt mechanism for the door, a bevel gear carried by the bolt mechanism, a spindle located in the spindle opening, a bevel gear on the spindle for engagement with the bevel gear connected with the bolt mechanism, said spindle having weakened portions, the connection 105 between said bevel gear and spindle being of increased strength as compared with the weakened portions of the spindle, a combination lock carried by the door, a similarly formed spindle projecting therethrough and in engagement with the lock, and means for 115 preventing the withdrawal of said last spindle and having increased strength as compared with the weakened portions thereof.

27. A safe or vault door having a tapered spindle opening therethrough, bolt mechanism for the door, a gear carried by the bolt mechanism, a spindle located in the spindle opening, a gear on the spindle for engagement with the gear connected with the bolt mechanism, said spindle having a weakened 120 portion, the connection between said gear and spindle being of increased strength as compared with the weakened portion of the spindle, a combination lock carried by the door, a similarly formed spindle projecting 130

therethrough and in engagement with the
lock, means for preventing the withdrawal
of said last spindle and having increased
strength as compared with the weakened
5 portion thereof, and means carried by the
door and in juxtaposition to the combina-
tion-lock spindle and the bolts and effective

on the forcing in of the combination-lock
spindle to dislocate the gears.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
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