



OCEAN TOMO

全球专利在线竞价交易市场

LOT #180

Improved Vehicle Seat Belt Reel



OCEAN TOMO

BID-ASK™ MARKET

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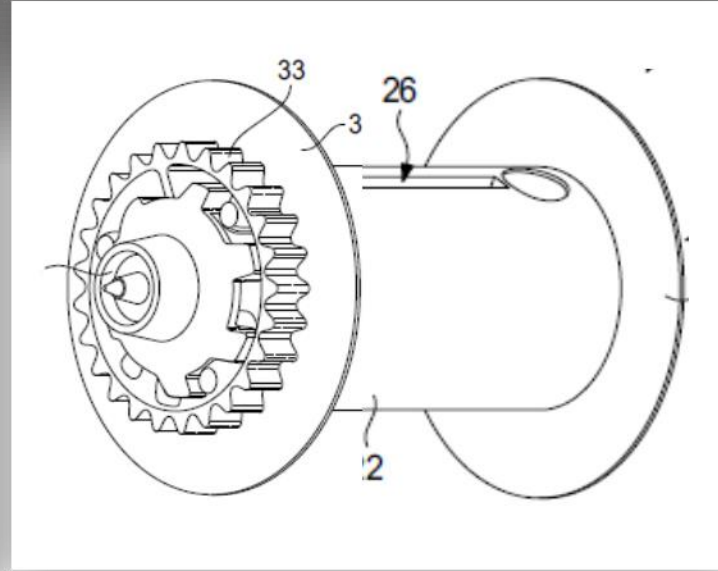
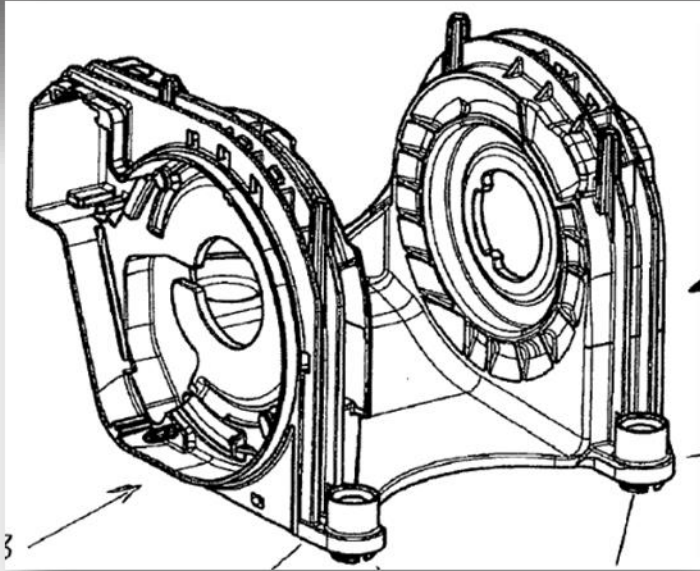
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ADOLF FÖHL GMBH & CO KG

**PATENTS FOR PLASTIC BELT RETRACTOR
FOR SAFETY BELTS**

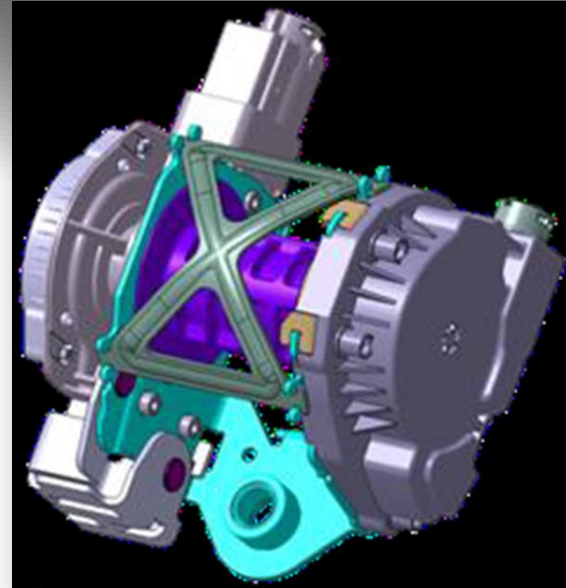
PATENTS FOR PLASTIC BELT RETRACTOR HOUSING AND PLASTIC BELT RETRACTOR REEL (SPOOL)



PLASTIC BELT RETRACTOR FOR SAFETY BELTS

TODAY'S TECHNICAL REALIZATION

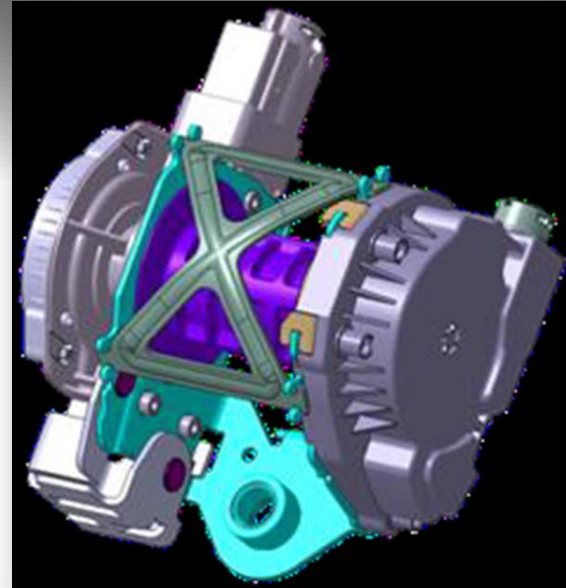
1. Belt retractor housing made of sheet steel as punched bending part
2. Belt retractor reel (spool) made of aluminum as a die-cast part



PLASTIC BELT RETRACTOR FOR SAFETY BELTS

USE IN ALL RESTRAINT SYSTEMS

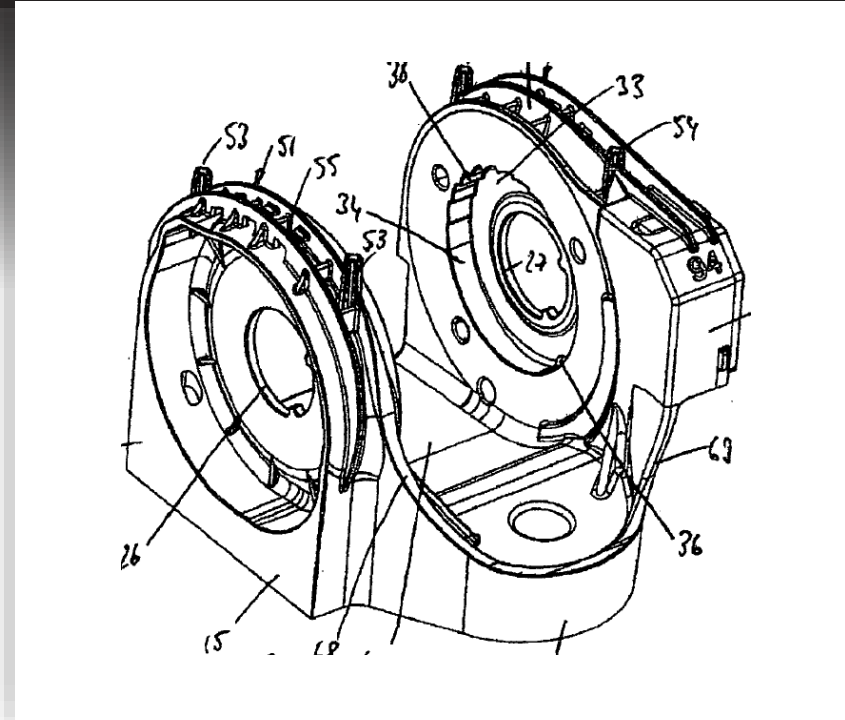
- with and without force limitation
- with and without belt tensioners
- reversible and irreversible systems



PLASTIC BELT RETRACTOR FOR SAFETY BELTS

BELT RETRACTOR HOUSING

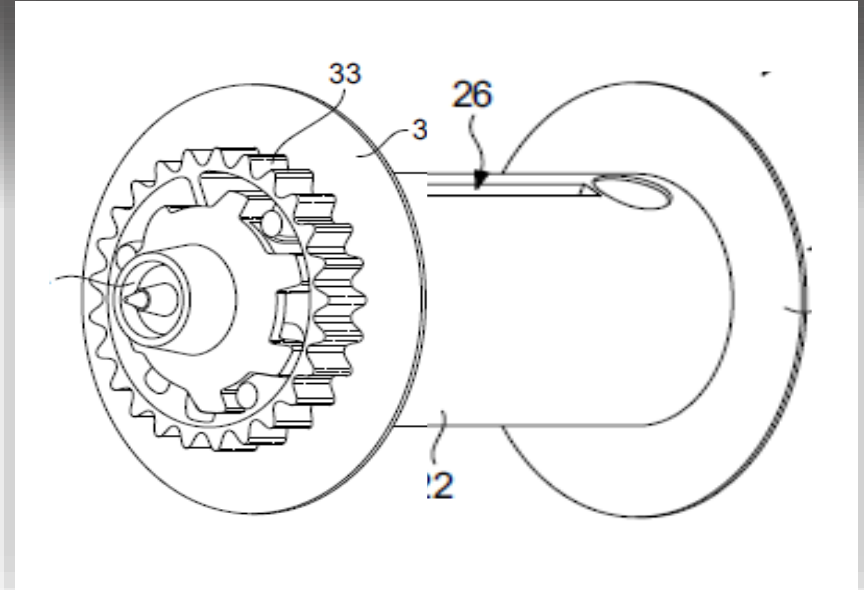
- Belt retractor housing in plastic
- One-piece housing made of glass fiber reinforced plastic
- Plastic injection molded part



PLASTIC BELT RETRACTOR FOR SAFETY BELTS

BELT RETRACTOR REEL (SPOOL)

- Belt retractor reel in plastic
- One-piece reel made of glass fiber reinforced plastic
- Plastic injection molded part



PLASTIC BELT RETRACTOR FOR SAFETY BELTS

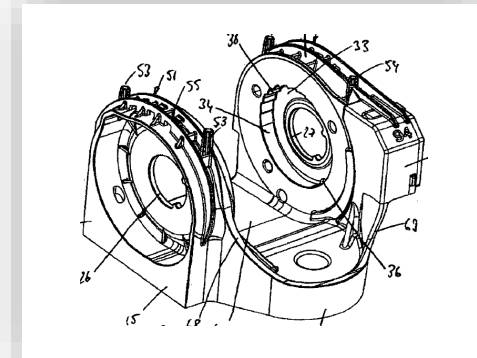
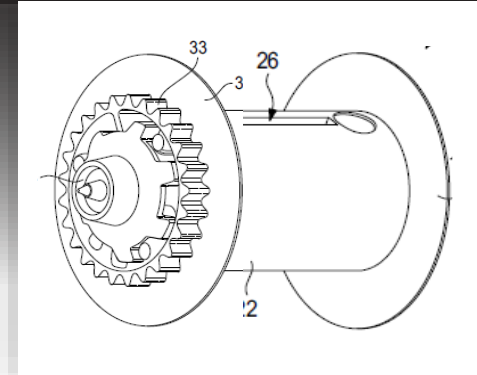
ADVANTAGES

- Coil weight reduction: 0.2 to 0.4 kg
- Cost reduction coil: 1 to 2 €
- Weight reduction housing: 0.5 to 0.7 kg
- Cost reduction housing: 2 to 3 €
- Higher accuracies, smaller tolerances

-> depends on design and material – plastic instead of aluminum or zinc

-> all data related to vehicle with 5 belts

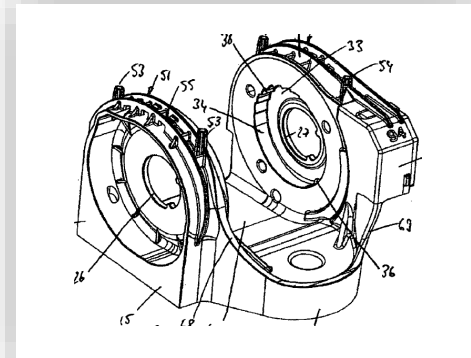
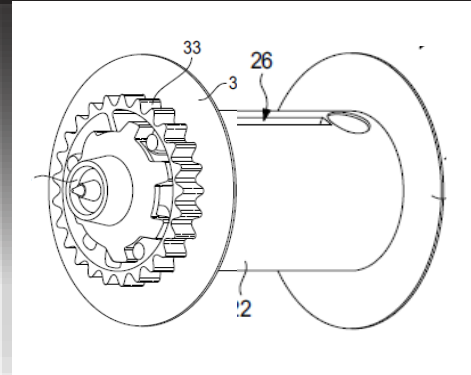
Can be used in all systems (with/without force limitation, reversible/irreversible, with/without tightener)



PLASTIC BELT RETRACTOR FOR SAFETY BELTS

CURRENT STATE:

- Tests and examinations done – see next page
- Patents for belt retractor housing granted for EP (CH, CZ, ES, FR, GB, IT, LI, PL, RO, TR), CN, BR, KR, US, applied in IN
- Patents for belt retractor reel granted for US and CN



ASSEMBLY PLASTIC BELT RETRACTOR

TEST RESULTS – BRIEF OVERVIEW

- One tool for all variations (exchangable insert in tool)
- Significant cost reduction through material selection and production
- optional with free thread

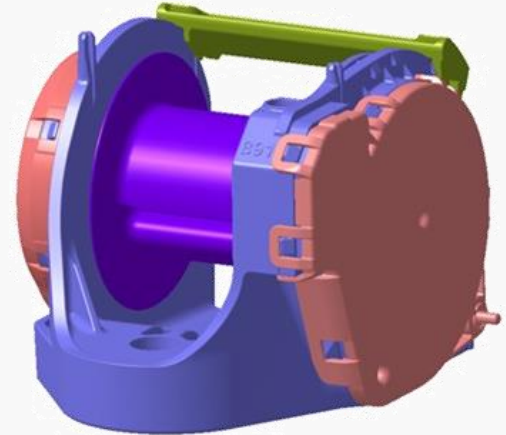
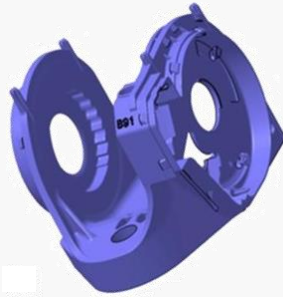
Reel housing

Variation including force limiter



Reel housing

Variation without force limiter



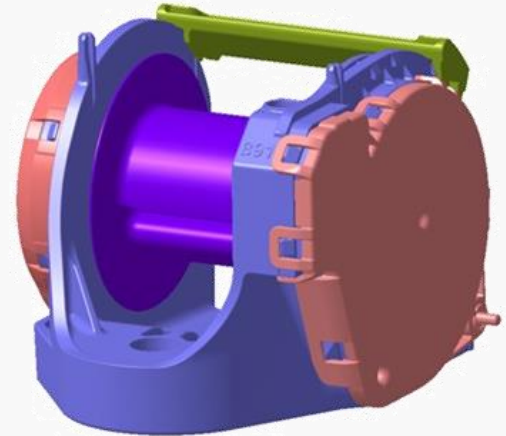
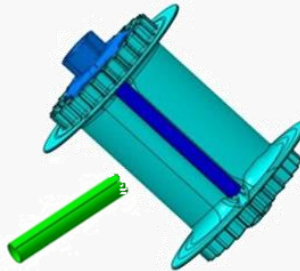
ASSEMBLY PLASTIC BELT RETRACTOR

TEST RESULTS - BRIEF OVERVIEW

Spool assembly
variation without torsion bar



Spool assembly
Variation with torsion bar



TEST RESULTS

SPOOL IN REEL HOUSING

1. including torsion bar - all tests passed

All torsion bars (TB) simplified pressed
(teeth not formed)

- Breaking load, **static** (April 2010):

	pas sed
450 BP* (TB diameter 8)	✓
450 BP (TB diameter 12, milled)	✓
600 BP (TB diameter 10)	✓
Full deduction (TB diameter 8)	✓
Full deduction (TB diameter 12)	✓



- Spool materials used: PA 6 /6.6 with 50%-60% glass fiber content
- after design optimization a further weight reduction of approx. 10-20% seems feasible

*BP – Belt Path in mm

TEST RESULTS

SPOOL IN REEL HOUSING

2. without torsion bar

All torsion bars (TB) simplified pressed (teeth not formed)

- Breaking load, **static** (April 2010):

	pas sed
450 BP 14.5–17 kN	✗
600 BP 14–15.5 kN	✗
800 BP 13.7–14.5 kN	✗
Tensile strength test 0- BP	✗
Full deduction	✓

✗ Toothing sheared



- Spool materials used: PA 6 /6.6 with 50%-60% glass fiber content
- after design optimization a further weight reduction of approx. 10-20% seems feasible

The plastic will generally hold more dynamically than statically, therefore static tests were intensified.

TEST RESULTS

REEL HOUSING

all tests passed, sampling without tool change

- Breaking load, **static** (April 2010):

	pas sed
450 BP (TB diameter 10.5)	✓
Full deduction	✓
1/2 support	✓
also with injected thread (full support)	✓

- Breaking load, **dynamic** (April 2010):

	pas sed
Rt, +85°, -35°	✓
70000 Digits -96°	✓
450 BP (TB diameter 10.5)	✓
Full deduction	✓
UWS	✓
UV resistance	✓



TEST RESULTS

REEL HOUSING

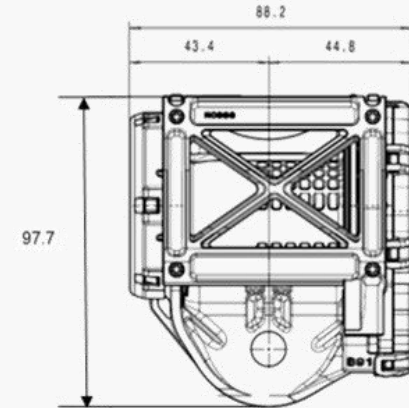
- Materials used: PA 6 /6.6 with 30%, 40%, 50% glass fiber content
- after design optimization 15 kN are also feasible with PP 50% glass fiber content, which would allow a further cost reduction as well as a further weight reduction to approx. 85g
- The plastic will generally hold more dynamically than statical



TEST RESULTS

ASSEMBLY PLASTIC BELT RETRACTOR

- Lock tightener suitability tested
- Roll up tightener suitable tested
- Same parts for specifications AK, ECE with and without torsion bar
- existing know-how about tools, assembly lines, additional features at the inventor's site
- Function known and proven over many years
- stable process, all important dimensions are tool-bound
- lighter and more cost effective than all previous solutions
weight without torsion-bar: 253g
weight including torsion-bar: 280g
→ weight savings compared to previous solutions: 50-100g

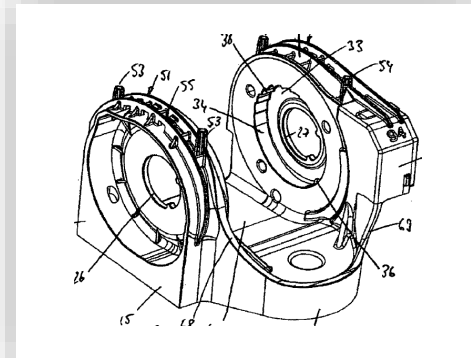
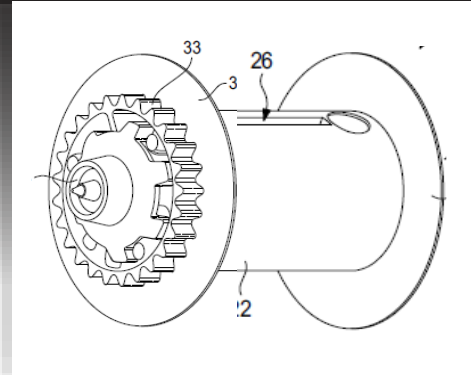


PLASTIC BELT RETRACTOR FOR SAFETY BELTS

MARKET POTENTIAL

- Worldwide demand for approx. 761 million cars
2/3 of which are in China (23.2 m), USA (13.7m) and Europe (11.3m)
- Plus trucks
China (0.8m), USA (0.5m) and Europe (0.3m)
with a CAGR of 10 %

Source: VDA, statistical registration data for 2021/2022



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提交已完成的专利交易信息

SEMICONDUCTOR MANUFACTURING TEST
半导体制造测试

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18 ASSETS 18项资产

OCEAN TOMO BID-ASK™ MARKET
OCEAN TOMO全球专利在线竞价交易市场

TOUR THE MARKET
市场一览

The Ocean Tomo Bid-Ask™ Market (OTBA) was built to further enhance Intellectual Property (IP) liquidity and transaction transparency. OTBA serves a broad community of active buyers and sellers, providing a platform to purchase or sell patents and patent applications globally. This market is supported by Ocean Tomo Transactions and affiliate international voice brokers.

建立OTBA的目的是进一步促进IP资产流通性,提高了IP交易透明度。买卖双方通过 OTBA平台来购买或者出售全球专利权以及专利申请权, Ocean Tomo交易团队和旗下全球经纪人为平台提供线下提供服务支持, 以此建立活跃买卖双方的全球专利交易市场。

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